PREFACE

The Fifth Built Environment conference provided in the wake of the First FIFA World Cup on African soil an international forum for researchers and practitioners from developed, developing and underdeveloped nations to address fundamental problems and constraints that affect the Built Environment. The broad objectives of the conference were:

• To provide a forum for multi-disciplinary interaction between academics and practitioners;
• To provide an internationally recognized, accredited conference for the built environment;
• To disseminate innovative and cutting edge practices, and
• To contribute to the built environment body of knowledge (BEBOK).

The organizers brought together in a single forum researchers, academics, administrators and practitioners representing educational institutions, government agencies, contracting organizations, consulting enterprises, financial institutions, and other construction related organizations. The conference had a broad scope and topics were organized around the conference theme of The Built Environment.

In particular, the conference sought responses to the following critical questions:

• What changes would lead to improvements?
• How can informal technology contribute to improvement?
• What are the barriers to change?
• What economic levers can be used?
• How can informal construction sector and SMME problems be addressed?
• How can education, training, and professional development be improved?
• How can all industry participants be integrated?
• How can communication and management difficulties be addressed?
• How can safety, health, and environment risks be better recognized, understood and avoided?
• How can diversity and exclusivity be promoted?
• How can the regulatory environment be more effective?

These internationally peer reviewed and edited proceedings were aimed at contributing significantly to the body of knowledge relative to the science and practice of construction and the improvement of construction health and safety on sites not only in South Africa but everywhere that construction is being done.

Theo C Haupt
Durban, South Africa
July 18, 2010
ACKNOWLEDGEMENTS

The organizing committee of The Fifth Built Environment conference, held in Durban, South Africa, wish to thank the Durban University of Technology, and the Council of the Association of Schools of Construction of Southern Africa and member universities and individuals for supporting this conference through their valued contributions.

Without the substantial financial support of the major conference sponsor the Council for the Built Environment (CBE), Wiehahn, the Construction Industry Development Board (CIDB) Group 5, WBHO and NMC this conference and the further development and growth of the Association of Schools of Construction of Southern Africa (ASOCSA) with respect to its mission in the region would not have been possible. Further, this support demonstrates the commitment of the sponsors to the further development of the body of knowledge relative to the science and practice of construction. This commitment is deeply valued and acknowledged.

Our thanks are extended to Professor Theo Haupt (Mississippi State University and University of Johannesburg), Mr Ferdinand Fester (University of Johannesburg) and the Council of ASOCSA who worked unstintingly on every aspect of the conference. Together with the Scientific and Technical Committee and additional reviewers to whom special thanks are extended they worked hard and long to prepare refereed and edited papers and published proceedings of the highest standard that satisfy the criteria for subsidy by the South African Department of Education.

Special mention is necessary of Mr. Ruben Ndihokubwayo for his efforts relative to this conference - often under extremely difficult and trying circumstances.

The contribution and excellent support of our webmaster, Wendal Koopman in setting up and supporting our conference website is appreciated.

Finally, the sterling contribution and efforts of Ferial Michaels and her staff at RFM Design to the success of this conference is acknowledged in their capacity as conference organizers working with the conference committee and evident in the superlative logistic coordination and attention to detail in every aspect of the conference organization.
ORGANISERS – SOUTH AFRICA

Ms. Ferial Michaels, RFM Design
Prof T C Haupt, Mississippi State University, United States of America and University of Johannesburg, South Africa (ASOCSA President and overall Program Chair)
Mr. Siva Reddy, Durban University of Technology, South Africa
PEER REVIEW PROCESS

In order to maintain and ensure the highest quality in the conference proceedings and comply with the requirements for subsidy of the South African Department of Education, a rigorous two-stage system of peer review by no less than two acknowledged experts in the field has been followed. In terms of this process, each abstract received was twice blind reviewed in terms of:

• Relevance to conference theme and objectives;
• Originality of material;
• Academic rigour;
• Contribution to knowledge; and
• Research methodology.

Authors whose abstracts were accepted after the review process was completed were provided with anonymous reviewers’ comments and requested to submit their full papers noting and addressing these comments. Evidence was required relative to the action taken by authors regarding the comments received. These resubmitted papers were twice blind reviewed again in terms of:

• Relevance to 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 into both the conference presentation schedule and the conference proceedings after evidence was provided that all comments were appropriately responded to, having been multiple peer-reviewed for publication. At no stage was any member of the Scientific and Technical Committee or the editor of the proceedings involved in the review process relative 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 based on the conference presentation schedule as captured on the CD-ROM and Table of Contents. Of the 66 abstracts originally received, only 44 papers were finally accepted for presentation at the conference and inclusion in these proceedings, representing a rejection rate of 33%. To be eligible for inclusion these papers were required to receive a minimum score of 3 out of 5 allocated by the peer reviewers during the final review process.
LIST OF REVIEWERS

Dr Ayman Othman, University of Kwazulu Natal (formerly)
Prof Chris Cloete, University of Pretoria, RSA
Dr Islam Eladaway, Mississippi State University, USA
Prof Paul Bowen, University of Cape Town, RSA
Mr Ben Swart, University of Free State, RSA
Dr Geraldine Kikwasi, Ardhi University, Tanzania
Mr. Didi Thwala, University of Johannesburg, RSA
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Prof G Ofori, National University of Singapore, Singapore
Dr D Root, University of Cape Town, RSA
Prof W Shakantu, Nelson Mandela Metropolitan University, RSA
Prof JJ Smallwood, Nelson Mandela Metropolitan University, RSA
Prof B Verster, University of Free State, RSA
History

ASOCSA is not the first attempt to form a body that addresses, inter alia, matters of construction education and training. In the days of the Building Industries Federation South Africa and the National Development Fund there were regular annual meetings of the Heads of Departments that offered construction-related programs. Recognizing the two-tiered higher education sector in South Africa, there were separate meetings for universities and the former technikons. In the more recent past, the Chartered Institute of Building - Africa initially convened annual educators' forums that did not quite fulfill the same function as the previous forums. However, during 2005 the very first meeting of University Heads of Departments drawn from all higher education institutions in South Africa met for the very first time since the re-landscaping of the sector in the same venue to discuss matters affecting construction, and particularly construction education in the country. This meeting was repeated in 2006 where the need was expressed for the establishment of a formal forum / association of universities to engage in discussion / debate / collaboration / promotion of matters of mutual interest.

Broad Aims

ASOCSA aims to be the professional association for the development and advancement of construction education in Southern Africa, where the sharing of ideas and knowledge inspires, guides and promotes excellence in curriculums, teaching, research and service. To achieve this aim ASOCSA is partnering with the construction industry to find ways to effectively represent the interests of both construction academic and industry practitioners. ASOCSA will offer a variety of programs and services designed to help its members serve their customers more effectively and succeed in an increasingly challenging environment of construction information management and technology. To this end ASOCSA provides a forum for the debate and discussion of issues of mutual interest to all industry stakeholders. For example, one of the tasks of ASOCSA will be supporting the development of curriculums that address the needs of the construction sector in the Southern African region. ASOCSA convenes an annual conference where construction academics and practitioners can interact relative to practical experience and the findings of relevant research.

The Journal of Construction presently published twice per year is the official journal of ASOCSA and more than 5,000 complimentary copies
are distributed to all industry stakeholders in the Southern African region. The production and distribution of practice notes and technical papers is a further endeavor to grow the partnership between academia and industry.

With respect to the Southern African region, ASOCSA is committed to the following:

**Vision**
To be the custodian of construction related higher education

**Mission Statement**
To promote, facilitate, develop and monitor the relevance and quality of construction related curricula, research and graduates in conjunction with higher education institutions, industry and government.

**Strategic objectives**
The objectives of the Association are:

- to promote and facilitate the development of curricula for construction related programmes
- to facilitate accreditation of construction related programmes
- to hold an annual conference that acts as a forum for multi-disciplinary interaction between academics and practitioners
- to publish an accredited research-based journal and contribute to the built environment body of knowledge (BEBOK)
- to disseminate information dealing with construction education and related matters
- to develop and maintain closer links with industry and government
- to represent the collective views of its members
- to liaise with other organisations and persons to promote the interests of its members
- to promote and support relevant postgraduate research
- to provide bursaries to postgraduate students in accordance with set criteria

ASOCSA continues to seek opportunities to promote both academic and industry employment opportunities. Finally, ASOCSA intends to play a significant role in the accreditation of construction-related academic programs.

**Meeting of Heads of Schools and Departments of Construction**
ASOCSA believes that meetings of Heads of School and Departments of Construction is a vital component of its functions and holds Heads meetings at the end of each conferences in addition to bi-annual Heads meetings.
International Affiliation
ASOCSA has commenced discussions about closer collaboration with similar institutions such as the Associated Schools of Construction (ASC) in the United States and the Royal Institute of Chartered Surveyors (RICS).

In summary, benefits of membership of ASOCSA which are self-evident include participation in meetings of Heads of construction programs throughout the region, access to the Journal of Construction, reduced rates at all ASOCSA events, involvement at regional level with industry-academia forums, interaction and networking opportunities relative to, for example, collaborative research, curriculum development, external moderation of courses, and external examination.

ASSOCIATION OF SCHOOLS OF CONSTRUCTION OF SOUTHERN AFRICA

Office bearers
President: Prof. Theo C Haupt (MSU)
Past-president: Prof. John Smallwood (NMMU)
Vice President: Mr. Ferdinand Fester (UJ)
Vice-President: Ms. Kathy Michell (UCT)
Honorary Treasurer: Mr. Pieter Fonternel (CUT)
Honorary Secretary Dr. Hendrik Marx (UFS)

Council members and Portfolios
Mr. Felix Le Roux (UP) Media and publications

For more information on ASOCSA and its activities visit www.asocsa.org

TAX BENEFIT
ASOCSA is a registered Public Benefit Organization as defined in Section 30 of the Income Tax Act and a registered Section 21 Company as defined in the Companies Act. Therefore all donations made to ASOCSA will be fully deductible for income tax purposes and a section 18A certificate, for proof of deductibility will be issued to the donor upon receipt of the donation. The deductible donation is limited to 10% of the donors’ taxable income before providing for Section 18A and Section 18 deductions.
SPONSORS

Main Sponsor

Opening Cocktail Function sponsored by:

Closing Cocktail function sponsored by:

Conference bags, CD proceedings and names tags sponsored by:

Institutional Host
Council for the Built Environment

Vision
To provide sustainable built environment professions, serving public and national interest.

Mission
To facilitate integrated development, whilst promoting efficiency and effectiveness through leadership of the built environment professions.

Core Values

Integrity
We will carry out our responsibility in a manner that will preserve and enhance the integrity of the organisation.

Transparency
We recognise that the CBE is a public entity and are committed to providing accurate and reliable information to all our stakeholders.

Excellence
We will endeavor to achieve the best possible standards in all we do.

Innovation
We will seek out and employ superior, more affordable solutions to meet the needs of our clients, stakeholders and end-users.

The Council for the Built Environment (CBE) was established in terms of the Council for the Built Environment Act, 2000 (Act No. 43 of 2000). The Council was tasked with addressing the shortcomings in the built environment, in order to create a climate that would enable ongoing transformation and development of professions in the built environment. Currently, the following built environment councils are statutorily governed by CBE, namely:

Engineering Council of South Africa
South African Council for the Architectural Profession
South African Council for the Quantity Surveying Profession
South African Council for the Property Valuers Profession
South African Council for the Landscape Architectural Profession
South African Council for the Project and Construction Management Professions

The CBE is the most significant however, being the authoritative, all encompassing structure incorporating all these councils. It provides leadership to the professions, ensuring good governance, and serves as a two-way channel between councils and the government, thus guaranteeing
coordinated input into a restructuring and development process that is in the public interest.

The CBE, *inter alia,*

Champions sound governance of the professions, appropriate standards of health, safety and environmental protection, standards of training as well as ongoing human resource development. The underlying aim is to protect the interests of the public and to maintain a sustainable environment – both built and natural.

- Serves as a forum where the built environment professions, through their respective councils, can interact and address matters of mutual interest, to the benefit of the built environment.
- Serves as a facilitator, encouraging the professions to integrate their development within the context of government’s national goals.
- Acts as a sentinel, put into place to ensure the application of norms and guidelines.

CBE works closely with government in terms of policy implementation. It also advises on policy changes, to ensure the growth of healthy professions that conform to best practice standards and quality built environments. It seeks to create public consciousness of issues within in the built environment.

The CBE fosters alignment between the individual Councils while serving as the nexus, providing strategic leadership from within the built environment professions.
Overview
The Construction Industry Development Board (cidb) - a Schedule 3A public entity - was established by Act of Parliament to promote a regulatory and developmental framework that builds:

- The construction delivery capability for South Africa’s social and economic growth.
- A proudly South African construction industry that delivers to globally competitive standards.

The cidb’s focus is on

- Sustainable growth, capacity development and empowerment
- Improved industry performance and best practice
- A transformed industry, underpinned by consistent and ethical procurement practices
- Enhanced value to clients and society

Background and history
Construction plays a vital role in South Africa’s economic and social development. It provides the physical infrastructure and backbone for economic activity. It is also a large-scale provider of employment. The legacy of Apartheid has, however, left the South African construction industry with a number of development and transformation challenges. These include:

- Improving effectiveness of public sector spending on physical infrastructure development and maintenance.
- Improving labour absorption, labour relations and job stability.
- Accelerating sustainable transformation through access to opportunity, finance and training.
- Reducing the impact of HIV and AIDS in construction
- Ensuring international competitiveness.
- In 1997 government published the Green Paper on “Creating an Enabling Environment for Reconstruction, Growth and Development in the Construction Industry” paving the way for establishment of the cidb. The cidb Act was passed in October 2000 establishing the cidb mandate to lead stakeholders in construction development

Mandate
The cidb Act mandates the Board to:

- Establish a national register of contractors and of construction projects to systematically regulate, monitor and promote the performance of the industry for sustainable growth, delivery and empowerment.
- Promote improved delivery management capacity and the uniform application of procurement policy throughout all spheres of government.
- Promote improved performance and best practice of public and private sector clients, contractors and other participants in the construction delivery process.
• Promote sustainable participation of the emerging sector.
• Provide strategic direction and develop effective partnerships for
growth, reform and improvement of the construction sector.

Vision - 2012 and Beyond
A dynamic, innovative and development organisation that provides
strategic leadership and an efficient service to stakeholders, leading to a
transformed and competitive construction industry that delivers quality
infrastructure, promotes economic growth, and an organisation that is
caring for its employees.

Mission
To direct and drive an integrated construction industry development
strategy that transforms the role of industry and stakeholders for
sustainable growth, improved delivery, performance and value to public
and private sector clients, and investors through strategic partnerships; to
strategically and deliberately promote the empowerment of small, medium
and micro enterprises to improve their capability and grow the economy; to
develop employees to be meaningful participants in the organization.
Introduction

WIEHAHN – SETTING THE PACE IN FORMWORK SOLUTIONS & SERVICES

With the solid foundation provided by more than 40 years of experience in the supply of formwork solutions to the construction industry in South Africa, Wiehahn is fast becoming the industry leader supplying to all of the key construction companies nationally. Wiehahn continues to support ASOCSA and therefore research and development of the formwork industry to ensure expertise in the Built environment.

Founded in 1968 as Wiehahn Equipment, the company today is widely recognised as a premier brand in the building, general construction and civil engineering industries and as a leader in the supply of formwork systems, solutions, design, consulting and related services.

By 1999 the company had achieved high status and wide recognition as an expert in its field and a milestone achievement that year was securing the sole distributorship in Southern Africa for the internationally renowned PERI formwork systems designed and manufactured in Germany. This marked the beginning of a paradigm shift in the South African construction industry as Wiehahn introduced innovative formwork solutions that bordered on the revolutionary and produced outstanding results. Today Wiehahn has an indefinite sole distribution agreement with PERI GmbH.

Having infinitely proved its worth in building, slab and beam formwork solutions Wiehahn is now strongly focused on the civil engineering arena with a dedicated civils division that has great depth in technical expertise to service this specialised market. The company’s growth and potential is underlined by the fact that it now supports eleven operations in South Africa, a head office and branch located in Cape Town and branches at Midrand, George, Port Elizabeth, East London, Durban, Bloemfontein, Nelspruit, Polokwane, Richards Bay and Rustenburg.

Over the past decade Wiehahn has distinguished itself as market leader and top performing company, supplying a wide range of formwork that includes both conventional and technologically advanced systems backed by design and technical support that ensures clients benefit from custom-made, fit-for-purpose solutions no matter what type or size of concrete structure is required. Wiehahn’s strengths lie in its well-developed infrastructure, product maturity, large stockholding and sustainable long-term client relationships. Today, more than ever before, the company is perfectly positioned to exceed client expectations in all facets of formwork solutions.
Introduction

As one of the largest construction and materials manufacturing companies in Southern Africa, Group Five is a broad-based infrastructure company with a balanced portfolio of businesses offering multi-disciplinary construction and engineering skills and expertise to deliver any aspect of an infrastructural project, including concept development and design.

With an annual turnover of almost R9-billion the group employs some 12000 people throughout its operations in Africa, the Indian Ocean Islands, the Middle East and Eastern Europe.

With decades of construction experience, Group Five has played a major role in the development of southern Africa’s infrastructure, achieving a reputation both nationally and internationally for innovation and professionalism.

Group Five has evolved from being a single disciplinary contractor into an integrated contracting model with the ability to:

- create opportunities to develop its own contracts
- deliver complete turnkey contracts

The group’s customer-focused philosophy aims to provide full service solutions across the broad base of the infrastructure value chain. Service delivery is based on an incisive understanding of customer needs and requirements with the objective of standing by projects until customers are satisfied.
Introduction

THE CONSTRUCTION INDUSTRY DEVELOPMENT BOARD (CIDB)

Introduction

The Durban University of Technology: Institutional Host

With approximately 23 000 students, the Durban University of Technology (DUT) is the first choice for higher education in KwaZulu-Natal (KZN). It is located in the beautiful cities of Durban and Pietermaritzburg (PMB). As a University of Technology, it prioritises the quality of teaching and learning by ensuring its academic staff possesses the highest possible qualification that they can get. The Durban University of Technology is a result of the merger in April 2002 of two prestigious technikons, ML Sultan and Technikon Natal. It was named the Durban Institute of Technology and later became the Durban University of Technology in line with the rest of the universities of technology.

Vision and Mission

VISION

A preferred university for developing leadership in technology and productive citizenship.

MISSION

Our mission is to excel through: • A teaching and learning environment that values and supports the university community. • Promoting excellence in learning and teaching, technology transfer and applied research. • External engagement that promotes innovation and entrepreneurship through collaboration and partnership.

CORE VALUES

Respect, Recognition, Opportunity and Access Loyalty, Dignity and Trust Transparency, Openness, Honesty and Shared Governance Responsibility, Accountability, Collegiality and Professionalism
Introduction

CIB is the acronym of the abbreviated French (former) name: "Conseil International du Bâtiment" (in English this is: International Council for Building). In the course of 1998, the abbreviation has been kept but the full name changed into:

INTERNATIONAL COUNCIL FOR RESEARCH AND INNOVATION IN BUILDING AND CONSTRUCTION

CIB was established in 1953 as an Association whose objectives were to stimulate and facilitate international cooperation and information exchange between governmental research institutes in the building and construction sector, with an emphasis on those institutes engaged in technical fields of research.

CIB has since developed into a world wide network of over 5000 experts from about 500 member organisations active in the research community, in industry or in education, who cooperate and exchange information in over 50 CIB Commissions covering all fields in building and construction related research and innovation.

CIB Members are institutes, companies and other types of organisations involved in research or in the transfer or application of research results. Member organisations appoint experts to participate in CIB Commissions. An individual also can be a member and participate in a Commission. CIB Commissions initiate projects for R&D and information exchange, organise meetings and produce publications. These meetings can be Commission meetings for members only or international symposia and congresses open to all. Publications can be proceedings, scientific or technical analyses and international state of the art reports.

CIB Past and Present

CIB was established in 1953 with the support of the United Nations, as an association whose objectives were to stimulate and facilitate international
collaboration and information exchange between governmental research institutes in the building and construction sector. At that time an implicit objective also was to help rebuild the European infrastructure for building and construction research following the ravages of the second World War.

At the start 43 research institutes were members of CIB and by far the majority of these were European. And just as in the programmes of these institutes at that time, so in the CIB programme there was a strong emphasis on technical topics.

For selected topics CIB Commissions were established to which member organisations appointed experts from their staff to participate.

Along with all types of less visible activities, this collective participation resulted in many important international symposia and congresses and in a large number of publications acknowledged as of global standing. Indeed many of these formed the factual basis for developing international standards or were themselves used as such. Others were international state-of-the-art reports that for a long time provided an indispensable input to programming new research by the participating institutes and countries.

However, CIB has come a long way since 1953.

At present about 500 organisations are members of CIB from whom about 5000 individual experts participate in over 50 CIB Commissions. These extend over the whole area of building and construction research and innovation.

Amongst the CIB member organisations we can now find almost all the major national building research institutes in the world, as well as many other types of organisations in the building and construction sector who have joined us since. And although within the CIB programme considerable attention is still given to technical topics, there are now also activities focused on topics like organisation and management, economics of building, legal and procurement practices, architecture, urban planning and human aspects.

It is no exaggeration to say that at present CIB is the world's foremost platform for international cooperation and information exchange in the area of building and construction research and innovation. And we continue to increase our membership, to expand our scope, to initiate new activities while constantly striving to improve the quality of our products and services.
18 July 2010

Dear Author

PEER REVIEW PROCESS: 5TH BUILT ENVIRONMENT CONFERENCE: DURBAN, SOUTH AFRICA 2010

I confirm that the following peer review process was strictly followed relative to this conference.

In order to maintain and ensure the highest quality in the conference proceedings and comply with the requirements for subsidy of the South African Department of Education, a rigorous two-stage system of blind peer review by no less than two acknowledged experts in the field has been followed. In terms of this process, each abstract received was twice blind reviewed in terms of:

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Regards

[Signature]

Ferial Michaels

Conference Organiser
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The Antecedents of TQM Deployment within the UAE Construction Sector

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ABSTRACT AND KEYWORDS

Purpose

The purpose of this paper is to examine the critical success factors and barriers (antecedents) of total quality management (TQM) deployment in the United Arab Emirates (UAE) construction sector.

Design/methodology/approach

A survey of a randomly selected samples yielded responses from 30 TQM and 23 non-TQM construction related organisations regarding the antecedents of TQM. The findings are investigated using appropriate statistical tests.

Findings

Ten factors were found to be critical to TQM implementation success. These are top management commitment, coordination between departments, quality related training, teamwork, purchasing policy, supplier chain management, customer focus, quality documentation, benchmarking and empowerment. Customer satisfaction and top management commitment were the two most important ranked critical success factors whereas purchasing policy and benchmarking were the least ranked. Lack of primary focus and top management involvement in improving ways to
Performing tasks were identified as the two major barriers to TQM deployment.

Research limitations

The cross-sectional data made it difficult to generalise the findings.

Practical implications

The paper provides a framework for future research to explore the antecedents and barriers of the TQM deployment process.

Keywords

Total quality management, Critical success factors, Construction, Empirical analysis, United Arab Emirates

1. INTRODUCTION

The importance of the UAE Construction Industry can be attributed to its value which is $221 billion, the highest in the region. This highlights the fact that planned construction is the focus of the Emirates, particularly Dubai. This boom in Construction is due to the direct result of high return on investment and commitment of the govt to develop the infrastructure and building sector through the United Arab Emirates (Mathias, 2006). Construction and the UAE have become synonymous in recent years. The construction industry plays a substantial role in the UAE’s economy, accounting for almost 20 per cent of its GDP and is expected to grow at a compound annual growth rate (CAGR) of around 20% during 2010-2013. (Research and Markets, 2010). Furthermore, investment by public and private sector in UAE construction industry for different major projects like airports, roads, ports and railways is on going.

The importance of the industry can further be attributed to the role it plays in employment. According to the UAE Contractor’s Association, 16,000 contractors are sharing the UAE business, and 340,000 workers are employed in the sector. In view of the above, the construction business is considered the UAE’s largest single industry. Considering the giant size of the industry, most of the projects are on fast basis therefore to maintain the required standards of quality are difficult in this situation and it is the greatest challenge for the construction organisations to deliver the required product or service to the client. Most of the construction organisations are taking care of price and time saving and ignoring the quality issues. However some of the international companies have started quality
implementation in their organisations and they are trying to deliver the required product according to required standards. Despite the uptake on implementation of TQM, the majority of the organisations are within the services and manufacturing industries, furthermore extensive literature review indicates that little or no studies have been conducted on TQM implementation and critical success factors related issues within the UAE construction industry. It's against this omission that has been the motivational for this research. The study therefore aims to examine the critical success factors and barriers (antecedents) and benefits of total quality management (TQM) implementation (deployment) in the United Arab Emirates (UAE) construction sector.

The paper is structured as follows; first an extensive general international literature review on the TQM in various industries is presented, with the main focus on the issues in implementation, critical success factors & barriers (antecedents), measurement instruments and the relationship between TQM and ISO 9000. This is followed by specific TQM writings within the UAE context. Third, an explanation of the research methodology adopted is presented. Following on from the research methodology, the statistical methods employed and the interpretation of the findings are next, the focus of which is to identify and compare the critical success factors for TQM deployment between TQM and non-TQM organisations, investigate the impact of organisation size on the deployment process and highlight the rationale and benefits of TQM implementation. The paper concludes with a discussion and implications for future research.

2. LITERATURE REVIEW

Literature review indicates that a lot has been written about TQM deployment issues in various industries.

2.1 General International Review

The general TQM literature is inundated with articles related to identification of the critical factors of TQM (Saraph et al, 1989; Flynn et al, 1994; Black and Porter, 1996; Huq and Stolen, 1998; Yusof and Aspinwall, 2000a; 2000b; 2000c; and 2001), Chileshe (2004; 2005; 2007), and more recently Sohal and Terziovski, (2000), the few authors cited are Quality Management specific. Other areas as identified by Sousa and Voss (2002), and a comprehensive study by Sila and Ebrahimpour (2002) found the following as the generally accepted areas of TQM; Research as related to issues in the implementation of TQM (Porter and Parker, 1993; Sommerville and Sulaiman, 1997; Martinez-Lorente et al, 1998; Samson and Terziovski, 1999a, 1999b; Al-Khalifa and Aspinwall, 2000; and Zhang et al, 2000), Identification of the links between TQM factors and

2.2 Specific UAE TQM and ISO 9000 Related Literature Review

Quality management related studies within the United Arab Emirates are abundant and though mostly industry specific such as Manufacturing and Service industries and be broadly classified into the following five areas: (1) Benefits of ISO 9000 and TQM; (2) Testing the applicability of measurement instruments; (3) Relationships between service quality and transformational leadership; (4) Critical success factors & barriers; and (5) Excellence Models: Validation; and Relationship between TQM / ISO 9000 and organisational performance. The following sub section presents a brief literature overview of the studies with particular emphasis on the fourth area, namely that of antecedents.

2.3 Benefits of ISO 9000 and TQM

Within the UAE, Zaramdini (2007) investigated the motivational and beneficial aspects of ISO 9001 and the relationship between the two aspects. The findings suggested that certified firms adopted the right approach when seeking ISO 9000 certification because they focussed on potential internal benefits. However one of the limitations of the study was that it focussed on the Manufacturing and Service firms, as such there is a knowledge gap in terms of what benefits the Construction related organisations can derive from either adopting ISO 9000 systems or even TQM.

2.4 Testing the Applicability of Measurement Instruments

Badri et al (1995) tested the Saraph et al (1989) instrument with its associated 8 factors within the Service and Manufacturing firms in the United Arab Emirates and found the instrument to still be reliable and valid. Although the advantage of this study was its big sample size, an obvious omission again was the lack of testing the validity and applicability of this instrument within a Construction environment. Badri et al (1995) further recommended the testing of the instrument for the individual service sectors to examine the differences between industries. Jabnoun and Chaker (2003) used a modified version of the Parasuraman et al (1995) SERVQUAL instrument to compare the service quality rendered by private and public hospitals and found a significant difference between private and public hospitals in terms of overall service quality. Jabnoun and Khalifa
(2007) developed a measure of service quality in UAE and tested the applicability of the instrument within the Islamic banks and found the two new dimensions of value and image as been important in determining the service quality in Islamic banks. The emerging picture from the testing the applicability of measurement instruments is that the proliferation of studies has been in the Service and Manufacturing industries. To date no studies have been conducted specifically within the Construction environments nor have the differences between or across industries been examined. This study is aimed at bridging the knowledge gap identified.

2.5 Relationships between Service Quality and Transformational Leadership

Jabnoun and AL Rasasi (2005) investigated the relationship between transformational leadership and service quality in UAE hospitals and found that UAE patients were satisfied with the service quality although the employees had a low rating of their leaders in terms of the three dimensions of transformational leadership and the transactional leadership of contingent reward. As with the studies identified within the research themes of benefits of ISO 9000 and TQM; and developing and testing the applicability of measurement instruments, this study was service based with the obvious omission of the construction industry.

2.6 Critical Success Factors and Barriers (Antecedents)

2.6.1 Critical Success Factors

Critical factors is one of the Quality Management research areas according to Sousa and Voss (2002) and examination of the literature review within the UAE reveals the following: Al-Marri et al (2007) examined the critical success factors of total quality management (TQM) in the United Arab Emirates (UAE) banking sector and found sixteen factors to be critical. However considering that the study focussed on the banking sector which is more service oriented than the construction industry, there is a need for an investigation of critical success factors within a construction environment setting, and hence this study aims to bridge that knowledge gap.

2.6.2 Barriers

There is ample literature on inhibiting factors for TQM implementation within the construction, services and manufacturing industries. For example, within the USA construction context, Haupt and Whiteman (2004) identified the following barriers: management commitment and involvement; customer focus; participative management style; transfer of TQM from the office to field operations, too much paperwork; transient nature of workforce; field employees regarding TQM as irrelevant; low bid
subcontracting; and subcontractors and suppliers not interested in TQM. Soltani et al (2005) in citing Lakhe & Mohanty (1994); Macdonald (1995) and Kanji (1995) identified 12 barriers within the UK Manufacturing industries. Among the barriers were lack of senior management commitment and their visible participation; fear of change; work overloads; lack of comprehensive quality improvement education; lack of people involvement; institutionalised quality management. Other studies such as Ngai and Cheng (1997) identified 17 barriers within the Hong Kong Manufacturing and Services industries, whereas Whalen and Rahim (2001) identified 8 barriers within the USA Manufacturing and Service industries.

2.7 Excellence Models: Validation

The literature review outside the UAE context reveals an abundance of studies around the empirical testing of various quality models such as the Malcolm Baldrige National Quality Awards (MBNQA); European Foundation for Quality Management (EFQM). Similarly within the UAE context, Badri et al (2006) empirically tested the casual relationships in the Malcolm Baldrige National Quality Award (MBNQA) within the higher institutions of learning such as Universities and Colleges. Leadership as in other validation of excellence models studies was also identified as the driver for all the components. The emerging picture is that while there is evidence of quality related studies within the UAE, industry wise, they are mostly within the hospitals, banking and higher educational sectors.

3. RESEARCH METHODOLOGY

To examine the critical success factors and barriers (antecedents) of total quality management (TQM) implementation in the United Arab Emirates (UAE) construction sector, the following research methodology was employed in the study.

3.1 Sample

A questionnaire survey was conducted in 2007. Survey targets were limited to the representatives of construction related organisations within the UAE. A total of 100 questionnaires were sent out of which 40 were distributed by email and 60 by post to the construction organisations in the UAE randomly selected from different sources namely UAE telecommunication director, Abu Dhabi Chamber of commerce & Industry and UAE Contractor Association. A total of 53 completely filled questionnaires were returned, comprising 30 TQM and 23 non-TQM organisations. The effective return rate (52.0 per cent) was considered very high despite the difficulties
encountered in engaging the construction organisations participation in the study. The response was therefore deemed adequate for the purpose of data analysis.

3.2 Measurement Instrument

The final questionnaire comprises four parts. The first part seeks background information about the respondents. The second part deals with the rationale for TQM implementation. The third part investigates the critical success factors for TQM implementation. The final part sought the inhibiting factors or impeding the implementation of TQM. This paper reports on the demographics, critical success factors and barriers thus termed antecedents. Likert style rating questions, using a five-point scale, were used to elicit respondents' opinions of the importance of each nominated variable. The scale intervals are interpreted as follows: (1) Extremely unimportant; (2) Slightly unimportant; (3) Neutral; (4) Slightly important and (5) Extremely important.

Because of the small sample, a measure of the sampling adequacy using the Kaiser-Meyer-Olkin (KMO) was carried out and the results are indicated in table 1.

<table>
<thead>
<tr>
<th>Table 1.0: KMO and Bartlett's Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</td>
</tr>
<tr>
<td>Bartlett's Test of Sphericity</td>
</tr>
<tr>
<td>df</td>
</tr>
<tr>
<td>Sig</td>
</tr>
</tbody>
</table>

It's recommended that the value of KMO should be greater than 0.5 if the sample is adequate. (Field 2000). The above result of 0.688 indicates that the sample was adequate for each unfactorial determination.

Table 2.0 shows the frequency of the respondents according to their organisation size, business activities, experience and status of TQM deployment.

<table>
<thead>
<tr>
<th>Table 2.0: Description of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
</tr>
<tr>
<td>Organisation size</td>
</tr>
<tr>
<td>Small (no. of employees &lt; 100)</td>
</tr>
<tr>
<td>Medium (100 no. of employees &lt; 500)</td>
</tr>
<tr>
<td>Large (no. of employees &gt; 500)</td>
</tr>
<tr>
<td>Business activities</td>
</tr>
<tr>
<td>Main Contractor</td>
</tr>
</tbody>
</table>
4. STATISTICAL METHODS

The primary focus of the study presented in this paper was to examine the critical success factors and barriers of total quality management (TQM) implementation in the United Arab Emirates (UAE) construction sector. *Statistical Package for Social Sciences* (SPSS Release 17.0.0) computer program was used to analyse the data generated by the research questions. The analysis of the data consisted of descriptive statistics to depict the frequency distribution and central tendency of responses to fixed response questions. A 5-point Likert scale (where EI = Extremely Important, SI = Slightly Important, N = Neutral, SUI = Slightly Unimportant, and EUI = Extremely Unimportant) was used to determine the degree of occurrence relative to a range of critical success factors. A ratio from a difference of 1 – 5 (4) was used to discuss the degree of central tendency and the following results occur:

- $\geq 1.00 \leq 1.80$ : Extremely Unimportant
- $> 1.80 \leq 2.60$ : Unimportant
- $> 2.60 \leq 3.40$ : Neutral
- $> 3.40 \leq 4.20$ : Slightly Important
- $> 4.20 \leq 5.00$ : Extremely Important

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub Contractor</td>
<td>7</td>
<td>13.2</td>
</tr>
<tr>
<td>Management</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Consultancy</td>
<td>8</td>
<td>15.1</td>
</tr>
<tr>
<td>Supplier</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>5.7</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>53</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Respondents experience</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2 Years</td>
<td>11</td>
<td>20.8</td>
</tr>
<tr>
<td>&gt; 2 years .... &lt; 5 years</td>
<td>10</td>
<td>18.9</td>
</tr>
<tr>
<td>&gt; 5 years</td>
<td>31</td>
<td>58.5</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>Implementing TQM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>30</td>
<td>56.6</td>
</tr>
<tr>
<td>No</td>
<td>23</td>
<td>43.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>53</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
5. SURVEY RESULTS AND DISCUSSIONS

5.1 Degree of TQM Implementation

One of the objectives of the research was to establish the degree of the implementation of TQM or other quality initiatives within the construction organisations. The response of the frequency of respondents are shown in Table 3.

<table>
<thead>
<tr>
<th>Degree of Implementation</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totally</td>
<td>19</td>
<td>35.8</td>
<td>37.3</td>
<td>37.3</td>
</tr>
<tr>
<td>Partially</td>
<td>27</td>
<td>50.9</td>
<td>52.9</td>
<td>90.2</td>
</tr>
<tr>
<td>Reference Only</td>
<td>2</td>
<td>3.8</td>
<td>3.9</td>
<td>94.1</td>
</tr>
<tr>
<td>Guidance Only</td>
<td>3</td>
<td>5.7</td>
<td>5.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>96.2</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

5.2 Commitment to TQM or Similar Total Quality Programme

In order to assess the level of commitment to TQM or Total Quality Programmes such as EN ISO 9000:2000 series; EFQM and Dubai Quality Award, respondents were asked if they had made any significant commitment to such. The majority (94.3%) respondent affirmatively, whereas only 3 (5.7%) had not made any commitment. The results indicate that despite 43.3% (23) of the respondents not having a formal TQM programme, at least they had some form of quality initiatives. One probable reason for this is that large contractors in the UAE have used ISO accreditation as a means of achieving minimum standards. According to Foreman (2004), it’s acknowledged that although construction is all about building an end product, there is still some process element and more so some extent a service hence making it difficult to measure quality. Another benefit of this commitment to the accreditation process according to Foreman is that despite having some way to go before it becomes a total quality management system, ISO 9001:2000 has been successful in attracting companies to begin thinking about the quality of their management.
5.3 Analysis of the means for critical success factors

In Table 4.0, means and standard deviations of the 10 critical success factors are also presented for the TQM and non-TQM organisations. For TQM deploying organisations, the means ranged between 4.63 (top management commitment) to 2.70 (benchmarking) while for Non-TQM between 4.57 (customer satisfaction) and 2.74 (benchmarking). Since a five-point Likert type scale was used (1 = strongly disagree, 5 = strongly agree). A score of 4.20 or more indicates the extremely importance of the TQM critical success factor whereas a score of less than 1.80 indicates that the extremely unimportance of the critical success factor.

<table>
<thead>
<tr>
<th>Critical Success Factors</th>
<th>TQM Organisations (N =30)</th>
<th>Non-TQM (N = 23)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Top Management Commitment</td>
<td>4.63</td>
<td>0.765</td>
</tr>
<tr>
<td>Co-ordination between Departments</td>
<td>4.37</td>
<td>0.927</td>
</tr>
<tr>
<td>Training (Quality Related)</td>
<td>4.03</td>
<td>1.033</td>
</tr>
<tr>
<td>Teamwork</td>
<td>4.10</td>
<td>0.885</td>
</tr>
<tr>
<td>Purchasing Policy</td>
<td>3.57</td>
<td>1.135</td>
</tr>
<tr>
<td>Supplier Chain Management</td>
<td>3.83</td>
<td>1.289</td>
</tr>
<tr>
<td>Customer Satisfaction</td>
<td>4.53</td>
<td>0.629</td>
</tr>
<tr>
<td>Quality Documentation</td>
<td>4.23</td>
<td>0.728</td>
</tr>
<tr>
<td>Benchmarking</td>
<td>2.70</td>
<td>1.263</td>
</tr>
<tr>
<td>Reward Systems</td>
<td>4.07</td>
<td>0.907</td>
</tr>
</tbody>
</table>

Examination of Table 4 indicates that no TQM critical success factor fell into the “unimportant” (> 1.80 ≤ 2.60) and “extremely unimportant” (≥ 1.00 ≤ 1.80) category. For the TQM deploying organisations, the mean score ranged from 2.70 (benchmarking) to 4.63 (top management commitment), whereas for non-TQM organisations, these ranged from 2.74 (benchmarking) to 4.57 (customer satisfaction). As observed by Li et al (2005), the lack or absence of extreme negative scores could be attributed to the tendency of the five point Likert scale in measuring differences in opinion that are too subtle. As can be seen from Table 4.0, there were differences in rankings attached to the critical success factors with TQM deploying organisations clearly viewed top management commitment as being the important factor in the TQM quest whereas non-TQM deploying organisations valued customer satisfaction. However both types of organisations were less inclined on the uptake of benchmarking. Benchmarking and Purchasing Policy were found to be the least two
factors implemented by TQM deploying organisations as supported by various authorities in the international literature review (Dale, 1997; McCabe, 2001; Dattakumar and Jagadeesh, 2003; Davi et al, 2003; Chileshe, 2004).

5.3.1 Analysis of the means for barriers to TQM

In Table 5.0, means and standard deviations of the 13 barriers factors are also presented for the TQM and non-TQM organisations.

Table 5: Comparison of barriers of TQM mean scores

<table>
<thead>
<tr>
<th>Barriers</th>
<th>TQM Organisations (N = 30)</th>
<th>Non-TQM (N = 23)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean SD Rank</td>
<td>Mean SD Rank</td>
</tr>
<tr>
<td>Top Management commitment to change the traditional customers</td>
<td>3.367 1.449 5</td>
<td>2.913 1.345 9</td>
</tr>
<tr>
<td>Top management involvement to improve ways of performing tasks</td>
<td>3.500 1.592 2</td>
<td>3.174 1.072 1</td>
</tr>
<tr>
<td>Primary customer focus</td>
<td>3.633 1.474 1</td>
<td>3.044 1.186 3</td>
</tr>
<tr>
<td>Well developed planning</td>
<td>3.400 1.380 4</td>
<td>2.826 1.267 10</td>
</tr>
<tr>
<td>Too much paperwork</td>
<td>2.800 1.243 12</td>
<td>2.739 1.356 11</td>
</tr>
<tr>
<td>Tight scheduling</td>
<td>3.333 1.348 6</td>
<td>3.087 1.164 2</td>
</tr>
<tr>
<td>Lack of effective and established communication systems</td>
<td>3.300 1.442 7</td>
<td>2.913 1.083 8</td>
</tr>
<tr>
<td>Transient nature of workforce</td>
<td>3.400 1.037 3</td>
<td>3.000 1.279 4</td>
</tr>
<tr>
<td>Selection of low bid subcontracting</td>
<td>3.100 1.242 9</td>
<td>2.956 1.147 7</td>
</tr>
<tr>
<td>TQM application to all field operations</td>
<td>3.233 1.455 8</td>
<td>2.130 1.099 13</td>
</tr>
<tr>
<td>Field employees regard TQM as irrelevant</td>
<td>2.667 1.398 13</td>
<td>2.261 1.389 12</td>
</tr>
<tr>
<td>Training for staff at all levels</td>
<td>3.033 1.450 10</td>
<td>3.000 1.243 5</td>
</tr>
<tr>
<td>Low education level of field forces</td>
<td>2.967 1.273 11</td>
<td>3.000 1.243 5</td>
</tr>
</tbody>
</table>

For TQM deploying organisations, the means ranged between 3.633, std dev = 1.474; (primary focus) to 2.667, std dev = 1.398 (Field employees regard TQM as irrelevant) while for Non-TQM between 3.174, std dev = 1.072 (Top management involvement to improve ways of performing tasks) and 2.130 (TQM application to all field operations). Since a five-point Likert
type scale was used (1 = strongly disagree, 5 = strongly agree). A score of 4.20 or more indicates the extremely importance of the TQM barrier whereas a score of less than 1.80 indicates that the extremely unimportance of the barrier. An independent samples t-test was conducted to compare the barriers to TQM scores for the TQM and non-TQM organisations. There was a statistically difference in only one barrier, namely ‘TQM application to all fields operations’ scores for TQM organisations (M = 3.233, SD = 1.455) and non-TQM [M = 2.130, SD = 1.099; t(51) = 1.050, p = .004]

5.4 Rationale and Benefits of TQM Implementation

In this section, we are interested in identifying the compelling reasons for organisations to apply for Total Quality Management. Respondents were asked to state either “Yes” or “No” to the following four benefits and based on the frequencies of the respondents, the benefits were ranked to their high positive responses. Table 6 summarizes the results of the frequency distributions and associated rankings.

<table>
<thead>
<tr>
<th>Benefits of TQM</th>
<th>Frequency of Respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To assure customers that the organisation is trying to deliver quality services and products</td>
<td>97.3 2.7 1</td>
</tr>
<tr>
<td>To improve the organisation efficiency and productivity</td>
<td>95.6 4.4 2</td>
</tr>
<tr>
<td>To get recognition as a quality organisation</td>
<td>92.9 7.1 3</td>
</tr>
<tr>
<td>To give a competitive edge to the organisation</td>
<td>91.9 8.1 4</td>
</tr>
</tbody>
</table>

It's evident from Table 6.0 that all the benefits were perceived to be very important considering that the majority of respondents (>90%) scored affirmatively on all of the four benefits. Respondents had an opportunity to provide qualitative answers regarding the benefits in additional to those listed. Some respondents identified “To satisfy client requirements”;

6. SUMMARY, CONCLUSIONS & IMPLICATIONS

This study examined the critical success factors and barriers (antecedents) of total quality management (TQM) implementation in the United Arab Emirates (UAE) construction industry and found from descriptive statistics customer satisfaction and top management commitment as the two most important ranked critical success factors whereas purchasing policy and
benchmarking were the least ranked for TQM deploying organisations. The major benefit of TQM was assurance it gave to customers that the organisation was trying to deliver quality services and products.

6.1 Limitations

Some limitations of the research need to be acknowledged. The sample is relatively small (53), comparable to others studies that have looked at the critical success factors of TQM within the UAE (Al-Marri et al., 2007), as such it is not representative and the findings presented are not generalisable to a wider population of organisations within the UAE Construction Industry. However the findings represent a snapshot of the reality of the perceptions of respondents relative to the critical success factors and benefits of TQM deployment within the UAE Construction Industry. Despite the limited studies on the critical success factors of TQM, and the measurement instruments used in the manufacturing and service industries, they are no substitute for information about applicability of these empirical scales among the construction organisations. This study contributes to what is currently a number of empirical studies on TQM in the construction sector and in particular within the UAE context.

7. ACKNOWLEDGEMENTS

The material for this paper was extracted from an MSc dissertation in construction management on ‘the evaluation of Total Quality Management (TQM) within the United Arab Emirates (UAE) construction industry’ on which Y.Hayat and N. Chileshe carried out further analysis. The dissertation was submitted to the Faculty of Development and Society, Sheffield Hallam University, U.K.

8. REFERENCES


Proceedings 5th Built Environment Conference
The Antecedents of TQM Deployment within the UAE Construction Sector
Durban, South Africa


Triggers of Disputes within the Ghanaian Construction Industry

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ABSTRACT AND KEYWORDS

Purpose
The purpose of this study was to identify the factors that cause disputes within the Ghanaian construction industry and their relative importance from the perspectives of clients, consultants and contractors and to recommend possible ways of preventing or reducing them.

Design/Methodology/Approach
To achieve the study objectives, a comprehensive literature search and interviews of the main stakeholders in the Ghanaian construction industry were conducted to identify the factors that cause or have the potential of causing disputes within the construction industry. A questionnaire was subsequently designed to collect information from clients, contractors and consultants on the relative importance of these factors in causing disputes in the Ghanaian construction industry. The field survey conducted included 20 clients, 27 contractors and 57 consultants.

Findings
The results suggest that the ten most important triggers of construction disputes in the Ghanaian construction industry from the collective view point of the three categories of respondents were: (1) poor financial arrangements by clients leading to late payments; (2) failure of the client to honour payments as and when due; (3) unclear and incomplete description of items in the bills of quantities; (4) ineffective communication between the parties on the project; (5) contractor’s failure to read the contract documents; (6) design and specification oversights; (7) award of contractors to incapable contractors; (8) contractors’ failure to price properly for the works; (8) disruptions and delays by the contractor that
create deviation from initial programme of works; and (10) Government policy which encourages low evaluated tenders followed by claims.

**Research limitations/implications**

The survey was done on samples from two regions of the Ghana. An expanded sample covering the other eight regions would have generated an increased understanding of the nature disputes in Ghana.

**Practical implications**

The study increases the awareness of stakeholders of the causes of construction disputes and provides concepts that contribute to minimising the factors that trigger them.

**Originality/Value**

This study provides a basis for reducing construction disputes and thereby minimising the incidence of costly disputes. The findings are of value for clients, contractors and consultants.

**Keywords**

Construction industry, Disputes, Ghana

1. **INTRODUCTION**

Construction disputes happen fairly often; they are a reality on every construction project and could happen at any point in time during the design or construction phase of the project (Hall 2002). Disputes occur because construction projects by their nature bring together a wide variety of people with different set of objectives and who are often unfamiliar with one another. These individuals or groups of individuals are expected to mesh hurriedly to get a specific job done in a short-term and afterwards get disbanded. These project participants rarely have any opportunity to align their interests before the project begins; their roles and obligations are often predetermined and cut out in conditions of contract which seek to apportion risks, sometimes disproportionately. This ad hoc arrangement provides a hot bed for disputes prompted by mistrust and the predictable attempt by each party to make the most of its position while minimising its risk.

Construction disputes vary in nature, size, and complexity, but they all have a common thread; they are costly both in terms of time and money and are often accompanied with the destruction of individual and good working relationships. Indeed, it is this tendency to destroy relationships
and increase time and cost of construction projects, that has provoked a common interest of researchers in different countries to understand the nature of the causes of construction disputes in order to formulate measures to prevent or minimise their occurrence or resolve them swiftly, efficiently and in a cost effective manner if they happen.

In Ghana there is no published literature or statistics regarding construction disputes, but there is sufficient anecdotal evidence to suggest that they occur in numbers that should justify a research in the area.

2. OBJECTIVES OF THE STUDY

The main objectives of this study are the following:

- To identify from the literature and interviews the factors that cause disputes on construction projects;
- To evaluate and rank the importance and frequency of the factors responsible for disputes on Ghanaian construction projects from the view point of clients, contractors and consultants and
- To suggest ways to prevent or minimise the occurrences of disputes on Ghanaian construction projects.

3. LITERATURE REVIEW

The literature on conflicts and disputes in construction reveals that conflict and disputes are sometimes used interchangeably but “conflict should be distinguished from dispute” (Murdoch and Hughes (2000, p.337). According to Murdoch and Hughes, conflict occurs when objectives are incompatible. On the other hand, disputes arise when conflict becomes an altercation. Similarly, Fenn et al (1997) submit that “conflict exists where there is an incompatibility of interest. When a conflict becomes irreconcilable and the mechanisms for avoiding it are exhausted, or inadequate, techniques for resolving the dispute are required." (cited in Poh, 2005, p. 10)

A number of articles and studies on causes of disputes on construction projects internationally were reviewed. Poh (2005) reported that disputes in the construction industry in Malaysia are attributable to actions or inactions by all parties. Some of these causes include incompleteness of drawings and specifications, design and specification oversights, poor management and supervision of projects, failure to provide design information in a timely manner and underestimation of the cost of the works.

Levy (2007) reported that the principal reasons for misunderstandings leading to disputes on construction projects in the USA were:

- Plans and specifications containing errors, omissions and ambiguities or which lack proper degree of coordination;
Incomplete or inaccurate responses or non-responses to questions or resolutions of problems presented by one party in the contract to another party in the contract;

- The inadequate administration of responsibilities by the client, architect/engineer, contractor, subcontractors, or suppliers;

- An unwillingness or inability to comply with the intent of the contract or to adhere to industry standards in the performance of work;

- Site conditions which differ materially from those described in the contract documents;

- Unforeseen subsurface conditions;

- The uncovering of existing building conditions which differ materially from those indicated in the contract drawings situations that occur primarily during rehabilitation or renovation work;

- Extra work or change order work;

- Breeches of contract by either party in the contract;

- Disruptions, delays or acceleration to the work that creates any deviation from the initial baseline schedule and

- Inadequate financial strength on the part of the client, contractor or subcontractor.

Campbell (1997) also revealed that in the UK, construction disputes generally occur due to:

- Adversarial nature of contracts;

- Poor communication between the parties;

- Ineffective communication on site;

- The inability to understand terms of contract and expectations of the parties;

- Proliferation of subsidiary contracts and warranties including those with consultants;

- Fragmented nature of the industry;

- Improper contractual documentation;

- Tender systems and government policy on tendering encouraging low tenders followed by claims; the inability or reluctance to pay;

- Erosion of contract administrator’s role as quasi-arbitrator in contracts and

- Unforeseen effect of third party interests.

Soekimo et al. (2007) studied the causes of disputes on construction projects in Indonesia and grouped the causes into the following categories:

- External conditions (26.79%);

- Change of drawings document (21.43%);

- Condition of the field (19.64%);

- Change of technical specifications (16.07%);
• Others (e.g., cost estimates, professional ethics and licensing) (16.07%)

It is evident from these studies that the causes of disputes are varied. As suggested by Kumaraswamy (1997) and supported by Younis et al. (2008), a direct comparison of the results is “neither possible nor useful, because of the diverse industry cultures and differing methodologies and terminologies used in data collection, analysis and outcome presentations.” This observation notwithstanding, these researchers support the suggestion by Kumaraswamy (1997) that these factors could be categorised into three broad causes: external factors, contract, and project teams. Consistent with this opinion, others (Vorster, 1993 and Mitropolous, and Howell, 2001) have similarly classified them under project uncertainty, process problems and people issues.

4. SAMPLING TECHNIQUE

A total of 97 respondents including 20 clients, 50 consultants and 27 large scale contractors (D1 contractors) in the Greater Accra and Ashanti Regions of Ghana were interviewed. These two regions have the highest population of contractors and consultants and these researchers believe that they are representative of the population of interest. Again, the researchers assumed that D1 contractors were the most likely to be involved in construction disputes since they handle more complex projects involving many parties.

The lists of D1 contractors and consultants were obtained from the Building and Civil Engineering Contractors Association of Ghana, Ghana Institution of Surveyors (GhIS) and Ghana Institute of Architects (GIA). The total number of registered D1 contractors and the combined total of registered quantity surveying and architectural firms in both regions at the time of the study (2008) were 30 and 65 respectively.

Stoker (1985) (cited by Strydom and De Vos, 1998, p.192) suggested that for a population size of 30, at least 24 (80%) ought to be the sample size. Nevertheless, the questionnaire was sent to all the contractors listed.

The sample for the consultants was determined using the Kish’s (1965) formula. The calculation produced a sample size of 39. However, in order to overcome problems of non-response, wrong answering of questionnaire, and to achieve the desired confidence level, the questionnaire was sent all the 65.

Clients in the study consisted of both public and private institutions. A snowball sampling was used to select the number of clients for the study. Contractors and consultants interviewed were asked to suggest clients they had worked for having the characteristics been required. This resulted in 30 respondents.
5. QUESTIONNAIRE DESIGN

Questionnaire was designed to determine the importance and frequency of occurrence of the identified causes of construction disputes. The questionnaire was divided into two main parts. Part 1 related to general information for both the company and respondent. Respondents were asked to give a brief background of the company and their experience. Part 2 included questions related to the potential causes of disputes. A 5-point ranking system and a three-level scale of low, moderate, and high were utilised and the respondents were asked to indicate from the list of 56 potential causes of construction disputes, how important each cause was and how frequent it occurred.

6. DATA COLLECTION

Sixty-five (65) questionnaires were issued to the consultants and a total of 50 were returned representing 77% rate of return. Thirty (30) questionnaires were issued to the D1 contractors and a total 27 were received representing 90% rate of return. Finally, 20 answered questionnaires out of 30 were received from the clients’ organization representing 67% rate of response. The total response rate was 78% which is acceptable for analysis.

7. RESEARCH FINDINGS AND RESULTS

7.1 General characteristics of respondents

The respondents were quantity surveyors (56.7%), project managers (9.3%), architects (7.2%), project engineers or clerk of works (6.2%) and directors of firms or companies (26.8%). Majority (77.3%) of the respondents had more than 5-years experience in the construction industry.

7.2 Ranking of potential causes of disputes

The relative importance of each variable was calculated using the formula:

\[
Relative \text{ Importance Index (RII)} = \frac{\sum W}{A \times N}
\]

where,

\(W\) = the weighting given to each cause by respondents, ranging from 1 to 5,
\(A\) = the highest weight (i.e. 5 in the study)
\(N\) = the total number of samples

Clients consider ‘disruptions and delays by the contractor that create deviation from initial programme of works’ the most important factor
causing delay. On the other hand, contractors believe that the most important factor causing disputes is ‘unconfirmed oral instructions.’ Consultants think that the most important cause of disputes is ‘Failure of clients to honour payments as and when due.’ However, from the combined perspective of the respondents, the most important cause of disputes is ‘Failure of the client to honour payments as and when due.’

7.3 Frequency of causes of disputes

The frequency index formula was used to rate the frequency of occurrence for each cause according to three ordinal scales: high (3), medium (2), or low (1).

\[
\text{Frequency Index (F.I)} = \frac{3n_1 + 2n_2 + n_3}{3(n_1 + n_2 + n_3)}
\]

where \(n_1\) is the number of respondents who answered ‘high’, \(n_2\) the number of respondents who answered ‘medium’ and \(n_3\) the number of respondents who answered ‘low’.

From the collective point of view, the most frequent cause of disputes is ‘Poor financial arrangements by the clients leading to late payments.’

7.4 Severity of Causes of Disputes

This is an overall index, (‘Relative Importance Index’ x ‘Frequency Index’), which was used to obtain the ten most severe triggers of disputes among the 56 probable causes of disputes on Ghanaian construction projects.

The combined opinion of participants regarding the ten most severe causes of construction disputes in Ghana are:

i. Poor financial arrangements by the clients leading to late payments;

ii. Failure of the client to honour payments as and when due;

iii. Unclear and incomplete description of items in the bills of quantities;

iv. Ineffective communication between the parties on the project;

v. Contractor’s failure to read the contract documents;

vi. Design and specification oversights and errors or omissions resulting from uncoordinated civil, structural, architectural, mechanical and electrical designs;

vii. Award of contracts to incapable contractors;

viii. Contractor’s failure to price properly for works;

ix. Disruptions and delays by the contractor that create deviation from initial programme of works and

x. Government policy which encourages low evaluated tenders followed by claims.
8. AGREEMENT ANALYSIS

To investigate the agreement among the three groups of respondents, a non-parametric statistical method, the Kendall’s coefficient of concordance (W) was used for assessing agreement among the clients, consultants and contractors.

\[
W = \frac{\sum_{i=1}^{k} (R_i - \bar{R})^2}{n \left( \sum_{i=1}^{k} R_i^2 - \frac{1}{k} \right)}
\]

\[
W = \frac{9036.76}{14630}
\]

\[
W = 0.62
\]

The value of W obtained from calculation is 0.62. This result showed a fair to good level of agreement beyond chance alone amongst the respondents consisting of clients, consultants and contractors.

9. SIGNIFICANCE TESTING

This method was used to obtain the most significant causes of disputes on Ghanaian construction projects among the Fifty six (56) factors found in literature. The decision was whether or not to reject the null hypothesis (Ho) which was:

\[H_0: \text{a source among the list of the 56 potential causes of construction disputes listed in the questionnaires does not qualify to be selected as a real cause of disputes on Ghanaian construction projects.}\]

Based on the ranking assigned by the respondents, the summation of weighting of each potential cause was computed to perform the significance test to enable the relevant ones to be selected for the first objective to be achieved. An evaluation of the test statistic (Xs) was done and the p-value determined. The P-value was taken to be the smallest value at which the significance level (α = 0.05) could be present and still have been able to reject the H₀. The H₀ was rejected when the P-value was considered to be less than 0.475.

The five point ranking (i.e. 1, 2, 3, 4, &5) have a mean (μ) of three (3) with a standard deviation of 1.58. The probability of observing the sample mean or larger if μ = 3 and standard deviation (δ) =1.58 was computed. The test statistic was by Central Limit Theorem, approximately normally distributed with a mean (μ =3 and δ /√n where n is the number of responses for that factor. The p-value therefore, was obtained using the equation below:

\[
P[x \geq \mu] = P \left[ z \geq \frac{x - \mu}{\sigma / \sqrt{n}} \right]
\]

(For positive values of z)
\[ P[x \leq \mu] = 1 - P \left[ z \geq \frac{x - \mu}{\sigma / \sqrt{n}} \right]. \]

*(For negative values of z)*

From the standard normal distribution table, values z was read.

\[
= 0.5 - \frac{\alpha}{2} \\
= 0.5 - 0.05/2 \\
= 0.475
\]

All P-values greater than 0.475 were accepted while those less than 0.475 were rejected (95% level of confidence).

Based on the test of significance, 30 causes were accepted as having the potential of causing disputes in the Ghanaian construction industry significance.

### 10. CONCLUSIONS

This study investigated the causes of disputes on construction projects in Ghana. It studied the importance, frequency and severity of the 56 causes identified from the literature and semi-structured interviews. The respondents in this study included 20 clients, 50 consultants and 27 contractors. The ten most severe causes of disputes which occur on Ghanaian construction projects from the collective viewpoint of the three groups of respondents were:

i. Poor financial arrangements by the clients leading to late payments;
ii. Failure of the client to honour payments as and when due;
iii. Unclear and incomplete description of items in the bills of quantities;
iv. Ineffective communication between the parties on the project;
v. Contractor’s failure to read the contract documents;
vi. Design and specification oversights and errors or omissions resulting from uncoordinated civil, structural, architectural, mechanical and electrical designs;
vii. Award of contracts to incapable contractors;
viii. Contractor’s failure to price properly for works;
ix. Disruptions and delays by the contractor that create deviation from initial programme of works and
x. Government policy which encourages low evaluated tenders followed by claims.
11. RECOMMENDATIONS

The following recommendations are made to minimise disputes on construction sites. Clients must pay particular attention to the following factors:

- Progress payments must be paid to contractors as when they are due. It means that sufficient financial arrangements must be made before construction projects are initiated. Additionally, the long bureaucratic processes involved in honouring payments of contractor’s claims must be curtailed to conform strictly to the provisions of the contract;
- Resources and capabilities of contractors must be thoroughly investigated prior to awarding of contract to the lowest bidder or any bidder;
- A comprehensive and thorough brief to the design team is necessary to enable it prepare detailed contract documents which leaves no doubt in the minds of the contractor regarding what the must be constructed. This is a key to avoiding design errors and omissions and the consequent variations on site and
- All members of the design team must be employed at the onset and must be involved in the evolution and production of working drawings. There must be proper coordination of the design process.

Contractors must consider the following factors:

- The right calibre of administrative and technical staff should be assigned to projects to handle all administrative and technical issues including pricing, planning and scheduling, interpretation of production drawings, receipt of instructions from consultants or project managers, and general supervision of works;
- Resources must be made available as and when required on site to achieve minimal interruption of the programme of works. This must involve proper management of financial resources, cash flow planning, the deployment of sufficient and motivated labour, and the provision of the right plant and equipment and
- Contract documents must be reviewed and related to one another and all ambiguities, inconsistencies, and deficiencies must be brought to the attention of consultants before construction begins.

Consultants must take note of the following:

- Sufficient time must be allowed for design production. Adequate and quality information must be obtained from the client, site, and market to achieve comprehensive design and specification and
- Design must be coordinated; all members must be involved and nothing must be left "to be sorted out" on site. Without fully coordinated drawings and specifications, the project will most certainly lead to variations and increase in cost.
Generally, effective communication between the parties before and during the construction of the project must be a priority. Issues concerning design, payment and compensation, variations in scope and others must be communicated effectively, efficiently and in a timely manner by the originator to the recipient. Effective communication must be supported by a good record keeping by all parties. Before the works begin, the parties should foresee possible future problems and establish procedures to organise and retain complete and accurate records concerning the progress of work. Taking photographs of the works as it progresses, carefully documenting all discussions particularly on site project meetings and recording all instructions received and actions taken on those instructions are absolutely valuable.

12. REFERENCE

Poh, K.C. (2005). The causes of construction disputes on client organisations. A project report for the degree of MSc. (Construction Management), Faculty of Civil Engineering, Universiti Teknologi Malaysia.
Information and Communication Technology Uptake and Utilization in the Zambian Construction Industry

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ABSTRACT AND KEYWORDS

Purpose

This study is aimed at investigating the level of Information Communication Technology (ICT) uptake in the Zambian Construction Industry and make recommendations on possible interventions.

Methodology

A relevant literature on studies done in other countries and in Zambia as well was reviewed. Investigations were done through a questionnaire to purposively selected clients, consultants and contractors registered with the National Council for Construction (NCC) in Zambia.

Findings

Preliminary findings indicate that Zambia has not fully appreciated the value of ICT and the impact of its use on the productivity Value Chain management. The delay in ICT uptake in Zambia is limiting advances in construction quality, cost efficiencies and competitiveness of local firms. Among others, suggested interventions included to lobby for increase in Government funding for training; to increase opportunities for more private trainers to participate in ICT training and credentialing; and to engage in
more regional collaboration for information exchange on competitive bidding processes and sustainable local contractor development programs.

Research Limitations

The survey through the questionnaire had limitations as it relates to industry best practice in the International Arena because of varying applications of construction techniques and methodologies which depend on National ICT policies and nature of ICT infrastructure in Countries where such studies have been conducted. Furthermore, the survey was relatively small compared to the target group of over 2000 industry players accredited to the NCC. This was mainly due to lack of funding for the research.

Practical Implications

The study establishes a baseline for future construction sector ICT studies and further registered the sectoral ICT competitiveness of the Zambian Construction Industry.

Originality

This is a pilot study regarding construction sector ICT uptake and utilization in Zambia.

Keywords

Construction Industry, global competitiveness, Information and communication technology

1. INTRODUCTION

1.1 Contribution of the Construction Industry to the Zambian Economy

The Bank of Zambia Annual Report (2008) reported that Zambia recorded 5.7% real growth domestic product (GDP) marking the fifth consecutive year of economic growth exceeding 5%. Major drivers in this growth were agriculture, construction, transport and communications, tourism and manufacturing sectors. During 2006, the construction sector grew by 14.4% and contributed 1.3% points to 6.2% GDP growth the country posted during 2006. However, this outturn was a slump from the 21.2% recorded in 2005 when it also contributed 1.7% points to the 5.2% GDP growth. In fact the construction industry has contributed the largest share of percentage points to GDP since 2003.
Furthermore, Zambia’s fiscal policies in the recent years have led to micro-economic stability which in turn has brought to fore increase in Foreign Direct Investments (FDIs) especially in the Agriculture and Mining Sectors, leading to a plethora of construction activities (Bank of Zambia Annual Report, 2008). Table 1 below illustrates the growth pattern of the top 5 economic sectors.

### Table 1: Performance of the top 5 economic sectors in Zambia from 2001 to 2007

<table>
<thead>
<tr>
<th>Sector</th>
<th>2001 %</th>
<th>2002 %</th>
<th>2003 %</th>
<th>2004 %</th>
<th>2005 %</th>
<th>2006 %</th>
<th>2007 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>2.6</td>
<td>1.7</td>
<td>5.0</td>
<td>4.3</td>
<td>2.8</td>
<td>2.2</td>
<td>1.9</td>
</tr>
<tr>
<td>Tourism</td>
<td>2.1</td>
<td>4.8</td>
<td>6.9</td>
<td>6.4</td>
<td>12.1</td>
<td>16.1</td>
<td>14.2</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>4.2</td>
<td>5.7</td>
<td>7.6</td>
<td>4.7</td>
<td>2.9</td>
<td>5.7</td>
<td>4.9</td>
</tr>
<tr>
<td>Mining</td>
<td>14.0</td>
<td>16.4</td>
<td>3.4</td>
<td>13.9</td>
<td>2.8</td>
<td>7.3</td>
<td>5.2</td>
</tr>
<tr>
<td>Construction</td>
<td>11.5</td>
<td>17.4</td>
<td>21.6</td>
<td>20.5</td>
<td>21.2</td>
<td>14.4</td>
<td>12.2</td>
</tr>
</tbody>
</table>

Adapted from: Zambia - Central Statistics Office (May 2008)

#### 1.2 The application of ICT in the Construction Industry Value Chain

In general the construction industry value chain comprises the following key stages: planning; procurement; implementation; handover and maintenance and the final stage of decommissioning and demolition. Each stage of cycle involves the use of ICT as outlined below.

#### 1.3 Planning

At planning stage there are two areas of application. Firstly it is applied in the Country and Town Planning (CTP) and secondly in actual project planning. In CTP the ICTs are applies in the following categories of works:

- Production of Environment Impact Assessment (EIA) reports
- Production of geographical and cadastral maps
- Simulation of services and impact analysis during the design stage

In the project management arena, the following processes are applied:

- Communication through mobile phones and emails
- Production of drawings in digital form
- Production of bills of quantities with preliminary cost estimates
- Submission of electronic copies for building permit or approval
1.4 Procurement

At procurement stage, ICT is used for soliciting bidders, through website or e-mails of digital drawing and contract documents. The same channel is applicable when receiving project bids. Evaluation of bids using specialised software such as Microsoft Excel. To augment this processes the successful or unsuccessful bidders are informed through emails or text messages on mobile phones.

1.5 Implementation

The implementation process is one of the crucial elements of the CI Value Chain and thus ICT application becomes an imperative. The following areas are the typical areas of application:

- Project setting out and validation of cadastral maps using appropriate software such as the Global Positioning System
- Communication with clients, consultants, contractors and regulators through emails or mobile phones
- Production of activity schedule with deliverables
- Production of Materials Buying Schedule for the project
- Monitoring and Evaluation especially by Project Managers
- Production and emailing of minutes of site meetings
- Submission of electronic certificates of payment
- Receipt of payments through electronic transfers
- Video Conferencing

1.6 Handover/Commissioning for use and maintenance

ICTs are applied in Monitoring and Evaluation of conditions of the structures. Clients also communicate to the Contractor on specific reports and queries from which appropriate interventions are proposed and communicated to key stakeholders.

1.7 De-commissioning and demolition

This phase amalgamates all data storage on the project in order to determine the structural-integrity and monitor safe life span of a structure. Sometimes special digital gadgets are used to produce specialised reports electronically. Demolition plans are thus recommended and communicated through emails, video conferencing and other forms of digital presentations.
2. E-BUSINESS IN THE CONSTRUCTION SECTOR – WORLDWIDE TRENDS

In the early beginning of the third millennium, many individuals and construction industry consultants carried a ‘dot.com business plan’ around in their briefcases. Entrepreneurs were seeking to reinvent housing production methods, product procurement, sales and marketing, and operations, among many other things by simply using technology. Today most big building companies run integrated software systems (Thompson, 2010). It is indeed amazing to see the communication improvements that have come from the cellular phones, emails, and wireless internet connections.

The ICT infrastructure platform helps to increase competitive advantage; enhance productivity; maximize growth; reduce risks; embraces workforce diversity; and reduces operating expenses (IDG Connect, 2010). It also increases employees’ morale and even protects the environment through project simulation and Environmental Impact Assessments (EIA) reports which are a prerequisite for large projects in Zambia. Another interesting example of ICT advancement is the artificial intelligence and expert systems which are now able to perform the work of white-collar professionals. As functionality of machines and computer systems continues to evolve, it will transform societies by influencing critical factors such as the quality of life, the dynamics of labour markets, and the nature of human interactions. For example, the benefit of advanced technology of the ICT platform has been noticeable in automobile navigation systems which are incapable of guiding a vehicle across the unpredictable desert terrain, but quite adept at finding the optimal route to the desired destination using a network of existing roadways. Global Positioning Systems (GPS) integrated with Geographical Information System (GISs) available in many modern vehicles allow the driver to hand over navigation decisions to the computer thereby offering additional level of safety and convenience.

The ICT platform allows for multiple round of feedback on important documents and actual construction processes thereby allowing an easy audit trail for the client and other key project stakeholders. This process assists to eliminate hurdles such as tracking responses, distribution of data in real-time, data management and streamline review processes.

The 2006 e-Business Survey data suggested that large construction enterprises are increasing their focus on ICT issues, as they have started introducing more advanced ICT solutions such as e-procurement systems, collaborative design systems and collaborative document sharing (Construction Industry e-Business w@tch, 2006). Ironically, this is a marked improvement on the 2005-e-Business Survey finding which confirmed the low ICT uptake as well as the untapped potential for ICT-based developments in the Construction Sector.

In fact the 2005 survey indicated that: “despite the potential of Enterprise Resource Planning (ERP) systems to increase productivity and ICT efficiency, construction companies hesitate to adopt these ICT
solutions” (Construction Industry e-Business w@tch, 2005). Unfortunately, Small, Medium Enterprises still lag behind in undertaking ICT skills development or employing ICT experts.

The Financial Times Limited - Malaysia (2007) reported that sectors such as entertainment, financial, tourism and retails industries beat the construction sector in implementing systematic methods of disseminating and collecting of information among stakeholders. The Financial Times Ltd of Malaysia (2007) further indicated that in the use of 3D Auto CAD, for example, architects and engineers can view and share information and develop engineering or detailed designs allowing the quantity surveyor to quickly quantify preliminary cost estimates of a project.

2.1 Predominant Image of the Zambian Construction Industry

The public image of the Zambian Construction industry is characterised by ‘shoddy works’ or sub-standard workmanship. Whereas the old structures bear good and reasonable outlook especially in public buildings, the recent public structures have left many questions in the eyes of the public as well as the Government who are the major Client of Public Infrastructure in Zambia. One of the reasons for this trend is falling enrolments in trades-schools that run core sector skills such as Bricklaying, Carpentry, Plumbing, Electrical and Welding at Advanced Certificate or Diploma level. This trend has seriously affected the stable supply of skills to the construction sector. However, the enrolment in business and commercial advanced certificate or diploma courses as compared to technical fields in the same level is on the increase (TEVETA Annual Report 2008, p.12).

The above trend is a common phenomenon worldwide as documented by a study done in the United States of America called the ‘Jobs Rated Almanac’ which found that construction trade was placed in the bottom 20% of career opportunities (Construction Newsline, 2007).

Ironically, the 2007 winner of the Most Effective Use of IT in the UK Construction Sector went to Edmond Nutall’s Construction Company (Financial Times Limited - Malaysia, 2007).

2.2 Impact of ICT on the Labour Market

One of the most prominent concerns about ICTs is the fear that due to technological advances, machines will replace millions of workers, leading to mass unemployment. As production processes become more efficient, they apply downward pressure on price levels, thereby leading to increased demand for products and subsequent upward response from consumers. To satisfy the growing demand, producers of goods and services tend to increase capacities through setting up of more production and selling points and in turn creating new job opportunities for the labour market. This theory is supported by Handel (2003) who argued that fluctuations in unemployment rates are generally associated with business cycles and do not indicate that ICT is likely to displace a large number of workers. Handel (2003) contended that this phenomenon only meant that introduction of
new technologies shall result in more efficient allocation of scarce resources, such as labour, capital and raw materials and not sheer displacements.

The uptake of 3D technology solutions in the construction industry is mainly driven by architects and engineers and then introduced into large construction enterprises. However, the Construction Small and Medium Enterprises, operating as contractors or independent contractors may have difficulties in meeting the ICT skills requirements needed to interact and fully benefit from the use of 3D technology. In a related development Wilkinson (2009) argued that “common processes and tools bond the team together and release major efficiencies”. For example, good inter-operability of ICT systems in the supply chain using Construction Excellence’s Avanti protocol, project extranets and single building information models, and common logistics for moving materials to and from site. Wilkinson (2009) suggested that the construction industry authorities should encourage industry professionals to explore the huge potential of ICTs in order to support the delivery of a meaningful and sustainable built environment. Furthermore, Oladapo (2007) contends that although the adoption of ICT in construction sector appears to be too slow and too late to impact on change in policy, increased investment in ICT education in the developing world could produce well informed future leaders who will install a culture of ICT uptake and utilisation in key sectors to improve productivity.

In Zambia, however, the application of ICT does not cover all the stages outlined above due to various challenges. It was against this background that an investigation was carried out to initiate a process of establishing the scope and extent of challenges of low ICT uptake and utilisation. This research study is a pilot one investigating the ICT uptake and utilization on the Construction Industry in Zambia. Its aim is to examine the extent of ICT knowledge and application by professionals in conducting construction business. It is hoped that studies such as this one shall generate solutions that will promote wide use of ICT in the Construction Industry.

3. METHODOLOGY

The quantitative approach was selected as a way of gathering data from the stakeholders. Closed-ended questions were administered to construction stakeholders. Due to financial constraints, the sampling criterion of stakeholders was based on the functional, statutory regulation, sector skills development roles as well as proximity to research base. Thus a population size of 32 persons out of an estimated over 2000 professionals in the Construction Industry was targeted. As a way of optimising costs, the Lusaka Urban District was selected in which construction industry respondents were purposively selected based upon their knowledge and role in the Construction Industry Value Chain. The data elicited from the exercise was processed using Microsoft Excel.
software through tables and graphic presentations then subsequently analysed.

The construction industry value chain in Zambia comprises the following: Clients such as Government, International Development Agencies and the private sector, Infrastructure Design and Development Consultants, Constructions firms registered under the National Council for Construction, the Built Environment Implementing and Regulatory Agencies such as Roads Development Agency (RDA), the Buildings Department in the Ministry of Works and Supplies, the National Roads Fund Agency (NRFA), The Zambia Public Procurement Authority (ZPPA), Local Authorities operating under the ambit of the Ministry of Local Government and Housing (MLGH), and the National Council for Construction (NCC). In summary, the works are planned and designed by the Clients in collaboration with the Consultants. The construction firms procure and execute the works under the supervision of local authorities and project consultants. The NCC in collaboration with other regulatory agencies plays the regulatory function through registration, development and implementing industry best practices.
4. RESEARCH FINDINGS

4.1 Research participation

Figure 1: Research participation

The research team targeted experienced construction industry consultants, experts from National Council for Construction (NCC) as a regulatory agency and senior officials of the Contractors Associations. Further contacts were made to Government officials from the infrastructure development Ministries and proprietors of construction firms. Figure 1 above illustrates the percentage composition of respondents to the survey.

Figure 2: Method of acquiring ICT knowledge
Contractors were asked about how they acquired knowledge in ICT. They indicated that there was no formal or structured approach to ICT uptake in the Zambian Construction sector. As shown in Figure 2, if 42% are acquiring skills through self-learning processes, then training the industry workforce will require a mammoth task to achieve the required competitive level in the face of globalizations. Research in many countries seem to suggest that although an entrepreneurial mindset is good at an individual level; such efforts are not sustainable due to macroeconomic elements which are inherently built within the big sectors of the economy such as construction (The Construction e-Business Watch European Commission 2005). Therefore structured training is appropriate and must be linked to a global perspective through sectoral Research and Development (R & D) to ensure sustainability.

The main observation was that there is uneven approach in methods of acquiring ICTs in the sector. This uneven diffusion of information technology is resulting in a ‘digital divide’. On the international level, the digital divide generally follows the income distribution, education levels, and several other characteristics of people both within and across countries. People and countries with limited access to information technology are unable to benefit from this valuable resource and this fact impedes the competitiveness of an organization. The digital divide in Zambia is therefore exacerbating a negative impact of globalization leading to many foreign construction firms procuring more lucrative projects while the local firms remain undeveloped due to limited contracting capacities.

As can be seen from Figure 3, the results indicate that almost a half (48%) of the construction industry stakeholders were only using email platform and very little interactive websites and Short Messaging System (SMS) to communicate. This suggests that there are very few local contractors who are utilizing websites for procuring works and communicating with clients and thus are conducting business in a traditional manner. This implies that...
their growth portfolio shall remain static for some time while the effects of globalization will further limit their competitiveness. In countries where there is an increased use of websites, construction firms are more robust and agile.

![Knowledge of Construction Sector ICTs vs Utilization](image)

Figure 4: Knowledge of construction sector ICTs vs. utilization

Figure 4 indicated that although 70% industry persons were aware about specific sectoral ICT platforms for use in their daily operations, the utilizations side was below 50%. This suggests that there is neither a strategy to improve performance nor knowledge of the effects of ICT utilization and how ICT can improve competitiveness of a nation on the global market. Moreover, local contractors have complained that Government awarded lucrative infrastructure development projects only to foreign firms. Our research went further to investigate the perspective of procuring entities, which operate under the ambit of the Zambia Public Procurement Authority (ZPPA), in different Government Ministries. The findings indicated that most local bids were 'non-responsive'. This view was also reflected by the Buildings Department in the Ministry of Works and Supply as well as the Road Development Agency who both indicated that even simple tasks of completing contract documents was still a problem for local firms. Furthermore, many local firms were unable to download drawings and contract documents from client websites that were indicated in tender notices. When it came to most foreign firms, there was evidence of higher utilization of sectoral ICT platforms in the way they responded to e-procurement tenders.

As regards to the benefits of using ICT, TEVETA and most consulting engineers observed that ICT utilisation in the sector can improve data storage, sharing, productivity, quality and value of the product, thereby reversing the dented image of the industry. They further observed that the ICT platform offers quick and flexible data archiving and retrieval.
5. CONCLUSIONS

This study concludes that the Zambian Construction industry players have not appreciated the uptake and utilisation of ICTs to global competitive thresholds. The Government has put in place sufficient ICT legislation for increasing uptake and utilization. However, due to competing needs of government, matching resources for implementation of the main objectives may be lacking. It is for this reason that professionals in the sector must engage stakeholders in infrastructure development in order to optimize uptake and utilization of sectoral ICT platforms. Imbedding of ICTs should start from planning and design stage to completion phase of projects.

The delay in ICT uptake in Zambia is limiting advances in construction quality, cost efficiencies and competitiveness of local firms. The industry must become more flexible in its business conduct and encourage ICT uptake and utilization. It must seek integrated solutions instead of embracing and justifying outdated practices.

ICTs are here to stay and will continue to increase their impact. The challenge therefore is for the Zambian Government and the CI players to realize that this technology requires pragmatism in terms of improving the situation on the ground. The literature has demonstrated that the uptake and utilization of ICTs is below competitive thresholds and thus impliedly affecting the CI performance. Attaining the national vision of becoming a middle income country by 2030 implies that Zambia should begin to benchmark best industry practices from middle income countries in the region and beyond.

6. RECOMMENDATIONS

In a quest to increase uptake and utilization of ICTs in the Zambian construction sector, this paper is proposing the following interventions:

- Introduce rigorous sectoral ICT skills training, networking and advocacy for involvement of industry stakeholders.
- Engage in more regional collaboration for information exchange on competitive bidding processes and sustainable local contractor development programs.
- Lobby for increase in Government funding for training due to the absence of legal framework for skills development fund and perceived donor fatigue in capacity building support.
- Improve industry – schools links (e.g. Construction Clubs)
- Increase opportunities for more private trainers to participate in ICT training and credentialing.
- Improving the attractiveness of the industry through rigorous advocacy for Construction Sector Research and Development (R & Ds).

As a general recommendation, there is need for further research on this subject to elicit more evidence from a larger sample.
7. REFERENCES


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The Bank of Zambia Annual Report 2008


Evaluation of Botswana Housing Corporation Outsourced Housing Maintenance

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ABSTRACT

Purpose of the paper

Poor service delivery and costs associated with maintenance had prompted a review of the maintenance operations of Botswana Housing Corporation (BHC). The review highlighted deficiencies and recommended outsourcing of maintenance. Maintenance has since been outsourced, but a subsequent customer satisfaction survey undertaken revealed widespread dissatisfaction on the part of the customer. This study investigated the causes of the negative perception of outsourcing by customers.

Methodology

The research question was investigated by means of questionnaires administered to a randomly selected group of contractors and maintenance personnel who oversee the maintenance operations of the BHC. Population samples comprised of 35 contractors out of 58 (60%) and 17 out of 29 (59%) of maintenance personnel.

Findings

It was found that the majority of contracted companies lack management skills and broad knowledge of housing maintenance trades. Furthermore, the corporation does not have strategic plan to drive the maintenance operations and the provisions outlined in the maintenance policy are not being practiced.

Limitations/implications

The study was limited to maintenance operations of the BHC.

Keywords

maintenance, performance, quality, service level agreement.
1. **PURPOSE**

The Botswana Housing Corporation (BHC), a parastatal institution in Botswana, has restructured and changed its housing maintenance procurement system from in-house to an outsourced system. This outsourced maintenance has not yielded the intended results as evidenced by low rating in a subsequent customer satisfaction survey. The present study was undertaken to determine the causes of the negative perception of the BHC’s outsourced housing maintenance operations.

2. **METHODOLOGY**

Two questionnaires were designed to explore the causes of dissatisfaction amongst BHC customers. The questionnaires probed the educational backgrounds of both groups (contractors and maintenance staff) to determine their level of understanding of maintenance issues, processes employed as well as factors that could have a significant impact on performance of maintenance and the most frequently reported trades and capacity to deal with them. The questionnaires also probed the quality of workmanship as well as the existence or lack of proper processes and strategy in use to plan, track, supervise and report the maintenance performance.

The questionnaires were administered to a randomly selected group of contractors and also to maintenance personnel who oversee the maintenance operations of the BHC. Population samples comprised of 35 contractors out of 58 (60%) of the contractors engaged by the BHC to carry out residential maintenance operations, and 17 out of 29 (59%) employees of the BHC Maintenance Department. The latter were all employees at maintenance inspector level and CMMS (Computerised Maintenance Management Systems) co-ordinator level.

Prior to distribution to the respondents, the questionnaires were validated by two officers of the Maintenance Department and two officers of the Property Management Department of the BHC.

3. **FINDINGS**

3.1 **Responses from Maintenance Staff**

Out of a total of the seventeen respondents, 3 (18%) were females, while the majority of respondents (55%) were between the age of 25-34 years and 45% were between 35-44 years.

Qualifications of maintenance staff included a Construction Technician Certificate (9%), National Craft Certificate (36%) and the Diploma in Construction (55%) Except for the construction technician
certificate qualification, the qualifications are viewed as adequate and in line with expected work.

Most (91%) of the maintenance staff is trained in handling complaining tenants. This should have a positive effect on the satisfaction levels of customers through the way they are handled.

All of the respondents know about the existence of lead times as prescribed by the SLA. However, there were differing responses to the question of whether the lead times are met or not, with 64% saying lead times are not met and 27% saying they are met.

The study revealed that 64% of the respondents clearly understand the SLA, 9% very clearly and 27% somewhat understand. This compares well with the knowledge of the material specification as 73% are conversant, 9% very conversant while 18% are somewhat conversant.

Mixed responses were received on the method of checking whether contractors have used specified items: responses ranged from the use of brand names and prices, standard coding and, mostly, visual inspection.

Regarding the clarity of instructions to contractors, 82% of the respondents were of the opinion that instructions are very clear or clear.

![Figure 1: Distribution of Respondents by Opinion on Clarity of Instructions to Contractors](attachment:figure1.png)

Responses to the questions on whether inspections were carried out before work orders are issued or after work was done revealed that 36% indicate no inspections are done before work order generation and 82% say work is inspected after work is done. In cases where all work is not inspected upon
completion, random sampling is done to select reports for inspections and the inspections are further necessitated by the nature of the report.

On the question whether supervisory staff make any followups to clients’ comments, 64% of the respondents answered in the affirmative.

The existence of a system of receiving feedback was confirmed by 64%, with tenants’ meetings as well as contractors’ meetings being the feedback forums. The recording process is not mentioned.

Only 73% of respondents believed that records of maintenance work undertaken together with suspected causes of defects are kept in BHC.

In order to better serve the customer and operate effectively, maintenance practice requires adherence to safety. The responses show that there are no safety policies for both BHC and contractors engaged by BHC.

Electrical trades emerged as the least effective discipline (91%) whereas carpentry is fully effective (100%). This can denote shortage of skilled manpower in the electrical discipline.

Among the attributes that can have an effect on the customer, cleaning, courtesy, and time taken to complete work were rated as fair by the majority of the respondents (over 60%), while workmanship was rated as low (45%) – cf. figure 3.

The vast majority (91%) of the contractors were regarded to be sufficiently qualified bracket (perceived to have a nabove average ranking), while only 9% of the respondents rated contractors as unqualified.
The overall effectiveness of maintenance processes adopted by the BHC were rated by 55% of the respondents as good, 36% as fair and 9% as poor.

Quality was perceived by maintenance staff as somewhat satisfactory by the majority (55%), while 36% rated maintenance quality as satisfactory and only 9% rate the quality of maintenance as unsatisfactory (cf. figure 4).

![Contractor Rating by Attribute](image)

**Figure 3** Rating by Workmanship, Completion Time, Courtesy and Cleanliness of Work Area
Responses to an open-ended question on suggested improvements to the contracted maintenance system included aspects like improvement of capacity of contractors, opening up of the maintenance operations to competition and improvement of communication processes, with the latter perceived to be the highest priority. The majority of respondents also suggest that tenants should be educated about the new maintenance system in BHC.

Response as to whether an earlier recommendation by consultants to involve maintenance at design stage (G4, 2006) had been implemented, revealed unsatisfactory progress (figure 5). There is no effort to standardise fittings during construction and subsequent maintenance with the result that there is multiplicity of types of fittings in BHC properties. The varying fittings include those that tenants are unable to easily replace by themselves.
The last section of the questionnaire dealt with the computerised maintenance management system (CMMS), that forms a crucial part of the maintenance management operations. It is a tool that can monitor performance against set targets i.e. SLA, tracks progress of work, and facilitates records keeping and feedback to inform future decisions.

Figure 6 illustrates the perception of various attributes that define a functional CMMS. The responses are generally close to the median. This may imply that users have found a way of going around the problems they encounter or, alternatively, that the system just about does what is required.
3.2 Responses from Contractors

Characterisation of respondents: Responses revealed that 92% of the sample consists of former employees of the BHC, while only 8% come from the industry. Out of a total of the thirty-five respondents, 8 (23%) were females. Unlike the maintenance staff respondents’ age distribution, the majority of contractor respondents (46%) were between 35-44 years; 38% were between 45-55 years and 8% declined to indicate the age group. The majority of respondents (31%) hold Junior Certificate; 15% hold Cambridge Overseas School Certificate; 23% have tertiary training; 23% refused and 8% had neither an formal general educational background nor any industry qualification.

Qualifications of contractors included a Construction Technician Certificate (69%), National Craft Certificate (15%) and the Diploma in Construction (8%). The remaining 8% held non-building related qualifications ranging from secretarial, accounting and information technology to procurement.

Question 2 was asked to identify the contractors’ strengths by discipline. Plumbing was the highest with 31% and electrical and masonry were lowest at 8% each. Another group making 31% were general certificate holders who are trained across the building maintenance disciplines and 23% made the category of other and this group comprised of those who do not have building trades.

Contractors were asked specifically whether or not they had been trained on how to handle complaining tenants. The responses indicate that 72% of the contractors have received such training.
All the contractors were aware of the lead times contained in the SLA and 85% said the lead times are being met, with the balance believing the lead times were not being met. The majority of contractors indicated that they were either very conversant (31%) or conversant (54%) with the specification of materials, while 15% were somewhat conversant.

The majority (54%) believed that work orders were not clear enough and the information contained did not enable them to plan adequately. On the specification of completion time, 85% of the respondents indicated the work order did not give an indication of the completion time. It should be noted, however, that the completion time in the work order should not be interpreted in isolation to the SLA requirements. Though completion time may not be indicated, the SLA prescribes the turnaround times under classification of emergency, urgent and normal.

The majority (54%) believed that work orders were not clear enough and the information contained did not enable them to plan adequately. On the specification of completion time, 85% of the respondents indicated the work order did not give an indication of the completion time. It should be noted, however, that the completion time in the work order should not be interpreted in isolation to the SLA requirements. Though completion time may not be indicated, the SLA prescribes the turnaround times under classification of emergency, urgent and normal.

The work order notification process has a bearing on the time the customer reports the repair to the time repairs are carried out. The responses show that a cell-phone is the most common method of communicating work allocations (especially for emergencies).

The respondents were asked if they have received training on how to behave when at the customers’ premises (code of conduct). 82% indicated they had received such training. All of the respondents say they inform the tenants of the problems found and 92% claim to educate the tenants on ways to prevent a repeat and what to do should the fault recur.

Safety, health and environment questions were asked to establish possible exposure to risk from improper practices by contractors. Responses show positive adherence to staff safety clothing at 92%, staff training at 92% and observation of environmental policies at 82%.

Most of the contractors feel they are fully capable of carrying out maintenance work as required Figure 7 analyses the contractors’ capacity in terms manpower, financial and management capacity, equipment etc.

The questionnaire ended with two open-ended questions. The first was on problems encountered during the term of contract with BHC. The most common complaint was delayed payments by the employer. Contractors cited poor performance as a result of poor cash flows.

The second open-ended question probed the most frequent repairs. Electrical and plumbing were regarded to occur most commonly, followed by carpentry.
4. CONCLUSIONS

There are conflicting views between maintenance staff and contractors regarding the quality of the outsourced maintenance service. Whereas this needs to be resolved, the processes adopted so far do not adequately address the customer expectations.

The study has shown that the majority of these contractors are former employees of BHC. The report by G4 et al. (2006) stated poor qualifications and lack of supervision to be some of the causes of poor performance at that stage. These ex-employees are now contractors. The study has shown training for most of them as basic built-environment related training. Further, some have no technical training or come from non-building trades, for example, finance, information technology, secretarial and procurement. With no business management skills amongst the majority of the ex-employees, the companies that they established may experience organisational and financial management problems.

It has also been found that the expectations of the customers are not defined. The customers’ perceptions and expectations play a crucial role in the definition of quality of service and performance. This is an area that requires to be managed through engagements with customers.

The study has further identified deficiencies with the electrical trade. The maintenance staff respondents identified it as a trade where contractors are least effective. The contractor respondents by
specialisation have shown that only 8% have electrical trade as their specialisation. Responses to an open-ended question, to contractors revealed that the most frequent requests for repairs are electrical and plumbing.

The quality from the maintenance inspectors’ position is rated as average. The material specification is well understood by both groups of respondents. However, on being asked how they check material for compliance, the inspectors responded in different ways. Some use price tags and branding but they mostly rely on visual inspection and apply judgement on what they see. This tends to leave room for subjectivity. Literature has not helped much in this aspect either. However, the standardised condition assessment method of calibration for personnel can be applied to repair inspections. The respondents when asked if they carried inspections before and after repairs are done, indicated that there are no inspections before work orders are issued. Instead selective inspections are done after the work is done.

There has been very little progress towards maintenance personnel being involved in the overall design and specifications relating to fittings. There is no effort to standardise fittings during design and construction with the subsequent result being that there is multiplicity of types of fittings in BHC properties some of which are not user-friendly such that customers cannot carry out minor replacements on their own. The result is increased number of requests for maintenance including new projects. Further the approach has created a conflicting position between maintenance department and development department, whereby certain components are not replaced at all by maintenance department but continue to be specified by development department.

The BHC has implemented an in-house developed Computerised Maintenance Management System (CMMS). However, according to the respondents, the relevant data and reports for effective maintenance management of costs, trends/history and general performance issues are not available or are not adequate. The implemented system does not have a planned maintenance module or capability. Work related to planned maintenance is carried out manually with lump-sum figures entered for payment purposes only. On-site observation has shown that the details of work undertaken from manual work orders are not entered into the computer systems. Further, according to the respondents, the CMMS requires continuous availability of information Technology personnel and vendors of the system do not seem to be readily willing to make changes in the system.

It was also revealed that some properties are not registered in the system. Reports received by the Call Centre for these properties are forwarded manually to the maintenance department where manual work orders are generated.
5. RECOMMENDATIONS

Measurement of performance and quality in housing maintenance remains a difficult area to standardise. It is recommended that more research be done in performance measurement systems for the built environment with the view to standardise. Corporations like BHC need to define their position regarding what they are willing to offer and what the customers wish to receive. A balance can then be reached which should be achievable and works for both parties.

Further studies targeted at the customers need be carried out to isolate the primary cause of dissatisfaction. The customer satisfaction surveys should be designed to differentiate between whether what is expected by customers is in line with what the corporation undertakes to offer and whether what the corporation is willing to offer is reasonable.

Measurement of performance of housing maintenance is relatively non-standardised as the processes will mostly be derived from the requirements, policies and processes of the parent institution. The efficiency and quality of maintenance are to some extent measured against perception of recipients, who come from diverse backgrounds and will have different expectations and requirements. Much as objectives of housing maintenance and elements of maintenance are similar within residential housing properties, lack of standardisation results in inconsistent or inappropriate measurement.

6. REFERENCES


Criteria for selection of subcontractors and suppliers in a building project in Lagos state, Nigeria

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ABSTRACT AND KEYWORDS

Purpose of this paper
To examine the criteria used to evaluate subcontractors and suppliers during prequalification and tender evaluation and also their mode of selection process so that the project can be completed within time, cost and quality standard.

Design/methodology/approach
The paper entail selection criteria of subcontractors and suppliers at both pre qualification and tender evaluation stages of building projects. A descriptive research survey was used. The population for the study are the professionals in the construction industry. They include quantity surveyors, architect, engineer and contractors. About sixty questionnaires were distributed, but forty-two were retrieved. Random sampling technique was adopted for the study. Statistic package for social sciences was used to analysed the data using descriptive and inferential statistic.

Findings
Equipment of construction works is the main criterion for evaluation of subcontractors at the pre qualification stage while bid price is not an importance criteria at tender evaluation stage. Similarly, equipment and information technology was ranked most as the criteria for selection of suppliers.
Decision makers in the construction industry are subjective in the selection of the main contractors which directly affect the selection process of the subcontractors and suppliers, in order for the client to get value for money the criteria should be strongly considered for the projects to be completed within time, cost and quality standard.

Keywords
Criteria, Pre qualification, Subcontractors, Suppliers, Tender Evaluation

1. INTRODUCTION

One prominent characteristic of the construction industry is the practice of subcontracting portions of a project to speciality contractor(subcontractors) by general (main) contractors (Eccles, 1981; Smith, 1995). According to Dainty et al (2001), 57% of the gross work done (including small scale repair and maintenance) in the construction industry involves the buying-in of material and subcontracting services. The larger and more complex the project, the more the work is subcontracted (Eccles 1981). Hence, if only larger new build projects are included the proportion of subcontracting is even higher. Miller et al (2002) state that purchased materials and services from suppliers and subcontractors account for about 75-80% of total costs for main contractors, making construction ahead of most other industries in terms of outsourcing. Kumaraswamy and Matthews (2000) even argue that subcontractors can contribute to the total construction project value for as much as 90%. Hence, most construction work undertaken can be categorised as being outsourced (Miller et al, 2002; Dubois and Gadde, 2000). The heavy reliance on subcontracting can be explained as a response to uncertainty and complexity in which the technical and financial risks are shared between the parties (Brook, 1993). The style of selection will vary according to needs, environment and contractual situations. The more significant the contract, the more attention we are likely to pay to the selection and procurement processes. Qualification criteria are used to objectively assess information provided by an industry supplier. The process enables a purchaser to reach an informed opinion about the capacity of a supplier to successfully deliver a project.

The selection of subcontractors and suppliers often encounters problems, such as the selection of inappropriate subcontractors or suppliers, difficulty in the management of subcontractors and suppliers and out-of-control of budget and quotation systems (Shiau et al, 2009). Such
problems might be caused by insufficient time for execution, complicated procedures or poor information channels. It is, therefore, important for construction companies to control the subcontractor and supplier selection operation and make sure this is conducted in a fair and objective manner. Many construction projects have problems with sub-standard work, delay, disputes or even bankruptcy (Mbachu, 2003; Kerfoot, 1994). Some of these problems are caused by imprudent decisions made in the contractor selection process. It helps shift risk from the main contractor to the subcontractor and promotes specialisation (Millet et al., 2002). Inadequate subcontracting management, however, may result in an adversarial relationship between main contractors and their sub-contractors, uncoordinated on-site execution, and disappointing quality and schedule fulfilment (Talukhaba and Mapatha, 2007).

Most clients are still using ad hoc which does not give contractors confidence that the system is sufficiently well considered. As a result, the current practice of selection does not guarantee the selection of able and willing subcontractors and suppliers.

The purpose of the study is to examine the criteria for selecting subcontractors and suppliers for building projects in Lagos state, Nigeria.

2. SUBCONTRACTORS AND SUPPLIERS SELECTION CRITERIA

In competitive tendering, construction estimators rely largely on subcontractor’s sub-bids to arrive at a final tender sum to be submitted to clients. As the lowest tender is a determinant factor in securing work in traditional competitive tendering environments (Vilutiene, 2008), estimators often need to choose appropriate tender subcontractors who not only offer competitive prices that contribute to main contractors’ chances of winning tenders but who also perform well during actual construction of projects. The selection of tender subcontractors therefore needs to be based on a combined assessment of a variety of criteria including past performance, suitable experience, track record of competitive pricing and financial stability. This assessment is usually based upon intuition and past experience. Set amidst a large and changing number of subcontractors and a short tender period, this activity can be challenging, especially for inexperienced estimators. According to Shaiu et al. (2009) and Vilutiene (2008) price is the key criterion for traditional subcontractor and supplier selection. However, this neglect the quality, timeframe and other factors that are necessary for procurement process. The processes consist of a wide range of criteria for which information is both qualitative and subjective (Okoroh and Torrance, 1999). Some forms of selection criteria for selecting subcontractors and suppliers are not known to the outside world (Cook and Williams, 1998). However, CIB (1997) suggests that subcontractor and supplier should be selected through a formal process.
such as competition, negotiation or through partnering and/or joint ventures. It further suggests that principles of good practice be observed, to include among others:

- Clear procedures that ensure fair and transparent competition among all subcontractor.
- The tendering processes that shortlist systematically from a number of qualified candidates.
- The same conditions for the contract are used, to avoid or discourage collusion.
- Formal and recognisable contract bodies should be used where they are available.
- There should be a commitment to team work from all parties.

3. RESEARCH METHODS

A descriptive research survey was used for this study. The study necessitates the selection of parties concerned with building project execution and design. It includes the Engineers, Quantity Surveyors, Architects and building contractors. The sampling procedures adopted for the study is simple random sampling. These involved a random selection of 42 professional firms in the construction industry. This consist of 10 Architect, 14 Quantity surveyors, 10 Builders (contractors) and 8 Engineers. A structured questionnaires were used to collect data. Sixty questionnaires were distributed and 42 was retrieved. Statistical package for social science (SPSS) was used for the analysis using descriptive and inferential statistic.

4. ANALYSIS AND RESULTS

4.1 Methods of selection of subcontractors

Table 6.1 below show the various methods of selecting subcontractor and supplier. Open tendering were ranked highest by the respondent with an average mean of 4.12, Pre-registered tendering were the second highest with an average mean of 3.83, Negotiation tendering and invited tendering were ranked lowest with an average mean of 3.66 and 3.53 respectively.
Table 6.1: methods of selection of subcontractors and suppliers in the Building project

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<th>Mean</th>
<th>Std. Deviation</th>
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<td>Pre- registered Tendering</td>
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<tr>
<td>Annual/ invited Tendering</td>
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</table>

4.2 Benefits of subcontractors

Table 7.2 depicts benefit derived by main contractors from selection of subcontractors to carry out minor works. Ability to deliver were ranked most average highest by respondent with the mean score of 4.29, contractors who may be unable to perform due to backlogs were ranked second highest by the respondents, provides a uniform basis for comparing the suitability of the subcontractors and ensures fairness in the selection process and minimise the number of unqualified subcontractors who might enter unrealistic bids were ranked the same mean ranked of 4.20. It ensures a methodical approach and a justifiable basis for selection and discourages subjective judgments and removes low cost bias was ranked lowest by the respondents with the mean average of 3.98 and 3.93 respectively.

4.3 Criteria for suppliers selection

Table 8.3 depict the level of agreement for selection of suppliers in a building project. The below table shows that most of the respondent agreed that equipment and information technology systems were the most optimum criteria for selection of suppliers with mean ranked (4.91), the level of agreement for Health and safety and Human resources management and employment relation were ranked equally by the respondents follow by price with the mean average of 4.19. Insurance and co-operative contracting were ranked lowest average with the mean score of 3.93 and 3.68 respectively by the respondents.
4.4 Benefits of suppliers selection

Table 10.4 depicts benefit of supplier’s selection. Provide agencies with enhanced confidence in the ability of its suppliers to deliver satisfactory outcomes in terms of time, cost and quality were ranked most significant by respondents represent 4.30 average mean, Setting clear and visible standards for performance by suppliers were ranked next to the most significant by the respondent with an average mean of 4.21, Differentiating suppliers as a basis for getting the best match between suppliers and government contracts were ranked lowest by the respondent with an average mean of 3.89.
Table 8.3 criteria for selecting suppliers in Building projects

<table>
<thead>
<tr>
<th>Variables</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Mean</th>
<th>Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment and information technology system</td>
<td>24</td>
<td>12</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>4.91</td>
<td>1</td>
</tr>
<tr>
<td>Health and safety</td>
<td>20</td>
<td>14</td>
<td>7</td>
<td>1</td>
<td>-</td>
<td>4.26</td>
<td>2</td>
</tr>
<tr>
<td>Human resources management and employment relation</td>
<td>24</td>
<td>12</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>4.26</td>
<td>3</td>
</tr>
<tr>
<td>Price</td>
<td>12</td>
<td>27</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>4.19</td>
<td>4</td>
</tr>
<tr>
<td>Time</td>
<td>15</td>
<td>21</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>4.17</td>
<td>5</td>
</tr>
<tr>
<td>Commitment to client satisfaction</td>
<td>18</td>
<td>15</td>
<td>8</td>
<td>1</td>
<td>-</td>
<td>4.17</td>
<td>6</td>
</tr>
<tr>
<td>Capacity for innovation</td>
<td>18</td>
<td>16</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>4.14</td>
<td>7</td>
</tr>
<tr>
<td>Quality assurance</td>
<td>18</td>
<td>12</td>
<td>11</td>
<td>1</td>
<td>-</td>
<td>4.12</td>
<td>8</td>
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<tr>
<td>Compliance with legislative requirement</td>
<td>14</td>
<td>18</td>
<td>8</td>
<td>1</td>
<td>-</td>
<td>4.10</td>
<td>9</td>
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<tr>
<td>Management of continuous improvement</td>
<td>8</td>
<td>26</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>4.02</td>
<td>10</td>
</tr>
<tr>
<td>Management of environment issue</td>
<td>12</td>
<td>20</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>3.93</td>
<td>11</td>
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<tr>
<td>Financial capability</td>
<td>10</td>
<td>21</td>
<td>9</td>
<td>2</td>
<td>-</td>
<td>3.93</td>
<td>12</td>
</tr>
<tr>
<td>Insurance</td>
<td>16</td>
<td>12</td>
<td>7</td>
<td>6</td>
<td>-</td>
<td>3.93</td>
<td>13</td>
</tr>
<tr>
<td>Co-operative contracting and partnering</td>
<td>4</td>
<td>24</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>3.68</td>
<td>14</td>
</tr>
</tbody>
</table>

5. DISCUSSION OF FINDINGS

This study shows that the optimum method which was open tendering may not have a significant effect on the criteria for selection of subcontractors at each stages of Building project. In line with the research finding is the opinion of Miller et al(2002) where he emphasised that selection of subcontractors should tends to be on completeness and fairness and all potential subcontractor should be identified and given an equal chance to win. The respondent agreed that the selection of subcontractors by main
contractors or client could help to select suitable subcontractors who can deliver. Pressure is regularly applied by the main contractor on subcontractor to reduce prices and at the same time essential information is held back, making it almost impossible to allow for proper pricing and working. Incorrect pricing may also have been caused by the approach taken in procuring subcontractor services that is based on price alone. They further agreed that a proper selection of subcontractors will assist in preventing low cost bias which often experience by main contractors in a Building project. This finding is asserted by Packham, Thomas and Miller (2003) that main contractors mostly seek cost reductions rather than expertise and mutual cooperation from subcontractors. SIMILARLY, benefit of Suppliers enhanced confidence in the ability of its Suppliers to deliver satisfactory outcomes in term of time, cost and quality and also set clear, visible standard for performance by Suppliers. In tendering for Supply by Suppliers, offers must be evaluated, identify and justify the need for good and service.

6. CONCLUSION

The conclusion drawn from this study is that:
(a) Contractors require subcontractors that have adequate skill and resources to execute work effectively at an agreed price and quality.
(b) Each method of selecting subcontractors and suppliers depends on what main contractor and client want to achieve.
(c) Efficient management practice and meticulous scheduling of work can improve productivity for the benefit of the project and the main contractor.
(d) Subcontractors need to manage and organise their resources and skill at all time allowing themselves to be flexible.
(e) Subcontractors who cultivate good working relationship between workers as well as other subcontractors and the contractor could encourage a conflict free relationship.
Table 10.4 BENEFITS OF SUPPLIERS SELECTION

<table>
<thead>
<tr>
<th>Variables</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Mean</th>
<th>Rank</th>
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<tr>
<td>Provide agencies with enhanced confidence in the ability of its suppliers</td>
<td>19</td>
<td>16</td>
<td>3</td>
<td>2</td>
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<td>to deliver satisfactory outcomes in terms of time, cost and quality</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting clear and visible standards for performance by suppliers</td>
<td>11</td>
<td>24</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>4.21</td>
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<td>Encouraging the development and improvement through periodic review</td>
<td>14</td>
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<td>5</td>
<td>1</td>
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<td>4.18</td>
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<td>and adjustment of the pre qualification criteria</td>
<td></td>
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<tr>
<td>Providing a framework for assessing and aligning contract risk with</td>
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<td>4</td>
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<td>supplier risk in the supplier selection process</td>
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<tr>
<td>Providing objective, quantified data to support the decision making</td>
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<td>27</td>
<td>5</td>
<td>-</td>
<td>-</td>
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<td>process in the selection and subsequent performance monitoring of</td>
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<tr>
<td>suppliers</td>
<td></td>
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<tr>
<td>Streamlining the process of selecting suppliers</td>
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<td>20</td>
<td>5</td>
<td>2</td>
<td>-</td>
<td>4.05</td>
<td>6</td>
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<tr>
<td>Enhancing security of payment in the supply chain by early identification</td>
<td>8</td>
<td>26</td>
<td>5</td>
<td>1</td>
<td>-</td>
<td>4.03</td>
<td>7</td>
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<td>and appropriate management of suppliers who do not have adequate</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Differentiating suppliers as a basis for getting the best match between</td>
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<td>21</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>3.98</td>
<td>8</td>
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</tr>
</tbody>
</table>

6. REFERENCE


Causes of project cost overruns within the Ghanaian road construction sector

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ABSTRACT AND KEYWORDS

Purpose of the study
The purpose of this paper is to assess the main factors that influence the project cost overruns within the Ghanaian road construction sector and to examine their relative importance.

Design/methodology/approach
A survey of randomly selected samples via email resulted in 34 responses comprising 4 consultants, 23 clients (private and public) and 7 contractors drawn from Ghana Highway Authority, Department of feeder roads; and the Department of urban roads. The survey included 13 project cost overrun variables. The data was subjected to descriptive statistics analysis and subsequently the total scores were determined which enabled the ranking of the factors and establishing the level of importance.

Findings
The empirical analysis found the following factors of; delays in monthly payments to contractors; variations; inflation, and schedule slippage as significantly important. Other factors which appeared as not very important but of concern are poor communication; technical complexity / size of projects; force majeure; and dispute. Project management practices such as partnering and value management were not all that popular within the Ghanaian road construction sector. The study also found that risk
management and Total Quality Management (TQM) though popular were not being effectively applied.

**Research limitations**

The relatively small sample size and usage of cross-sectional data made it difficult to generalise the findings. This study is focused on public sector (government funded) projects limited to road construction where building was not included.

**Practical Implications**

The paper provides an understanding of the factors affecting project cost overruns within the road construction sector in Ghana. The assessment of the application of modern day project management tools and techniques and practices would enhance and contribute towards the reduction of project overruns within the construction road sector.

**Originality / value**

This study provides some insights and deepening the client’s, contractors and consultants understanding of the factors causing project cost overruns in developing countries. The uptake of project management practices could contribute to the reduction of project overruns within the Ghanaian road construction sector.

**Keywords**

Construction Industry, Ghana, Partnering, TQM, Project cost overruns

1. **INTRODUCTION**

The road construction industry in Ghana contributes significantly to the development of the country's economy. Good and safe roads for instance, facilitate timely and smooth evacuation of cocoa which contributes to the country's economic backbone from the growing areas to the marketing centres or depots. The importance of the road sector in Ghana is further highlighted by the observations of Gidisu (2009) who noted that the road transport is significant in Ghana's economy as it is the most widely available form of transport in Ghana; it links all major cities, towns, villages; it also links agricultural production areas with local, regional and national markets, and carries in excess of 97% of all passenger and freight traffic. However, road condition survey data in Ghana over the years suggest that about 40 to 50% of the country's entire roads are in poor condition. Governments have therefore been trying to channel a lot of funds into the road sector with the view to maintaining or improving the state of the roads.
In Ghana, Donor agencies such as Danish International Development Agency (DANIDA) and the British Government have been helping in this regard. Unfortunately, most of these maintenance projects and indeed some development projects are bedevilled with time, quality and cost objectives of the client. This phenomenon is not peculiar to the road sector alone. Indeed the building industry and therefore the entire construction industry in the country are affected by this problem.

The success of every construction project can be defined as meeting the goals and objectives of the client as specified in the project plan. A project is therefore said to be successful when it has accomplished the technical performance and been completed within schedule and budgeted cost. To ensure the success of projects, project management techniques and tools should be effectively utilised. Project management is about managing the resources, workers, money, equipment and machines, materials and methods to ensure projects success. Projects that are not managed effectively experience many cost overruns.

A project has defined phases that are interconnected: the conception or initiation phase, the planning/growth phase, the production/execution stage and the completion and the handover phases. Even though major causes of project cost overruns occur at the construction stage, this paper will not limit itself to this phase alone. Quality and time will also be integrated, as project cost overrun can not effectively be tackled in isolation from quality and time. This paper identifies and examines the causes of project cost overrun in the road construction sector in Ghana. In a preliminary investigation conducted by Berko (2007) in the road construction industry in Ghana for the purpose of this research, it was realised that almost all construction projects from 2003 to 2007 overran their cost. It is therefore necessary and important that research be carried out to help in efficient project management to reduce cost overrun. The rest of the study is structured as follows: Section two reviews the extant literature on factors causing project overruns and delays. Section three presents the methodological approach adopted whereas the presentation of the survey results and data analysis is presented in section four. The discussion of the findings is in section five. The conclusions and implications are drawn in section six.

2. LITERATURE REVIEW

Although there is ample literature on project cost overruns within the construction industry, the review of the literature revealed that very few studies have been conducted within the Ghanaian road construction sector. Some example within the African context that have examined the project overruns and delays within the construction industry can be found in Odeyinka and Yusuf, (1997); Frimpong et al. (2003); Berko, (2007); Agyakwa-Baah, (2007); Agyakwa-Baah, (2009); Aje, Odusami and
Ogunsemi, (2009). For example Frimpong, Oluwoye, and Crawford (2003) identified the main causes of delay and cost overruns included the following: monthly payment difficulties from agencies; poor contractor management; material procurement; poor technical performances; and escalation of material prices. The study by Odeyinka and Yusuf, (1997) revealed that seven out of ten projects surveyed in Nigeria suffered delays in their execution. Aje et al. (2009) identified contractors’ management capability had significant impact on cost and time of building projects. Lack of appreciation and execution of risk by contractors can lead to project delays as identified by Hassanein and Afify (2007). Dada and Jagboro (2007) surveyed the impact of risk on project cost overruns in the Nigerian construction industry and indentified finance and political influence as the main risk factors.

Other studies in sub-Saharan Africa such as one done by Manelele and Muya (2008) also identified the following six categories of critical risks: project initiation; community contribution and participation; budget and finance; skilled labour; materials procurement and technical supervision. Enshassi, Al-Najjar, and Kumaraswamy (2009) within the Gaza strip identified four main causes of time delays as strikes and border closures; material-related factors; lack of materials in markets; and delays in material delivery to the site. Three main causes for cost overruns: price fluctuations of construction materials; contractor delays in materials and equipment delivery; and inflation. Denini (2009) identified 80 delay factors and categorized them into the following 8 major groups of related delay factors: owners, designers, consultants, contractors, materials, manpower, electrical & mechanical (E&M), and external.

Kaming, Olomolaie, Holt, and Harris, (1997) identified inflation, underestimating and schedule slippage as among the main factors influencing project cost overrun in high rise buildings in Indonesia. Frimpong et al. (2003) ranked the factors according to their relative importance as delays in the monthly progress payment to contractors, poor contract management, material procurement inflation, and acknowledged force majeure as an important factor. Both Merewitz (1973) and Flyvberg, Skamris Holm, and Buhl (2003) attributed cost overruns mainly to schedule slippage whilst Carpenter (1973) concluded that about 2/3 of project cost overrun can be attributed to design errors and omissions. Vijayamohan and Kannan (2001) acknowledged that variations, delays in monthly payment to contractors and lack of project knowledge were the main causes of project cost overrun. Mansfield, Ogwu, and Doran (1994) who researched causes of delay in construction projects in Nigeria mentioned delayed progress payment, poor contract management and shortage of materials. Government interference, poor communication and force majeure which were not among the top factors by their ranking but are very significant also conformed to the existing knowledge on this research topic. Within South Africa, Okumbe and Verster (2008) study who highlighted the causes of delays and their consequences found the following among other
contributory factors as: late preparation of payment certificates, late processing by Project quantity surveyors, claiming problems; consultant’s inefficiency and lack of professionalism by the government employees among other factors. Other studies such as Oladapo (2007); Arain and Pheng (2005) also identified variations as having significant effect on cost and time overruns.

3. RESEARCH METHODOLOGY

To assess the factors leading to project cost overruns (over budget) within the Ghanaian road construction sector, the specific methodology of this study is based on a literature review, 7 telephone interviews comprising 4 personnel from the Ghana Highway Authority, 2 from the Department of Feeder roads and 1 contractor were also conducted and a questionnaire survey. The following section briefly describes the sample and measurement instrument as employed in the study.

3.1 Sample

In order to satisfy the aims and objectives of the research a total of 51 questionnaires together with covering letters were sent to professionals active in the Ghanaian road construction sector through using an embedded e-mail survey because of its notable benefits (Dommeyer and Moriarty, 2000) and as opined by Jackson and DeCormier (1999), cheap and quick means of communicating with clients and customers. A total of 34 responses were received. This represents a response rate of 66.6%. Boyer et al. (2002) also found electronic surveys are generally comparable to surveys in most respects. The essence of the covering letter was to explain the rational of the study and also assure the respondents of anonymity. (Denscombe, 2007). Table 3.1 presents the summary of the questionnaire distribution, their responses and respondents demographics.

<table>
<thead>
<tr>
<th>Sector of respondents</th>
<th>Questionnaire distribution</th>
<th>Profile of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sent</td>
<td>Returned</td>
</tr>
<tr>
<td>Client</td>
<td>32</td>
<td>23</td>
</tr>
<tr>
<td>Consultants</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Contractors</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>34</td>
</tr>
</tbody>
</table>

The majority (67.64%) of the respondents were practising with the client through Ghana highway authority (12), Departments of feeder roads (6) and urban roads (5).
Table 3.2 presents the demographics of the respondents by designation. The majority (20) of the respondents were professionals of the Quantity surveyors (32.35 percent) comprising the majority of the total respondents. The remainder were (11) 26.47% project engineers with 27% directors and 15% chief executives.

<table>
<thead>
<tr>
<th>Designation</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cumulative percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief Executive</td>
<td>5</td>
<td>14.71</td>
<td>14.71</td>
</tr>
<tr>
<td>Directors</td>
<td>9</td>
<td>26.47</td>
<td>41.18</td>
</tr>
<tr>
<td>Quantity Surveyors</td>
<td>11</td>
<td>32.35</td>
<td>73.53</td>
</tr>
<tr>
<td>Project Engineers</td>
<td>9</td>
<td>26.47</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Relative to the experience in construction work, all the respondents had a substantial amount of experience in the industry ranging from fifteen years to twenty-five years and most of them were directly involved in the management of construction projects of average value above £1200k. The background of the respondents supports the notion that they were involved with running of projects at both operational and strategic levels, therefore had some knowledge of issues related to project cost overruns. This also enhances the internal data validity (Bing et al. 2005).

3.2 The instrument

The questionnaire distributed comprised two sections. The first section sought the background information about the respondents. The second part was made up of the 14 factors identified from literature as causing project overruns cost overruns. Respondents were then invited to rate the levels of importance of these factors according to a four-point Likert scale (1 = not important; 2 = important; 3 = very important; and 4 = most important). Total scores were used as a basis for ranking the factors.

4. SURVEY RESULTS & DATA ANALYSIS

The primary purpose of this research was descriptive as the study aimed at identifying the main factors that cause project cost overruns. The appropriate data analysis for this type of research was to report descriptive statistics such as the total scores and frequencies which enabled the ranking of these factors. Therefore Statistical Package for Social Sciences (SPSS) computer program version 17.0.0 was used to analyses the data generated by the research question. The total score for each factor, representing its relative importance was calculated using the following equation.
Total score = \sum (WL) \quad \text{Equation 1.0}

Where: \( W \) = Frequency of a level of importance of a particular factor
\( L \) = Value attached to the level of importance (min =1; max =4)

An illustration of how equation 1.0 was applied can be demonstrated for the client’s scoring of the ‘underestimating’ factors as follows: where 11 respondents said it was important, 10 said it was very important and 2 said it was most important the calculation was done as follows.

Total score for underestimating = \((11 \times 2) + (10 \times 3) + (2 \times 4) = 60\)

A summary of all the 14 factors and their rankings including total scores are shown in Table 4.1.

The five most important factors agreed by the clients, consultants and contractors as causing project cost overruns were (see Table 4.1) delays in payment, variations, inflation, schedule slippage, and lack of project knowledge. All of the three parties (clients, consultants and contractors) ranked delays (total score = 113) first. Variations to the original scope of work came next with a score of 104. Inflation came out as the third significant factor with a score of 101.

<table>
<thead>
<tr>
<th>Table 4.1: Comparison of total scores and ranking by all the groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor</td>
</tr>
<tr>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Underestimating</td>
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<tr>
<td>Delays in monthly payment</td>
</tr>
<tr>
<td>Inflation</td>
</tr>
<tr>
<td>Design errors &amp; omissions</td>
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<tr>
<td>Disputes</td>
</tr>
<tr>
<td>Low tender price</td>
</tr>
<tr>
<td>Poor communication</td>
</tr>
<tr>
<td>Schedule slippage</td>
</tr>
<tr>
<td>Variations</td>
</tr>
<tr>
<td>Lack of project knowledge</td>
</tr>
<tr>
<td>Labour productivity</td>
</tr>
<tr>
<td>Force majeure</td>
</tr>
<tr>
<td>Technical complexity/size of project</td>
</tr>
<tr>
<td>Government interference</td>
</tr>
</tbody>
</table>

Note*: R = Ranking

The following subsection presents a discussion on the total scores and ranking of importance of the factors according to the different groupings.

Schedule slippage, lack of project knowledge, underestimating and design errors followed in that order. It is important to note that even though labour productivity and government interference do not seem to be very...
important by the overall ranking (Table 4.1), they feature prominently in the rankings by contractors and consultants. Whilst labour productivity is ranked 10th, contractors and consultants rank it 5th and 6th respectively (Table 4.1).

Government interference is ranked 4th by the consultant. The following factors of low tender price, poor communication, force majeure technical complexity of projects although least ranked by the respondents could still be argued to be very significant. It is interesting to note that force majeure is ranked very low by all the groups. Dispute is the least important factor in the ranking.

4.1 Level of familiarity of project management techniques and practices

In order to ascertain the level of familiarity of project management techniques and practices, respondents were asked to indicate their familiarity with the techniques and practices. The summary of the responses according to the frequencies and rankings are presented in Table 4.2

Risk Management was ranked as the most known management practice with 28 (82.35%) indicating being familiar with the concept while 8.8% were very familiar. On the contrary, Partnering appeared to be the least popular within the Ghanaian road construction sector as evidenced by a majority 31 (91.11%) indicating not being familiar with the concept.

Table 4.2: Level of familiarity of Project Management Practice

<table>
<thead>
<tr>
<th>Project Management Techniques and Practices</th>
<th>Not familiar</th>
<th>Familiar</th>
<th>Very familiar</th>
<th>Total</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partnering</td>
<td>31</td>
<td>3</td>
<td>0</td>
<td>34</td>
<td>4</td>
</tr>
<tr>
<td>Total Quality Management (TQM)</td>
<td>4</td>
<td>22</td>
<td>4</td>
<td>34</td>
<td>2</td>
</tr>
<tr>
<td>Risk management</td>
<td>3</td>
<td>28</td>
<td>3</td>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td>Value Management</td>
<td>19</td>
<td>11</td>
<td>4</td>
<td>34</td>
<td>3</td>
</tr>
</tbody>
</table>

Value management was next to Partnering in terms of least popularity with nineteen respondents comprising 5 contractors and 14 from the client side not being familiar with the concept. Total Quality Management (TQM) was second relative familiarity among the respondents.

4.2 Usage of information technology in project planning and control

In order to ascertain the importance of information technology in risk assessment activities, and project planning and control, respondents were asked to indicate the frequency of usage. The summary of the responses according to the frequencies and rankings are presented in Table 4.3

Table 4.3 Use of computers in project planning and control
It is quite clear that from the results that computer usage is quite popular within the Ghanaian road construction sector with the majority (19) 56% of the respondents quite often using computer and 10 (29%) very often use this tool. Only a minority (2) 5.9% stated that they never used computers. Relative to the sector, it is evident that the utilisation of computers was more prevalent among the clients and consultants than the contractors.

5. DISCUSSIONS

5. Overview of the Findings

The findings of the research showed that there are quite a number of important factors responsible for project cost overrun in the road construction industry in Ghana. The study established that project cost overruns are caused by factors inherent in technology and its management to those resulting from physical, social and financial environment. The most important factors include delays in monthly payment to contractors, variations, inflation, schedule slippage, underestimating, lack of project knowledge and design errors/omissions. The findings are very much similar to those identified in the literature review. The review of the literature acknowledged schedule slippage, delay in monthly payment to contractors, variations, complexity and size of projects, underestimating, lack of project knowledge and disputes as the most important factors. Dispute for instance is considered almost insignificant in the road construction industry in Ghana as a contributing factor to project cost overrun. The other area worth mentioning is the application of modern day project management tools and techniques and practices in the road construction sector Ghana.

5.1 Discussions on the rankings

5.1.1 Delays of monthly payment to contractors

The first most important factor agreed upon by all the groups as causing project cost overruns was delays in monthly payment to contractors. This finding is consistent with literature in developing economics (Agyakwa-Baah, 2007; Adams, 2008; Okumbe and Vester, 2008; Agyakwa-Baah, Durban, South Africa, ISBN: 978-0-620-46703-2)
Despite the majority of funds been budgeted for in Ghana either through foreign assistance, or domestically generated funds, there is still regular delay of payment to contractors as a result of bureaucracy in government departments and obvious delays in the release of funds from the donor agencies. Most road contractors in Ghana are not well resourced to fund the projects on their own and therefore abandon the projects during this period of delay. This often results in deterioration of some completed sections which are repaired at additional cost when the contractors resume work.

5.1.2 Variations

The second most important factor identified as contributing to project overruns was that of variations. This finding is also consistent with literature in developing economics as Oladapo (2007) indicated changes in specifications and scope as one of the prevalent sources of variation. The variations results in additional payments to contractors which themselves attract further payment as interest as in most cases, payment for contractors on these additional works are delayed. Arain and Pheng (2005) study also found variations as contributing to increases in project costs and additional payments for contractors.

5.1.3 Inflation

The third most important factor identified as contributing to project overruns was that of inflation. This finding is also consistent with literature in developing economics as Agyakwa-Baah (2007; 2009), Frimpong et al (2003); Denini, (2009). Cost overrun due to inflation comes about as a result of currency instability. Currently there is stability in the currency, but again the oil hikes still keep project cost overruns very high. Between 2001 and 2007, the cost of fuel in Ghana increased by as much as 280%. Fluctuation in price in one project was about 300% between 2001 and 2007 so one can appreciate the effect of the oil hikes. Frimpong et al. (2003) attributes the high inflation to demand exceeding supply.

5.1.4 Schedule slippage

Schedule slippage and its attendant extension of time are synonymous with cost overrun. Schedule slippage in the road sector in Ghana can mainly be attributed to delays in monthly payment to contractors and variations as highlighted above and poor project management on the part of most contractors. Ogunlana et al (2002) postulate that in developing countries, many contractors are entrepreneurs whose focus is mainly to make money at the expense of good management. In construction, the cost of materials, equipment and workforce man-hours are directly related. Schedule slippage or delays result in cost escalation because of increases in material cost due to inflation, salaries and other related costs.

5.1.5 Lack of project knowledge/underestimating/design errors and
Lack of project knowledge, underestimating and errors/omissions are interrelated. Most projects are hurriedly arranged as a result of either political pressure or to utilise funds which need to be spent within a time frame. Project preparation is most often not adequate because the Project Manager and his team have little time to package projects. Consequently designs are associated with errors and omissions which are varied at the construction stage at additional cost. Even where projects have been adequately engineered, the funds may not be readily available. At the time the funds are available, the intervention would have become obsolete. Detailed estimates are often completely absent and in their place are project comparison estimates which are not reliable. Another issue affecting accurate estimating in the industry is the over reliance on “price adjusted factors”. These factors are established factors that had been developed from cost indices several years back. Billed rates for each item of construction are therefore adjusted with these factors primarily based on the current or a projected economic situation in the country. However, prices over time in the country get distorted thereby affecting the accuracy of bill estimates. In their desperate move to ensure accuracy in their estimates project administrators allow for “Contingencies” which themselves turn out to be unrealistic.

5.1.6 Low tender price / Labour productivity

Low tender price and labour productivity were ranked very high by the contractors. Contractors in Ghana have the culture of submitting low bids. This tendency is due to the fact that contractors see their offer as the most important criterion for the evaluation of tenders. They lack the competence to appreciate the consequence of their actions and will therefore go all lengths to submit the lowest bid. This finding is also consistent with literature in developing countries (Hassanien and Affify, 2007; Berko, 2007). For example, Berko (2007) established that, contractors in Ghana pay very low salaries to their workers which are even delayed sometimes. Their workers are hence de-motivated to perform.

5.1.7 Government interference

The fourth most significant factor according to the consultants was government interference. This is due to cheaper negotiations by governments on development projects which are mostly handled by consultants on behalf of the clients. Consultants and clients are thus compelled by pressure from the government to throw away realistic figures because a cheaper price has been promised by a contractor. This finding also confirms those of Dada and Jagboro (2007) who identified political influence as one of the main factors contributing to project cost overruns.
5.1.8 Other Factors.

Other factors which appeared as not very important but of concern are poor communication, technical complexity and size of projects, force majeure and dispute. Dispute was the least factor according to the ranking. The reason is that, in Ghana, there is the culture of blinding people “litigants” for pursuing their legitimate rights. This culture is also deeply rooted in the construction industry. Contractors for “fear” of being sidelined for future awards prefer not to become involved in any conflict with clients. This finding is also consistent with literature in developing economics as Agyakwa-Baah (2009) opined, contractors also feared being blacklisted when payment was delayed. Some local contractors do not even feel comfortable in putting in claims for interest on late payments.

5.2.8 Force majeure.

Force majeure refers to those circumstances beyond the control of either the client or the contractor. This includes war, strike, riot, crime and the act of God such as flooding. War, riot and crime are social issues that can not be said to be on extensive scale in Ghana. Even where they do occur, their effects on construction are insignificant. Strikes in Ghana are mostly common with public sector workers. It is rare with private sector workers and therefore the road construction industry where the actual works are executed by private contractors. Even though rain or flooding may stop construction activities, its effects are not considerable.

5.2.9 Shortage of materials

Shortage of construction materials was mentioned in the interview as one of the factors. The main materials for the construction of roads in Ghana are Bitumen, cement, fine aggregate (sand) and coarse aggregate popularly known as chippings. The total cost of road projects are therefore largely determined by the cost of these materials. Unfortunately, the processing industry is not adequate enough to support this extensive road works in the country. The consequence is demand exceeding supply which eventually leads to an increase in the price of chippings. Secondary, some projects experience delays because of this shortage.

5.2.11 Project Management practices

The unfamiliarity and ineffective use of modern day project management practices stems from the fact that the industry has a culture of resisting change. Again, the bureaucracy in this sector which is publicly controlled makes it difficult for a change to take effect readily. This finding is also consistent with literature in developing economics (Aje et al, 2009; Agyakwa-Baah, 2009; Hassanien and Afify, 2007) who found lack of familiarity of project management techniques as contributing to delays.
6. CONCLUSIONS

This study investigated the main factors that influence the causes of project cost overruns within the Ghanaian road construction sector and sought to examine their relative importance. The study established that completion of road projects in Ghana within client objectives and especially within the budgeted cost has been and continues to be a problem for both the Government and its road agencies. It was established that both the Government and road agencies are regarded as being ineffective and corrupt from the general public and especially the political opponents of the ruling government. The causes of project cost overruns as identified from the review of the literature are not different from those factors pertaining in the road sector in Ghana. The main conclusions from the survey established that all the three groups, clients, contractors and contractors identified delays to monthly payments to contractors as the most important factor influencing project cost overrun. The above issues thus make it almost impossible for road projects in Ghana to be executed within the budgeted cost and time.

Whilst clients and contractors ranked force majeure very low, consultants ranked it very highly. Labour productivity was identified as unimportant by the clients but acknowledged by contractors and consultants as an important factor. The study also found that modern day practices such as Partnering, Risk management and Total Quality Management (TQM) were either not practised in Ghana or effectively not implemented. Furthermore the utilisation of such practices was minimal within the road construction projects.

6.1 Contributions and managerial implications

Some limitations of the research need to be acknowledged. The sample size (n=34) is relatively small, comparable to other studies. This means that the findings presented are not generalisable to the wider population of Ghanaian construction industry.

7. REFERENCES


Challenges facing newly established quantity surveying firms in securing contracts in Tanzania

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ABSTRACT

Purpose and objectives
The study focuses on investigating the challenges facing newly established quantity surveying practices in securing contracts in Tanzania. The challenges have led newly established quantity surveying practices not to fully utilize their professional potential in the construction industry.

Methodology
The research approach includes the use of literature review, questionnaire survey and structured interview. Literature review focused on bringing to light what other researchers have done on the subject while questionnaire and structured interviews were used to obtain the general and specific quantity surveying practices in the Tanzanian construction industry.

Findings
The study determined that the specific challenges faced by newly established consulting firms are quantity surveying marketing ethics, lack of detailed information during the invitation for expression of interest, and low fees charged by other firms.

Practical implication
This paper contributes to the understanding of key challenges facing newly established quantity surveying practices. The paper also addresses the need for the Architects and Quantity Surveyors Registration Board (AQRB) to review the current practices and monitor the fees being charged by Qs against their recommended fee scales. The AQRB and Public Procurement...
Regulatory Authority (PPRA) should integrate their objectives as far as professional fees are concerned.

Keywords

Qs practices, construction contracts, professional fees.

1. INTRODUCTION

The role of the quantity surveyor (QS) within the Tanzanian construction environment is of great importance to both clients and other industry professionals. Being in charge of financial matters carries with it a great responsibility and the quantity surveyor has the expertise to provide independent advice on these matters (Turner, 1988). Unfortunately, due to a lack of understanding by other industry professionals, the quantity surveyor, who is expected to fulfill the role of cost controller, is left simply playing the role of cost monitor. This has meant that the Quantity Surveyor is left wandering in the professional wilderness (Turner, 1988). The quantity surveying profession has not at any given moment fared well in terms of consolidating its achievements in the society despite its relevance and justification in the country’s economy. A quantity surveyor is a link person to all land based professions in matters of economy. With the increase in the complexity and cost of construction projects, the demand for an expert in construction economics is on the increase, hence justifying the existence of QS. However, since the inauguration of the QS profession in 1947, it has been haunted by its conservative nature of not ‘going out there’. More than 60 years since its birth in Tanzania it is claimed to be little known to the public. While some circles claim that its existence has been threatened by power hungry consultants especially engineers, its survival is further threatened by the opening up of the business frontiers to other practitioners outside the country (Mushumbusi, 2010).

Undertaking construction projects involves several stages and a number of stakeholders such as clients, consultants, and contractors. According to Sospeter (2004) the client or employer is the owner of the works to be executed; consultants are professionals or firms which manage the execution of works undertaken by the contractor on behalf of the client, and the contractor is employed to execute the work.

In construction projects, a client enters into direct contract with consultants for pre-contract and post-contract services. The consultants will undertake the management functions as delegated to him / her by the client. Hence, the consultants will act as the client’s agent. On construction projects, consultants include professionals such as quantity surveyors, architects and engineers. A quantity surveyor being one of the consultants on construction projects also enters into a contract with a client by
supervising the execution of work in terms of quality and cost control. (Sospeter, 2004; Shabani, 2004).

Practicing in any construction industry requires someone to have experience in his or her own field of expertise, likewise to quantity surveying professionals whereby in Tanzania, in order to practice as a Quantity Surveyor a person must be authorised by the respective Statutory body (AQRB). The newly established quantity surveying firms face difficulties with respect to job acquisition due to their unpopularity (Nyaluke, 2009).

According to quantity surveying marketing ethics (AQRB, 1997), companies practicing quantity surveying activities in Tanzania are not allowed to advertise their services through the media, posters, or brochures. It is therefore realised that marketing activities in the quantity surveying sector in Tanzania are the prerogative of the multinational companies (Nyaluke, 2009). The newly established quantity surveying firms use word of mouth as a main marketing tool, which doesn’t bring positive results in the short term (Nyaluke, 2009). Since clients enter into direct contracts with quantity surveyors to supervise their projects, it becomes difficult for a newly established quantity surveying firm to be trusted and awarded larger projects.

1.1 An Overview of Quantity Surveying Practice in Tanzania

The client employs the Quantity surveyor to assist in maintaining a budget surplus while the other consultants act without regard for the budget and without the quantity surveyor’s input, leading to a budget deficit which the quantity surveyor must take responsibility for. On Tanzanian construction projects, as on projects in other countries, the conditions of contract have been used to define terms, which shows every one’s responsibilities on what to be done. It indicates what to be done by the project manager, architect, engineer, quantity surveyor, contractor, and the client. The team formation practice in Tanzania is mainly by the client who approaches a project manager, an architect, quantity surveyor or engineer. Then the one approached, will assist the client to select other consultants such as an engineer or a quantity surveyor (Sospeter, 2009). The Procurement Act (2004) stipulates how nomination / appointment of consultants should be done for public works. Mostly, part of a team is formed before tendering for a consultancy service. Few key members are added after being selected. This may eliminate most of the teamwork problems, as the team members would have worked together on previous works. Another approach is by the client selecting consultants through tendering procedures or nomination. The client who is the owner and the financier of the project would normally approach a consultant for the design of the intended structure be it a building, a road, or an airport. The consultants and the client will enter into
a contract for the execution of the works starting from the design, preparation of tender documents, inviting and evaluation of tenders. Tenders will be evaluated and the successful contractor will enter into a contract with the client for carrying out the construction of the works to completion. The lead consultant will supervise the construction of the project to completion. The question here is: “How will the newly established quantity surveying firms make the leap? At all times the selection will be based on historical records, working relations with client / other consultants.

1.2 Qualifications to practice as a quantity surveyor in Tanzania

The qualification is designed for those working on a consultancy basis as a quantity surveyor, either in private practice or in local or central government in situations linked to the construction industry, and it reflects their role as client advisor on financial and contractual matters. This qualification is designed for those:

- Entering employment as trainees with a view to a career in project financial control, and
- Entering employment as trainees with aspirations to progress up the professional ladder to corporate membership of a relevant professional body. There are pre-requisite ages or academic requirements for those wishing to practice as quantity surveying professionals. With reasonable access to work based experience in a quantity surveying practice role and with opportunities to acquire the necessary knowledge associated with this role, candidates should be able to complete the registration award over a period of three years, as to the satisfaction of Architects and Quantity Surveyors Registration Board.
- As it is detailed by the AQRB for the qualifications to practice the quantity surveying profession provided under Section 10 (a) and (b) of the AQRB Acts of 1997, the Act stipulates that; subject to the provisions of this Act, a person or persons shall be eligible, on making an application to the Board in the prescribed manner and on payment to the Board of the prescribed fees, to be registered under this Act as an architect, quantity surveyor or as an architectural or quantity surveying firm if he satisfies the Board-just to mention a few: a natural person that, attained the age of 25 years; had a minimum of five years for architects and four years for quantity surveyors of approved training, a minimum of two years postgraduate professional training in Tanzania, in the work as an architect or quantity surveyor to the satisfaction of the Board and passed the prescribed professional interview, written examination or both, his professional and general conduct has been such as in the opinion of the Board, to make him a fit and proper person to be registered.
1.3 Regulation and rules governing quantity surveying practice

The government of the United Republic of Tanzania established the Architects and Quantity Surveyors Registration Board Act of 1997 to govern all activities related to architects and quantity surveyors. The main functions of the board are provided in the AQRB Act of 1997 Section 4. Furthermore rules and regulations that govern the Quantity Surveying practitioners are provided in the Architects and Quantity Surveyors Bylaws 2000.

1.4 Flow of Information about Projects

In the construction industry quantity surveyors work with public or private developers. With private developers the information regarding particular projects may be communicated to him either directly or through different media, by inviting the quantity surveyor for expressions of interest in carrying out the advertised task (Shabani, 2004: Nyaluke, 2009). For the public projects the information must be communicated in accordance with the public procurement Act 2004, which is through competition. It is therefore noted that the information regarding the flow of information about projects are normally communicated directly to the quantity surveyor or through media which is the competitive way, whereby different firms are invited for the expression of interests.

2. METHODOLOGY

2.1 Sampling procedure

In selecting the sample size a number of factors need to be considered, such as confidence in data, margin of error to be tolerated, type of analysis to be undertaken and population size. It is a general rule to have as large a sample as possible to reduce the possibility of error and to generalise with respect to the population. The criteria used to select the sample size for the consultants are: the firm must be registered, have supervised different classes of contractors on more than five projects, at least one project for each contractor. Furthermore, the firm should have less than 5 years of experience in the construction industry. While for general challenges this needed more experienced consultants of which the criterion considered was that, the firm should have more than 10 years of experience in the construction industry. The list of newly established quantity surveying firms obtained from the AQRB (2008) indicated 28 firms, of which 15 were randomly selected. 5 interviews were conducted to consultants.
2.2 Research methods

To obtain the primary data for this study, the questionnaires were distributed to the director of each of the individual quantity surveying firms. Follow-up interviews were also conducted with the director of each of the individual quantity surveying firms. A total of 15 questionnaires were distributed to consultants with less than five years experience, and interviews were conducted with 5 (five) consultants with more than ten years of experience in order to identify general challenges.

3. FINDINGS AND DISCUSSION

Respondents were provided with lists of some challenges faced by the newly established quantity surveying firms in securing jobs as identified in the literature review, whereby the respondents had to agree or disagree if his/her firm experiences those challenges. 12 Questionnaires were returned, upon which the discussion is based. The results are as shown in table below and the discussion of findings thereafter.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Challenges</th>
<th>No. of respondents agreeing</th>
<th>No. of respondents not agreeing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Quantity surveying marketing ethics</td>
<td>10 (83%)</td>
<td>2 (17%)</td>
</tr>
<tr>
<td>2</td>
<td>Favouritism and corruption</td>
<td>9 (75%)</td>
<td>3 (25%)</td>
</tr>
<tr>
<td>3</td>
<td>Low fees charged by other competitors</td>
<td>12 (100%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>4</td>
<td>Lack of experienced personnel</td>
<td>10 (83%)</td>
<td>2 (17%)</td>
</tr>
<tr>
<td>5</td>
<td>Competition of the existing firms</td>
<td>8 (67%)</td>
<td>4 (33%)</td>
</tr>
<tr>
<td>6</td>
<td>Lack of detailed information during the expression of interest</td>
<td>11 (92%)</td>
<td>1 (8%)</td>
</tr>
</tbody>
</table>
3.1.1 Low fees charged by other competitors

All respondents as shown in table 3.1 identified this as a crucial problem to quantity surveying profession. The study revealed this to be the dominant challenge over the other. Most firms are charging fees lower than the minimum mandatory fee set by the AQRB; this has been a great challenge to most newly established firms. The reason is likely to be the increase in the cost of construction, due to increased material costs and labour shortages, which have put significant financial pressures on developers, who are now trying to find ways of reducing their capital expenditure. Naturally this tends to encourage developers to search for the lowest possible price for all services. As a result in order for a firm to be sure in securing projects they normally tend to lower their prices. Furthermore they do not abide with the fee scale set by the AQRB because the PPA allows them to charge any amount as it does not state exactly the minimum fee that should be charged.

3.1.2 Lack of detailed information during the expression of interests

Eleven (11) respondents out of twelve (12), which is 92% of respondents agreed. This is because information given to them during the invitation for expression of interest is insufficient for them to compile calculated proposals. During the expression of interest, consultants are required to submit the financial proposal covering remuneration of the staff and reimbursable costs, also technical proposals must be submitted which covers the work plan, experience, work schedules and methodology. With this case in order for a consultant to arrive at probable and reasonable proposals, they need to be provided with detailed information regarding the projects especially in larger projects. They even suggested that they should at least be provided with sketches.

3.1.3 Quantity surveying marketing ethics

From the findings ten (10) respondents, which is 83% agreed to face this challenge. This is because according to the code of ethics that applies to the marketing of quantity surveying, QS practitioners are forbidden to engage in any commercial activities concerning services offered by their firm or themselves as quantity surveyors. Thus since they are new in the field and they need to expose themselves to the industry, they find it difficult to secure projects, especially large projects. Furthermore, most clients prefer to work with practices they are familiar with.
3.1.4 Lack of experienced personnel

The findings revealed that, ten (10) respondents out of twelve (12), which is 83% responded, positively by accepting and marking this as the one of the challenges they are experiencing in their firms. The number of QS graduates is increasing, and but they lack experience as they need more time to apply their theoretical knowledge. Furthermore, the construction industry is growing at a very high rate and buildings and construction technology are becoming complex, thus the industry requires experienced personnel to carry out the activities. Most newly established quantity surveying firms are not able to pay experienced personnel, hence ending up recruiting graduates who have got no experience. As a result when it comes to submitting their proposals they end up losing the project, because the company profile does not show extensive practice experience.

3.1.5 Favouritism and corruption

The findings revealed that nine (9) respondents out of twelve (12) respondents, which is 75% indicated that they have encountered this challenge. This is unprofessional conduct and it is not ethical. Most of the respondents complained that, some time, even the criteria used for awarding the projects were not explained or described clearly. They even questioned the practice where in some projects neither the most technically competent nor the lowest price proposal submitted are awarded the projects. Respondents claimed that some clients especially Public Works, have their preferred consultants, irrespective of their submissions and these are always awarded contracts. One of the respondents stated that corruption and favoritism is unavoidable in the construction industry.

3.1.6 Competition within the sector

Only 67% of the respondents indicated that they faced this challenge. This is notable as most practitioners would expect it to be the predominating challenge, because the existing firms have been practicing for quite some time, and thus have the appropriate experience and skills required for the submission of the expression of interests. They will always be the best in terms of experiences just because they have executed many projects. Some respondents said their company profiles are not well established in terms of number of employees, experiences and number of projects executed. This finding clearly indicates that newly established quantity surveying firms are challenged when it comes to securing jobs. The study also revealed that it is difficult to secure a project when you are not known to the client. Respondents were asked, if they had ever secured
any projects without having any relationship with the client or an architect. 33% of the respondents said yes, and 67% said No. Respondents were also asked whether they have ever secured big projects with a value of more than 1 billion Tshs. All the respondents responded yes, which is a positive trend and promising. However, 67% of the respondents said they were awarded the project directly by the client, and only 33% through competition. This is a serious situation because it implies that a practice must wait for a client who knows them, and then it hinders the firm to grow, when one doesn’t have someone to offer a big project. Respondents were also asked to state the number of big projects they have executed. 67% stated two projects, 16.5% stated three projects, and 16.5% stated more than four projects.

4. CONCLUSIONS

Arising from the questionnaire survey and the personal interviews, it has been determined that the preferred ways through which quantity surveying firms market their services to clients are through expression of interest, followed by word of mouth, and lastly through sign boards, plaque and letterheads.

The general challenges faced by quantity surveying firms are increased competition in the field and increased client expectations. However, the information technology revolution, globalization and world economic growth, new knowledge areas and new skills face QS practices. Moreover, expansion of knowledge and learning, and knowledge workers proved to be the least challenges encountered by quantity surveying firms. The specific challenges faced by newly established quantity surveying firms in securing jobs are, low fees charged by competitors, insufficient information during the expression of interest and quantity surveying marketing ethics. Lack of experienced personnel, favouritism and corruption, and competition from existing firms constituted lesser challenges. Furthermore, the interviewees added that there is a contradiction between the AQRB bylaws and public procurement regulations in terms of fee scales.

5. RECOMMENDATIONS

The AQRB and the PPRA should work together so as to realise common professional fees. It’s the role of the AQRB to create and ensure a conducive working environment in order to nurture the profession and bring its performance gain in the market. The important question to be solved here is “can they make the leap, and end the notion that newly established
firms cannot perform better. To enhance that, the body must promote and ensuring meaningful partnership during securing projects.

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The impact of strategic spatial planning on private development in the City of Tshwane

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ABSTRACT AND KEYWORDS

Local authorities in South Africa are under pressure to ensure that their strategic spatial plans address the spatial challenges that exist in our cities and simultaneously attract private investment.

It is generally perceived that development strategies and plans tend to lag behind development trends and seldom deliver the expected outcome. This leads to a question frequently asked in town planning circles, viz. Do strategic spatial plans guide development in the private sector (or do they follow them)?

In an attempt to address this question a hybrid of quantitative research methods have been applied. Strategic spatial plans for the City of Tshwane were analysed in terms of their spatial development objectives and compared with private development trends in the City of Tshwane between 2004 and 2006. Development focus areas i.e. nodes, activity spines, corridors and an urban edge were identified as priority areas and delineated to a spatial level for correlation determination with land development data. It was determined that there was no correlation between private development trends and strategic spatial plans over the research period. Lessons learnt from the research are that strategic spatial planning should be regularly monitored and should also adapted to changes in the political, social, technological and economic environment.

Keywords

land development trends, spatial framework, strategic planning
1. INTRODUCTION

The key to successful strategic spatial planning by municipalities is vested in the establishment of an effective link between strategic spatial planning and development control functions. Traditionally the development control function was seen as the means for implementing strategic spatial planning (Motte, as cited in de Kort et al., 2005). In practice though, the two functions have generally been exercised quite separately from each other. Significant resources were expended on the making of elaborate plans which had little prospect of ever being implemented, especially where their planned outcomes differed from what was permitted by the existing development control rules, such as zoning or town planning schemes. The essence of development control is the power to stop or discourage particular types of land development and not the means of implementing strategic spatial planning. In order to implement a plan it is necessary to have mechanisms in place to encourage the desired types of land development.

Municipalities must ascertain themselves that their development strategies and plans make spatial sense from, amongst others, an economical point of view in order to attract and stimulate the need for private investment. On the other hand municipalities in South Africa are simultaneously challenged with spatial imbalances. Private investment forms a critical part of the overall development picture and is pivotal to the achievement of an efficient, sustainable, equitable and liveable city. As long as private developers are assured that their investment decisions are reconcilable with the spatial objectives of the municipality, benefits will be reaped by both parties, but in most instances the spatial objectives of municipalities are in conflict with private development trends. In view of this the question is asked: To what extent did Strategic Spatial Plans impact on private development trends in the City of Tshwane Metropolitan Area (CTMA) during the period 2004 to 2006?

2. RESEARCH METHODOLOGY

In essence the research reflects a correlational study that strives to examine whether there exists any correlation between what strategic spatial plans proposed and what private development actually did take place over the research period.

The research first had to establish what spatial challenges are addressed in the CoTs development strategies and plans. To this extent literature on the historical spatial composition of the CoT was obtained and the city’s most prominent spatial characteristics were identified and graphically presented. The assessment of the spatial characteristics of the CoT presented a measure for the later analysis of the spatial objectives of the plans. The next phase of the research involved the identification of the strategic spatial plans applicable to the research period. The relevant frame-
works and plans were obtained from the Metropolitan Planning Section at the CoT, either electronically via the municipality’s website or in hard copy from the relevant departments. The plans were listed and categorised in different years based on the date of submission of the first draft and or the date of approval of the plan. Only plans drafted or approved over the research period were analysed in terms of their status, objectives, development proposals and their spatial implication to the restructuring challenges of the city.

Overall development strategies and development focus areas were identified, listed and graphically presented per strategic plan. This approach displayed similarities between plans and gave a clear picture on the direction of growth and the priority areas for development in the CoT. In this instance the MSDF (2005) was identified as the most comprehensive and important strategic spatial plan, not only for its status in terms of legislation, but also due the inclusion and description of the majority of strategies and focus areas identified in other plans. The most frequently referred to, and prominent development focus areas in the MSDF were listed and divided into categories viz. nodes, activity spines, corridors and an urban edge. For purposes of the research the boundaries of the various focus areas were determined in order to locate development applications submitted inside and outside of the focus areas in the next phase of the research, as follows:

**Urban core and nodes:** The boundaries of these areas were obtained from their description in lower order Regional Spatial Development Frameworks (RSDF’s) and Precinct Plans. The boundaries were captured through GIS application and drawn onto cadastral maps.

**Activity spines:** An area 100 meters wide on both sides of the road reserve, were demarcated as the extent of an activity spine based on the description of their zone of influence depicted by RSDF’s and Precinct Plans.

**Corridors:** An area 500 meters wide on both sides of the road reserve, were demarcated as the extent of a corridor based on their description of their zone of influence depicted by the MSDF and described in Chapter 4 of the research report.

The position of the urban edge was predetermined by the Gauteng Provincial Government which was available in electronic form. The fact that the urban edge comprises such a large area and the further fact that all other development focus areas i.e. nodes, activity spines and corridors are all located inside the urban edge necessitated its separate presentation in the analysis of the research data.

The demarcation of the development focus areas was done through Geographical Information System (GIS) application and presented on maps. For purposes of the research the submission of township establishment applications, rezonings, subdivisions, consolidations, consent uses and removal of restrictive conditions were considered to be a reflection of private development trends due to the fact that strategic spatial
plans serves to guide private development through the management (approval or refusal) of land uses i.e. land use or development applications. The intent of a land use or development application is to intensify or change the existing use of the land to a higher or improved use e.g. rezoning from dwelling house to offices, or establishment of a township on farm land. It is therefore considered that the submission of a land use or development application by a private developer reflects his intend to develop and is therefore reflective of private development trends.

Application submission data was obtained from the CoT’s ‘Application Processing System’ (APS) although it became apparent that the APS was not properly updated or integrated. The further fact the CTMA was, at the time of the research, still functionally divided into three administrative regions viz. Centurion, Akasia and Pretoria complicated the collection of data immensely. In view of the above, fragmented batches of application data were obtained at various departments at the CTMM in different formats that range from hard copy spreadsheets, Excel spreadsheets and GIS database files. The different data sets were processed to a single format (excel spreadsheet) before it could be scrutinised for duplication, completeness and accuracy. The development application data was divided into different years (2004 to 2006) and the types of applications per year. The types of applications were divided into two groups, viz. first group: rezoning, subdivision, consolidation, consent use and removal of restrictive conditions, and a second group: townships. The division of the data set into two groups was necessitated due to the fact that data on the individual areas of townships were not available. The absence of township area data in the comparative analysis of development applications could be confusing and misleading and therefore the research dealt with the two sets of data separately. Township data over a longer period of five and half years (2002 to June 2007) was captured and analysed in terms of the number of township applications submitted over this period. This data set was included in addition to the above data set in order to determine whether the information presented by the township data during the research period was consistent with findings over a longer period. In view of this rezoning, subdivision, consolidation, consent use and removal of restrictive condition applications were collectively referred to as ‘land development applications’.

The development application data was captured on a GIS for purposes of determining the exact position of submissions inside or outside the demarcated development focus areas identified in the previous phase. A data query was installed on the GIS in order to determine the number and area of development applications submitted inside and outside of the development focus areas. Charts and graphs indicating the number of land development applications and the area (hectares) of development applications, inside and outside of the identified development focus areas were generated per year over the research period for interpretation purposes. The CTMA was further divided into quadrants for purposes of identifying possible development shifts over the research period. The alignment of the
quadrants followed the alignment along the PWV 2 development corridor (N4 route) and the alignment of the proposed PWV 9 development corridor. The alignment concurred with the demarcation of town planning regions at the Municipal Planning Division at the CoT. Development application data was captured through similar GIS application and charts and graphs of development applications were generated per quadrant over the research period.

Finally, correlation between development focus areas identified by the strategic spatial plans and the submission of development applications inside these areas during the research period was determined by means of trend lines. To this extent the information obtained from the GIS data query in the previous phase was imported onto spreadsheets for further processing.

3. FINDINGS AND DISCUSSION

The research revealed that the number of land development applications in the CoT increased per year over the research period. This increase in development activity could be attributed to the healthy economic conditions that prevailed during the research period. The increase in land development applications between 2004 and 2006 must however be considered in the context of the national and international economic situation during the time of the research. The property sector in general is also driven by factors such as interest rates, inflation, government intervention etc. and for this reason projections on the ‘property cycle’ cannot be based merely on the number of land development submissions over a certain period of time. The trend lines did however confirm that the research was undertaken in a period when development activity was on the rise. Of importance to the research is the lower rate in the number of land development applications detected during 2006. This can be attributed to many factors such as interest rate uncertainty, saturation of the market, high land prizes, increased construction cost, and the scarcity of developable land. The decrease in the rate of land development applications over the later part of the research period could also signalise an over provision of stock in the market coupled with a decrease in demand.

Similarly, the research revealed a decrease in the area of land development applications over the later part of the research period which could be indicative of renewed interest shown by developers to invest in the established areas such as the inner city, as a result of favourable development policies in these areas, and the opportunity that was created by the healthy economic conditions for smaller developers to enter the property market at the time. The regeneration and revitalisation of older established areas is a phenomenon that concurs with international land development trends (Bertaud, 2004; Bertaud, undated).
The decrease in the area of land development applications over the later part of the research period coupled with an increase in the number of applications over the same period implied that development tend to be focused on infill development, densification and intensification of land uses, albeit not necessarily inside the identified focus areas. These principles of land development are enshrined in all land development legislation and strategic spatial plans from national to local level and included in the spatial objectives presented by the MSDF, 2005.

The continuous increase in the number of land development applications outside the development focus areas over the research period as indicated in figure 1 is indicative of a development urge away from the focus areas.

This trend could be attributed to the supply and demand equation viz. limited developable land inside the focus areas during the ‘boom’ period resulting in high land prices which limited the number of developers that could afford to invest in these areas. Although this trend is projected to increase in future it seemed that the rate of land development applications slowed down during the latter part of the research period. This could be as a result of the identification of new focus areas by the MSDF which came into operation during 2005.

The slowdown in the development trend outside focus areas and the impact of the MSDDF on development is better explained by the area of land development applications that were submitted inside and outside the focus areas over the research periods, as indicated by figure 2.

Although on a downward trend, the increase in the area of land development applications inside the focus areas coupled with the decrease in the area of land development applications outside these areas during 2006...
could be attributed to the creation of new development opportunities inside focus area e.g. the new urban cores (nodes) that were identified by the MSDF during 2005, and the extension of existing node boundaries. In view of this it seemed that the identification of focus areas, such as the ‘new’ nodes mentioned above, by the MSDF could have impacted on the development decisions especially during the later part of the research period.

Townships are established on farm portions which are, in general, located on larger tracks of land situated outside the established and build-up areas, and for this reason a high percentage of township applications were submitted outside the focus areas. The research did however reveal a slight increase in the percentage of township applications inside the focus during 2005. To this extent the identification of activity spines and corridors in the MSDF will play an important role in future correlation of development trends inside focus areas as these focus areas stretches over long distances adjacent to undeveloped farm land. The high percentage of townships established outside focus areas could however be attributed to the fact that the identified nodes do not consist of farm portions but were located in established areas and therefore did not necessitate township establishment. It could therefore be deduced that the low percentage of township applications inside the focus areas over the research period were a result of infill development on vacant land inside nodes or adjacent to activity spines and corridors.

Although the great majority of land development applications (townships and other) were submitted inside the urban edge over the research period, the research revealed a steady decrease in the number and...
area of applications inside the urban edge over the research period. This development trend could be attributed to the increased scarcity of suitable and developable land and the increase in land prices inside the urban edge. As a result developers tend to seek affordable opportunities elsewhere outside the urban edge. This trend was further enhanced by the demand for estate living that became popular especially during the research period which concurs with land development trends (Schoonraad, 2004), hence the increase in the rate of township applications outside the urban edge mentioned above. Further to this the increase in the number and areas of land development applications outside the urban edge signalised the saturation of focus areas inside the urban edge. It seemed that development will challenge the urban edge demarcation of this focus area and its effectiveness over the long term.

On a city wide level the south-eastern quadrant of the CTMA attracted the majority of the development activity over the research period, but the focus of development in general shifted to the northern part of the CTMA with a steady increase in the percentage of land development applications in northern quadrants and a decrease in southern quadrants of the city as indicated in figure 3.

![Figure 3 Percentage of land development applications per quadrant (townships excluded): 2004 – 2006](image)

This development shift to the northern quadrants of the CoTT was also in the percentage of township applications, as indicated by figure 4.

The ‘development shift’ coincides with the development principles promoted by the MSDDF which strategy emphasis the development and upliftment of Tshwane’s northern region where the majority of the city’s previously disadvantaged residents are located. The availability of large and affordable pockets of land inside the urban edge, at the time of the research, further attributed to the develop shift. Another factor that contribu-
uted to this shift is the growing black middle class in this region as well as the construction of the Bakwena Freeway (N4) which increased the accessibility to the northern regions.

In conclusion, it seems that land development applications and township applications over the research period in general tend to move away from the identified focus areas and outside the urban edge. Therefore it suffices to say that there was a negative correlation over the research period between private development trends and the focus areas identified by the MSDF. The submission of development applications inside the quadrants however indicated that there was a shift in development to the North which was contradictory to previous private development trends. It is important to note that the shift to the North correlated with the development strategy stipulated by the City Development Strategy (CDS, 2004) and not with the MSDF. The MSDF is in essence a spatial plan that identified focus areas where development should be promoted whereas the CDS is a citywide strategy which consists of a selective set of initiatives that, over 20-30 years, provide a coherent framework of action for a wide set of role players, in both private and public spheres.

The CDS is in essence a ‘pro poor’ policy which is driven by a process that strives to create a collective city vision and strategy through improved urban governance and management, increased investment and systematic and sustained reductions in urban poverty. The CDS was compiled by the mayoral office and has no legal status and therefore it was not considered to be an important spatial plan. The correlation between the CDS and the development shift to the north promulgates the importance of a clear vision that is driven by political will and a champion to realise a vi-
4. CONCLUSION AND FURTHER RESEARCH

The aim of the research was to establish whether strategic spatial plans had an impact on private development trends in the City of Tshwane during 2004 to 2006. The reason for the research stems from a regular asked question in town planning circles viz. Do strategic spatial plans really succeed in guiding private development or are they merely presenting a wish list to accomplish an ideal urban form? The general notion is that development strategies and plans tend to lag behind private development trends and seldom present the expected outcome. The City of Tshwane as all other metropolitan areas in South Africa is typified by a distorted urban form due the legacy of apartheid and as a result the municipality is continuously challenged with the restructuring of its spatial form to rectify the imbalances of the past. Simultaneously with this the municipality needs to attract development to areas where development is needed and prevent development that will retain or exacerbate the existing distorted urban form.

The research therefore envisaged to determine whether the CoT succeeded in redirecting natural private development trends in line with their strategic spatial objectives during the property boom period that prevailed during 2004 and 2006. The research revealed that there is a lot of confusion about the status of strategic spatial plans and the proposals contained it. In most instances these strategies and plans lack integration between the different municipal sectors and often contradict each other. The research further revealed that although certain focus areas for development were identified throughout the CTMA no clear vision was established to guide development. Although development activity increased during the research period as a result of the booming economic climate at the time the research showed that development took place primarily outside the identified focus areas and that this trend was expected to continue in future.

Although there was no clear correlation between private development trends and the focus areas identified by the MSDF, a shift in development to the northern part of the CoT was detected. The shift in development activity to the North during the research period was a testimony to the fact that the CDS, as strategic plan, driven by political will was successful in attracting development during the property boom period, albeit not to the identified focus areas. In view of this it was submitted that the MSDF, as spatial tool for the guidance of development did not succeed in its spatial objectives over the research period. It is therefore deduced that the MSDF, although comprehensive in its description of focus areas, was merely interpreted as a blueprint plan for development and had little to no impact on private development trends during this period.
The reason for this could be attributed to a few factors. The impact of strategic spatial plans is only detectable over longer periods as was the case with the city of Curitiba. The literature revealed that strategic plans provide frameworks for future action and that its implementation is only realised over the long term. The research period was limited to three years which is considered to be very limited in terms of these plans’ implementation range and therefore it is submitted that future research in this field should extend over a longer period in order to determine the plans impact on private development trends. The favourable economic climate at the time of the research further contributed to the MSDF’s failure to direct private development. During a property boom period land prices in favourable areas such as the identified focus areas in the MSDF tend to increase significantly to a point where development inside these areas becomes unviable. Together with this land inside these focus areas becomes scare and together with the increased cost of development (land and construction) developers are pushed to areas outside the focus areas. This trend contributes to the low density sprawl which is synonymous to the spatial form of the CoT and concurs with the international trends. Thus, the failure of the MSDF to attract development to focus areas cannot be attributed to the development proposals contained in the plan but rather to the limited period in which the research was done coupled with the working of market forces during the economic boom period that was experienced over the research period.

Lessons learnt from the research are that strategic spatial planning should be regularly monitored and adapted to changes in the political, social, technological and economic environment. The literature revealed that strategic planning involves an ‘interactive’ ‘communicative’ and ‘collaborative’ approach (Healey, 2006; de Korte et al., 2005). The timeframe for the compilation of these plans can be extensive due to the participatory nature of the process and therefore it is likely that the situation on the ground has changed by the time the plan is adopted. In view of this strategic spatial plans must be flexible and adaptable to changes and municipalities must have the capacity and ability to react in time to changes especially during a property boom period as experienced in the CoT over the research period. The designers of plans should have an integrative view of urban development and knowledge of the present situation and solutions to improve spatial patterns. The regular monitoring of plans (Acioly, 2001) is critical to the evaluation of its success and in this instance municipalities must have appropriate and effective land management systems unlike the inconsistent management of development data experienced at the CoT during the research period. Municipalities should also have adequate means and resources to invest in focus areas where development is needed in order to attract private development e.g. infrastructure projects, bulk services and tax incentives. The CoT as many other South African cities is still challenged with the spatial imbalances of the past albeit the plethora of spatial strategies that have seen the light over the past decade. Strategic spatial planning in essence
constitutes a long term approach and although the MSDF failed in attaining its spatial goals the research has shown that the value of strategic spatial planning lies in the collaborative vision that is pivotal to the compilation of development strategies and goals coupled with the continuous monitoring and evaluation of their outcome. The question is whether the CoT is able to recognise the failure of their strategic spatial plan and their willingness to introduce and enforce new measures to restructure spatial imbalances.

5. REFERENCES


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The Feasibility of Building Integrated Photovoltaic Systems for Single Residential Buildings in the Western Cape, South Africa

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ABSTRACT AND KEYWORDS

Purpose

This study aims to determine the feasibility of making use of Building Integrated Photovoltaic (BIPV) Systems in single residential buildings in the Western Cape with the aim of applying it in this region.

Design/methodology/approach

Information required for the case studies and qualitative research was collected from up-to-date product specifications from suppliers and specialists, journals of research by others, and from interviews with PV specialists and representatives from the national utility provider. The case studies were conducted to measure the generating capacity of BIPV systems, determine system requirements for residential application, and to compare BIPV system costs with conventional electricity costs. The qualitative research was undertaken to identify policies that could be used to promote the usage of BIPV systems in South Africa.

Findings

In spite of global PV developments and high industry growth rates, the financial feasibility of the usage BIPV systems in South Africa remains
poor. Policies implemented by the National Energy Regulator (NERSA) for the promotion of clean energy generation seem to be inadequate and will have to be reconsidered.

Value

The study aims to promote the application of BIPV systems, which will have beneficial results for both the South African economy and the environment.

Keywords: 
BIPV systems, single residential buildings, financial feasibility, promotional policies

1. INTRODUCTION

90% of South Africa’s electricity is generated from coal-fired power stations – a very inefficient method for electricity generation. This has led to an energy crisis which has had devastating effects on the economy in recent years. Furthermore, this method causes excessive carbon dioxide emissions which lead to a global rise in the earth’s temperature (Engineering News, 2009; Eskom, n.d.).

Authorities are looking to renewable resources for a solution. The Department of Minerals and Energy (DME) has set a target of 10 000GWh of energy to be produced from renewable energy sources such as wind, solar and hydro energy by 2013. Benefits that this target will bring include the following:

- the net impact on Gross Domestic Product will be as high as R1.071 billion per year
- additional government revenue of R299 million
- stimulate additional income and creating more than 20 000 new jobs
- contribute to water savings of 16.5 million kilolitres, which constitutes into a R26.6 million saving

In spite of the potential for solar generation in South Africa, the uptake of PV technologies have remained limited.
2. PHYSICAL FEASIBILITY

2.1 South Africa’s generation potential

The DME suggests that South Africa’s solar resource is “one of the highest in the world”. Their baseline study shows that South Africa’s annual solar radiation levels are between 6000MJ/m² and 9200MJ/m², and the country is exposed to an average of 2500 hours of sunshine per year, which results in radiation levels ranging between 4.5 and 6.5kWh/m²/day (DME, n.d.; Eskom, n.d.).

2.2 Building integrated systems

The case studies have shown that, even for extremely demanding households, the space requirements of the required system would be minimal in relation to the probable space available. Maximum power requirements for non-energy conscious households require only 45m² of solar panels, assuming an optimally inclined surface is used, which could easily be accommodated in the form of a rooftop system. This finding is confirmed by EPIA (Philbin, P. (editor), Bitter, M., Fraile, D., Latour, M., Teske, S., Wolfsegger, C., 2008:17):

In central Europe, a 3kW rated solar electricity system, with a module area of approximately 23 square metres would produce (approximately 3000kWh/yr) enough power to meet the electricity demand of an energy-conscious household.

Building façades would generally have lower generation capacities due to insufficient inclination and exposure to irradiation. Research by the International Energy Association (IEA) has shown that “the architecturally suitable area of building surfaces is 60% for roofs and 20% for façades” (Gutschner, M., Nowak, S., Ruoss, D., Schoen, T., Toggweiler, P., 2002:6).
3. FINANCIAL FEASIBILITY

In determining the financial feasibility of BIPV systems, the research compared PV systems to conventional generation, taking capital and operating costs into consideration, as well as the time value of money.

3.1 Financial analysis

Table 3.1 shows the estimated BIPV component and installation costs. This estimate is based on averages drawn from pricelists that have been gathered from five of the country’s BIPV system suppliers and specialists.

Table 3.1 Estimated BIPV component and installation costs

<table>
<thead>
<tr>
<th>Component</th>
<th>Estimated cost (excl VAT)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modules</td>
<td>R70.00/W</td>
<td>Crystalline silicon modules</td>
</tr>
<tr>
<td>Grid-tied inverters</td>
<td>R12.80/W</td>
<td></td>
</tr>
<tr>
<td>Stand alone inverters</td>
<td>R10.50/W</td>
<td></td>
</tr>
<tr>
<td>Batteries</td>
<td>R4.00/Ah</td>
<td></td>
</tr>
<tr>
<td>Charge controllers</td>
<td>R95.00/Amp</td>
<td>including meters</td>
</tr>
<tr>
<td>Builders work/Installation</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Connection to the grid</td>
<td>R5 000.00</td>
<td>allowance/system</td>
</tr>
</tbody>
</table>

Technological advances have resulted in extended lifetimes of PV systems, currently estimated at a minimum of 20 years (Philbin et al., 2008). Therefore, the total costs of the three scenarios are determined over a 20 year period and then discounted to a present value. The following nominal discount and escalation rates are assumed for all calculations:

- escalation rate per annum for materials and components: 8%
- escalation rate of conventional electricity: 30% (CAIA, 2009; Conradie, 2009)
- discount rate: 5%

Maintenance and operation costs of BIPV systems are minimal, which is partly due to the lack of moving components. It is considered that the only ‘weak link’ lies in the batteries that are used for off-grid applications. A well maintained battery will last approximately 15 years. This is the only variable cost that is considered for the case study.
3.2 The case study

Three different household scenarios were considered, namely, a non-energy conscious household with conventional appliances, an energy conscious household with conventional appliances, and an energy conscious household with alternative appliances, such as gas stoves, gas or solar geysers, and other appliances that don’t require electricity.

The power requirements used to estimate the system requirements for each scenario is based on information obtained from various sources, including an informal practical investigation, averages provided by various sources on the internet, working drawings, and data provided by the national utility provider, such as typical kilowatt ratings of different appliances and their usage levels, the daily radiation levels in plane of a solar collector and the conversion efficiency of the modules.

The estimated system requirements for each scenario (see table 3.2) is based on the following:

- Daily radiation in plane of a solar collector in the Western Cape region – 6.30kWh/m²/day (Albuisson, M., Dunlop, E., Huld, T., Suri, M., Wald, L., 2005)
- Average daily hours of sunshine – 6.85 hours (DME, n.d.)
- Based on a conversion efficiency of 20%, 1.26kWh can be generated per square meter per day

Table 3.2 Estimated system requirements

<table>
<thead>
<tr>
<th>Component</th>
<th>Particulars</th>
<th>Grid-connected</th>
<th>Off-grid</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scenario 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modules (maximum)</td>
<td>30m² x 184W/m² = 5 520W</td>
<td>386 400.00</td>
<td>386 400.00</td>
</tr>
<tr>
<td>Grid-tied inverter</td>
<td>3 500W</td>
<td>44 800.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Stand alone inverter</td>
<td>3 500W</td>
<td>0.00</td>
<td>36 750.00</td>
</tr>
<tr>
<td>Battery</td>
<td>2 220Ah</td>
<td>0.00</td>
<td>8 880.00</td>
</tr>
<tr>
<td>Charge controller</td>
<td>325Amp</td>
<td>30 875.00</td>
<td>30 875.00</td>
</tr>
<tr>
<td>Builders work</td>
<td>20%</td>
<td>92 415.00</td>
<td>92 581.00</td>
</tr>
<tr>
<td>Grid connection</td>
<td>Allowance</td>
<td>5 000.00</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>R559 490.00</td>
<td>R555 486.00</td>
</tr>
</tbody>
</table>

| Scenario 2              |             |                |          |
| Modules (maximum)       | 17m² x 184W/m² = 3 128W | 218 960.00 | 218 960.00 |
| Grid-tied inverter      | 3 500W      | 44 800.00      | 0.00     |
| Stand alone inverter    | 3 500W      | 0.00           | 36 750.00 |
| Battery                 | 1 260Ah     | 0.00           | 5 040.00  |
| Charge controller       | 184Amp      | 17 480.00      | 17 480.00 |
| Builders work           | 20%         | 56 248.00      | 55 646.00 |
| Grid connection         | Allowance   | 5 000.00       | 0.00     |
| **TOTAL**               |             | R342 488.00    | R333 876.00 |
### Scenario 3

<table>
<thead>
<tr>
<th>Description</th>
<th>Grid-connected</th>
<th>Off-grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modules (maximum)</td>
<td>5m² x 184W/m² = 920W</td>
<td>64 400.00</td>
</tr>
<tr>
<td>Grid-tied inverter</td>
<td>3 500W</td>
<td>44 800.00</td>
</tr>
<tr>
<td>Stand alone inverter</td>
<td>3 500W</td>
<td>0.00</td>
</tr>
<tr>
<td>Battery</td>
<td>400Ah</td>
<td>0.00</td>
</tr>
<tr>
<td>Charge controller</td>
<td>55Amp</td>
<td>5 225.00</td>
</tr>
<tr>
<td>Builders work</td>
<td>20%</td>
<td>22 885.00</td>
</tr>
<tr>
<td>Grid connection</td>
<td>Allowance</td>
<td>5 000.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>R142 310.00</strong></td>
<td><strong>R129 570.00</strong></td>
</tr>
</tbody>
</table>

### 3.3 The cost of conventional electricity

The current rate charged by South Africa's utility provider to residential households in urban areas is approximately R0.57/kWh.

The CAIA (2009) and Conradie (2009) both forecast a tariff hike by Eskom of at least 30% per annum leading up to 2012. Thus, the total estimated present value of conventional electricity supplied for 20 years is as follows:

- Non energy conscious household: R282 352.60
- Energy conscious household (conventional): R161 354.58
- Energy conscious household (alternative): R47 558.83

### 3.4 Grid-connected systems

Grid-connected BIPV can not be compared in isolation to conventional electricity. Unless incentives such as the feed-in tariff are available, BIPV systems will not be feasible for any of the three scenarios.

It can be argued that scenario 1 can adapt their power requirements by increasing energy consciousness to match their power requirement with scenario 2, which will provide the benefit that the excess generated energy can be fed into the utility grid and generate extra income for the household. The present value of the system for scenario 1 as at installation date will therefore be R404 552.00, taking into consideration a feed-in tariff of R2.10/kWh as declared by NERSA.

Therefore, making use of the feed-in tariff will greatly reduce effective system costs. However, the tariff declared by NERSA is not enough to promote the uptake of BIPV. For PV to become attractive to potential investors, the tariff should at least be capable of recovering systems costs before the 20 year period lapses and also provide a certain degree of profit. Dilchert (2009) suggests a tariff of at least R5.00/kWh.
If the PV system is integrated into the building to such an extent that it replaces conventional building materials, the saving in cost of building materials will also come into play. The research will also have to consider the effect on the market value of the building. This would require extensive research and, due to time constraints, was not dealt with in this study.

3.5 Off-grid BIPV for Rural Development

The case study for rural application concerns a grid expansion project undertaken by Eskom to provide electricity to a large rural region in the Karoo. The project includes the construction of a 93km three phase overhead conductor line, a 35km phase-to-phase staggered vertical conductor overhead line, including twelve 25KVA three phase trip supply points and nine 32KVA phase-to-phase transformer supply points, and installation of a three phase re-closure on the two new lines. Construction costs are estimated at just under R15 million (Conradie, 2009).

The capital cost of this project would not be affordable for the majority of landowners. They have, however, agreed to each make a contribution of approximately R30 000 towards the capital cost of the project.

3.1.1 Financial analysis

It has been estimated that each rural dwelling will require a maximum of 2m² of photovoltaic panels, or a total system cost of R52 295.00 per dwelling (calculated based on variables discussed under 3.2). Assuming that each farm in the project has 10 dwellings for its farm workers, the present value of the costs that will be incurred by each owner over a 20 year period is estimated at R531 990.00.

3.5.2 Connection to the utility grid

In addition to the contribution that each farm owner will make towards the capital costs and the usage charge, a monthly service and network charge will be payable for each transformer supplied (Conradie, 2009). The number of transformers supplied to each farm will range between 3 and 10. In order to keep this study conservative, the minimum of 3 transformers was assumed for all calculations.

It was calculated that the sum total of the capital costs, the annual service charge, the annual network charge, and usage will amount to a present value of R742 000.00, taking into consideration the various assumed escalation and discount rates as was discussed earlier.
3.5.2 Break-even

Figure 4.2 shows that, when applying BIPV in rural areas, break-even will be reached after approximately 11 years, after which there will be a saving in cost.

![Figure 4.2 Comparison of cumulative cost](image)

4. POLICIES FOR THE PROMOTION OF PV GENERATION

The current global take on global warming has led to political support for the development of solar electricity and promotional frameworks are being put in place in many countries.

4.1 The feed-in tariff and other policies

The feed-in tariff is a mechanism that has been proved, specifically in Germany, to be very successful in accelerating the reconstruction of the electricity supply system (Philbin et al., 2008:58).

The underlying concept of the feed-in tariff is that producers of solar electricity have the right to feed solar electricity into the public grid and receive a premium tariff per generated kWh, reflecting the benefits of solar
electricity compared to electricity generated from fossil fuels or nuclear power. The producers (investors) will therefore have an immediate return on their investment, and the difference in the generation costs of conventional electricity and solar electricity will effectively be reduced.

The feed-in tariff is not financed through tax, but rather by an extra charge on the electricity bills of the consumers. By using this strategy, all consumers are motivated to invest in solar generation. Furthermore, the producer does not receive a fixed payment per solar module, but rather a payment based on the overall performance of the system. This creates an incentive for the producer to invest in high quality systems with high output levels. In addition to this a “feed-in tariff guaranteed by law over a sufficient period of time” will provide adequate security when trying to obtain finance for the installation of high quality systems (Philbin et al., 2008:60).

Germany was the first country to make use of the feed-in tariff and has been particularly successful in implementing this policy. This has inspired other countries to follow suit. The country is currently in the process of perfecting the policy, and the feed-in tariff for new PV installations is being decreased on an annual basis, which results in a forced reduction of system prices by producers in order to maintain profit margins (Altevogt, J., Despotou, E., Fresneda, A., Helm, P., Juquois, F., Kohler, S., Montoya Rosero, C., Nemac, F., Protsogeropouulos, C., Silva, L., Swens, J., Thomopoulous, S., Veigl, A., Weiss, I., 2007:7). Today the PV sector in Germany boasts 10,000 companies, 80 of which are manufacturers, with a turnover of €5.7 billion and export revenues of €2.5 billion. The sector has created approximately 42,000 jobs and invested €175 million into research and development (Philbin et al., 2008:62).

Other policies have also been implemented, which include rebate programs and residential grants, as well as investment tax credit systems. While the feed-in tariff has proved to be the most effective policy for the promotion of clean energy generation, these policies can be considered for applications where grid-connection is not possible, such as in rural applications.

The countries that have identified the promotion BIPV systems as the key driver in promoting the uptake of clean energy generation, and have applied their policies accordingly, have had the most success in recent years (Philbin et al., 2008; Altevogt et al., 2007; Gisler, R., Orthen, S., Stierstorfer, J., Weiss, I., 2006).
4.2 South Africa’s development policy

At a meeting held in March 2009, NERSA approved certain Renewable Energy Feed-in Tariff (REFIT) guidelines. These guidelines include the following (Anon, 2009):

- Different tariffs have been established for the different types of renewable energy available – the tariff for “concentrated solar” is R2.10
- The term of the purchase agreement would be 20 years
- The tariff will be reviewed every year for the first three years and every three years thereafter
- The resulting reviewed tariffs will apply only to new projects
- Carbon revenues will not apply

The effect that this new policy will have on South Africa’s renewable energy market remains to be seen.

The mere existence of the policy will not be sufficient to promote renewable energy generation. Now that the policy is in place, action must be taken for its implementation. This includes the approval of proposed PV power systems to be connected to the national grid, as well as the conclusion of purchase agreements for the implementation of the feed-in tariff. Supportive mechanisms must be set for the smooth execution of the administrative processes of these projects in order to attract potential investors. The practicality and efficiency of this policy must be evaluated on a regular basis, and be adjusted to suit the needs of the local market in order to obtain optimum results.

For the feed-in tariff to be successful in South Africa, the national utility provider should provide renewable electricity priority and guaranteed access to the grid. The diversification of electricity resources will create stability within the utility grid and will lead to a reduction in power cuts.

5. CONCLUSION

5.1 Physical feasibility

Physical feasibility cannot be considered to be a limiting factor to the usage of BIPV systems. These systems are in fact an easy to apply, low-risk technology and can therefore be installed anywhere where there is sufficient exposure to light.

Practise notes and a “comprehensive set of rules of thumb” for the application of BIPV to buildings have been developed by the IEA (Gutschner et al., 2002).
5.2 Financial feasibility

This study suggests that the initial cost of investment, regardless of the system type, is too high for it to be financially feasible, and that the R2.10/kWh feed-in tariff that has been declared by NERSA is not sufficient to promote PV generation in the country. Adding to this, the feed-in tariff is currently not applicable to BIPV systems, as the tariff has been declared only for concentrated solar applications. NERSA must re-consider the feed-in tariff, as the current tariff is meaningless and will be of no value to the South African PV industry. Other countries have demonstrated the effectiveness of commitment from both the political and industrial sectors to achieving a greater contribution of solar electricity to energy generation (Philbin et al., 2008). Perhaps NERSA should consider the strategies used by other countries, strategies which include the promotion of BIPV systems.

As conventional electricity prices increase, and PV generation costs decrease due to technological improvements and an increase in large scale production, the financial feasibility of BIPV systems will increase over the years to come and will also have increased financial feasibility when it is considered as an “alternative building material” which can replace roof tiles, etc. (Philbin et al., 2008:45).

Furthermore, BIPV systems offer other benefits, such as job creation and rural development, over and above the generation of electricity. For this reason, a simple comparison with conventional generation and the unit costs of conventional electricity generation is not necessarily valid.

5.3 Rural application

Off-grid PV systems for rural application seem to be cost competitive and there will be a saving in cost for applications used for more than 11 years, and this could therefore be a viable option for supplying electricity to rural areas and regions that are great distances away from the grid.

Making use of off-grid PV systems would stimulate the development of rural regions, while simultaneously reducing the pressure on the environment and reducing the need for grid infrastructure.

However, according to Philbin et al. (2008:40), the initial investment costs may be a barrier to the uptake of PV systems. A possible solution to the high initial capital requirements could be that government incorporates PV systems into their low-cost housing and rural development schemes.
5.4 Raising awareness

While the value and advantages of making use of PV systems is not discussed in detail in this study, such values and advantages should be made known to the general public and potential investors.

Such advantages include improving the electricity network, job creation, energy payback, climate protection and other environmental advantages. Extensive research has already been done to prove the value of PV generation (Albuisson et al., 2005; Gisler et al., 2006; Philbin et al., 2008). It is merely a matter of sufficiently distributing the findings of this research in order to raise awareness. Philbin et al. (2008:8) suggest the following:

One crucial step is to bring a far broader range of actors into the sector, particularly in the investment, finance, marketing and retail areas. At the same time, there is a need to transmit to as wide an audience as possible, the message that solar electricity will bring socio-economic, industrial and environmental benefits to regions which proactively encourage its uptake.

6. REFERENCES


Beyond the Tradition: Extending Quantity Surveying Services in the Zambian Mining Sector

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ABSTRACT AND KEYWORDS

Purpose

This paper investigates the service delivery of the quantity surveying profession in the Zambian mining sector.

Design/methodological approach

Literature on the quantity surveying profession and the Zambian mining sector were reviewed. A case study of the Konkola Deep Mining project (KMDP) was analysed and a combination of open-ended and closed-ended questions in self-administered questionnaires was used to establish the views of clients (mining owners), in-house design team(s), consulting designers and Professional quantity surveyors.
Findings

It was established that design consultants and in-house design teams were widely used on mining sector projects and the focus on correct engineering specification(s)/procurement procedures could only be achieved by using the services of a Quantity Surveyor. It was further established that there was a resistance by clients and the design team to engage the quantity surveyor purely based on a wrong perception of the projects being too mechanical with a deep sense of ‘engineering practice’. The lack of understanding the role of the Professional Quantity Surveyor (PQS) on mining sector projects reduced the likelihood of incorporating him to the project management team.

Research limitations/implications

The research was limited to mines on the Copperbelt Province of Zambia, with particularly emphasis on the Konkola Deep Mining Project (KDMP).

Practical implications

The study shows the importance of utilising Quantity Surveying Services in the mining sector such as value engineering and cost control.

Originality/value

The study adds to the body of knowledge on the use of quantity surveying services in the mining sector beyond the traditional roles. It aims at exploring other ways of adding value to the procurement of mining sector projects.

Key words:
Mining owners (clients), Mining Sector, Quantity Surveying Services, Professional Quantity Surveyor.

1. INTRODUCTION

The construction industry contributes significantly to the development of any economy and the same applies to Zambia. Although there has been a steady growth over the past two decades in Zambia, Ngulube (2009) points out that there is need for the quantity surveyor to be more competitive on the global construction market. However, the Zambian economy is also privileged to have a great contribution to the economy by the Mining sector. According to the Copper mining in Zambia overview (2010), the mining sec-
tor contributes just over 10% to the Gross Domestic Product (GDP), representing 80% of Zambia’s export earnings. However, despite this huge turnover through the procurement of large capital projects, the roles of the quantity surveyor have been overlooked.

Hanid et al. (2007), observes that there has been considerable changes and challenges in the quantity surveying profession, to offer a more efficient service. Hanid et al. (2007) identifies the challenges as, changes of the demand of the market, unstable economic condition in the construction industry as well as competition from other professionals. Diversification is therefore an essential tool to deal with these challenges in order to sustain the quantity surveying profession beyond the tradition by exploring other sectors to safeguard and sustain the long-term future of the profession. Ngulube (2009) further points out the traditional roles of the quantity surveyor as financial management, measurement and accounting on construction projects.

Kelly and Male (1993), suggests that the quantity surveyor can maximise the functional value of a project by managing its evolution and development from concept to completion, by the use of the comparative cost analysis and audit of all decisions against a value system determined by the client.

This paper gives a synopsis of the mining sector in Zambia with a view to underscore its importance and contribution to the nation’s economy. Quantity Surveying services that can be provided to the mines are then highlighted and further emphasised in a case study of one single largest capital investment in the Zambian mining sector. Thus, the need for utilising quantity surveying services in the mines is established and a questionnaire survey was conducted to establish the existing level of utilisation of quantity surveying services in the mines. The implications of non availability of these services in the mines are established and finally the respondents’ opinion about the need for quantity surveying services is also established before appropriate conclusions and recommendations are made.

2. GENERAL OVERVIEW OF THE ZAMBIAN MINING SECTOR

The mining sector is one of the most important sectors that contribute to the Zambian economy. In the year 2003 cobalt production increased with a turnover of 20% of the world’s cobalt supplies.

The Zambia mining (2010), reports that Zambia is internationally recognised as a major producer of copper and cobalt. Figure 1 shows Zambia’s contribution of refined copper to the world market and underscores the importance of the mining industry to both the nation and the world. In 1966, it was ranked as the world’s seventh largest producer of copper, generating 3.8% of the western world’s production and world’s
largest producer of cobalt at 21.8%. It also has significant quantities of selenium and silver together with minor gold and platinum mineral elements which are produced as important by-products of the copper mining and processing. With a contribution of just over 10% to the Gross Domestic Product (GDP), representing 80% of Zambia’s export earnings, the Zambian mining industry is the nation’s bread basket (Copper mining in Zambia overview 2010).

Figure 1: The Zambian share of world refined copper production

![Zambian Share of World Refined Copper Production](image)

Source: ICSG; IWCC

Source: Mining and the Economy (2010)

2.1 The contribution of the mining sector to the economy

Zambia’s reliance on the mining sector can be further seen from the sectors contribution to the total export earnings highlighted in figure 2. The mining sector contributed US$822 million to the total export earnings of US$1050 million in 1997 and, of this; US$798 was realised from sales of copper and cobalt. The balance of mining-sector earnings come from sales of gold,
silver, and selenium, mostly byproducts of copper mining, and from emerald sales.

The above statistics highlight the nation’s reliance on the mining industry which sometimes makes it vulnerable to unfavourable market conditions of copper and cobalt. This vulnerability of Zambia's economy due to its reliance on copper mining has been exposed in the very recent past by the falling copper price and by falling production levels as a result of limited reinvestment in the mining industry. However, with reinforced future production of additional metals and minerals, there is no doubt that the mining industry will continue to provide both a sound base and a stimulus for growth in the other sectors of the economy, leading to long-term prosperity.

**Figure 2:** Contributions of industrial and manufacturing sectors to Zambian export earnings (Total Value = US $1050million)

![Figure 2](image)

*Source: Mining and the Economy (2010)*

**Figure 3:** Value of mineral sales in Zambia during 1997 (Total value = US $914million)

![Figure 3](image)

*Source: Mining and the Economy (2010)*
Thus the Zambian mining sector, being the nation’s key economic force should therefore strive to be as efficient as possible in the implementation of its capital projects since they account for a considerable outlay of capital. One of the initiatives to achieve cost efficiency in the implementation of capital projects in the mines is to embrace the quantity surveying profession in order to foster financial management on all construction projects.

3. QUANTITY SURVEYING SERVICES PROVIDED IN THE MINING SECTOR

According to Virnave (2003), the successful implementation of a mining project for the recovery of economic mineral constituents requires a very good knowledge of the following aspects of modern technology for exploration, extraction and mining methods, the evaluation of projects, and standard industrial practice for the development of mining metallurgical projects.

Chileshe and Kulkani (1992) suggest the following activities for the procedure of carrying out mining operations:

i.) Prospecting or search of minerals
ii.) Exploration
iii.) Development and investment stage
iv.) Exploitation and operational stage
v.) Decommissioning and post operation stage.

According to Hartman (1987:98), all the physical facilities provided to operate a mine are referred to as mine plant. In all these operations there is need for the stringent measures to be taken in order to achieve value engineering hence the need for the Quantity surveying services.

According to Virnave (2003), once the decision to invest has been arrived at using an accepted financial criterion, flow sheets with corresponding material and energy balances are prepared. Furthermore, plant layouts, piping, instrument and electrical diagrams are prepared. In addition, structural and building sketches are drawn up and an estimate of capital and operating costs are then prepared alongside a feasibility study. The final engineering design of all plant and facilities is completed based on the conceptual and preliminary engineering designs previously prepared and these include; all the details of machines and equipment definitive layouts, piping design, instrument and control design, and electrical design. Final site design lay-out and structural, civil and architectural designs are also completed.

Once all the final engineering and architectural drawings, bills of quantities, specifications and other contract documents are ready, then the process of procurement can be formulated for the purpose of selecting a contractor who can translate the designs into the actual plant.
Hartman (1987:10) considers underground mining to be generally complex and very expensive while at the same time acknowledging the fact that surface mining necessitates a large capital investment but generally results in high productivity, low operating cost, and good safety conditions. The scope of works which has potential for the Professional Quantity Surveyor (PQS) penetrating the mining sector according to Hanid et al (2007) can be split in two phases which are the technical and commercial roles.

3.1 Technical roles

3.1.1 Feasibility Studies

The PQS will be responsible to perform detailed feasibility study schemes in order to draw up the most suitable plan consistent with the company’s corporate objectives.

3.1.2 Health, Safety and the Environment (HSE)

The PQS will plan, implement and execute HSE processes and activities in relation to HSE standards, policies and guidelines.

3.1.3 Project Construction Management

The PQS will among other duties plan, lead and execute projects from feasibility stage, evaluation and supervision in relation to planned cost and programme schedules.

3.2 Commercial roles

3.2.1 Cost Engineering and Estimating

This role will provide cost engineering services for the development of total cost estimates and cost analysis required for budget forecasts, preparing of bills of quantities, pre-tender estimate and cost control.
3.2.2 Commercial Management and procurement

To manage all aspects of the contracting activities in order to ensure that all requisitions and commercial evaluations are carried out effectively and efficiently. The Engineering Procurement Construction Management (EPCM) procurement system can thus be applied through the services of the Quantity Surveyor.

3.2.3 Finance accounting and forensic auditing

Plan and execute the daily financial accounting which will comprise of subsequent forensic auditing and cash flow forecasting.

4. CASE STUDY- KONKOLA DEEP MINING PROJECT (KDMP)

The Konkola Deep Mining Project (KDMP) was aimed at expanding the production of copper ore at Konkola Mine from 2 million tonnes per annum to 7.5 million tonnes per annum by accessing the rich ore body that lies beneath what the current operations have been exploiting (KCM, 2010). This project would extend the life of Konkola Mine by 23 years. This involved the sinking of a new mine shaft to the depth of 1,490 metres, the deepest new shaft sinking project in Africa. In addition, the project involved the deepening of existing, sinking of three new ventilation shafts, one de-watering shaft and the construction of a new pump chamber.

Alongside the KDMP, a modern concentrator was built to handle the additional ore that would be produced at Konkola. The concentrator will treat 6 million tonnes of ore per annum. The Development of the KDMP, the concentrator and the new smelter is one of only three such plants in the whole world. The commissioning of the KDMP was a signpost to a future loaded with exciting opportunities for growth. According KCM (2010), it deemed the project to be a success and thanked the many contractors (local and foreign), employees and the Government for their support during the development of the project. The Shaft sinking and construction activities was executed by Grinker-LTA Mining. It was projected that this project would give KCM access to the ore reserves at a depth of 1,350m and is expected to significantly increase the life of the mine to beyond 2030. Phase 2 of the project would see the continued development of its new shaft complex to the design depth of 1,500m. TWP (2010), a multidisciplinary engineering consulting firm, concluded that the achievement of this project is a culmination of four years of preparatory work including the design and overall project management through the EPCM procurement contract. TWP (2010) further suggests that in order for a mining project to
achieve overall success, the PQS will play a vital and pivotal role to ensure that the cost budget estimates are monitored at every stage.

Plate 1: Konkola Deep Mining Project (KDMP)

5. METHODOLOGY

A combination of primary and secondary data was used as part of the empirical findings process. For primary data, a combination of open-ended and closed-ended questions as part of a self-administered questionnaire was used to collect data from clients (mining owners), designers and contractors. Additionally, informal interviews were conducted with public and private sector clients, designers and contractors. Similar opinions relative to
open-ended questions were grouped together and captured using Microsoft Excel. The contractors and consultants were selected on the basis of mining owners' register(s), while the professional bodies on the basis of them being custodians/overseers of the construction industry in Zambia. Additionally, secondary data was obtained from existing sources as well as the KDMP case study.

5.1 Findings

5.1.1 Utilisation of Quantity surveying services

100% of the respondents from PQS firms considered the utilisation of quantity surveying services in the mines to be low and attributed this to lack of knowledge about quantity surveying in the mines, hence the engagement of engineers. Similarly, all the contractors (100%), were of the view that the services are lowly utilised and they singled out the contracts departments which where key in the preparation of contract documents and awarding of contracts as being the most affected departments. 82% of design consultants said that the utilisation of these services in the mines was low while 18% regarded it to be very low. 83% of the construction professional bodies looked at the utilisation levels to be poor, only 17% concluded that it was good.

5.1.2 Implications of Non-Availability of Quantity Surveyors in the Mines

98% of the mining owners' capital project managers agreed that they were faced with site project management problems. An open-ended question was posed to the capital project managers to outline the problems faced; the major ones highlighted by different respondents were:

- Knowledge management was neglected in the sense of information flow.
- 100% of the respondents pointed out budgeting problems due to underestimating of the project value by the in-house design team leading to budget and cost over-run.
- Over-pricing of the contract value by the contractors without the design team noticing the significant differences.
- Over-claiming of the works done by the contractors due to the use of non-detailed specifications and bills of quantities.

On the other hand, 100% of the contractors also said that they faced problems on mining projects such as:

- failure by the in-house project team to understand contractual obligations;
- failure to reconcile claims, hence honouring the payments at a later date outside the jurisdiction of the contract;
• failure to agree variations against instructions issued on site.

5.1.3 The Need for Quantity Surveying Services in the Zambian Mines

80% of the mining companies interviewed were fully aware of the services offered by the PQS and indicated that such services were offered by engineers whose services they considered to be satisfactory. 67% of the project engineers were of the view that they did not see the need for quantity surveyors, while 33% thought otherwise and appreciated the skills of the PQS such as financial management, contract management and detailed cost budget estimates. Figure 3 shows an indication of copper production in the world. Zambia stands out to be the eighth largest producer with a turnover of over half a million tonnes of copper. This can therefore represent the amount of construction projects undertaken, which then translates in the inevitable use of quantity surveying services for mining sector projects.

Figure 4: Copper Mining production in the World
6. DISCUSSION AND CONCLUSION

The findings clearly suggest that the implementations of quantity surveying services in the mining sector are without a doubt evidently required. 80% of the mining companies and contractors interviewed agreed that quantity surveyors must be employed on mining projects. Furthermore, it was evident that with the unique skills of the PQS, a mining project will achieve the much desired milestones according to TWP (2010).

The potential services/roles which can be offered by the PQS were categorised as technical and commercial as detailed in table 1.

<table>
<thead>
<tr>
<th>Category of services</th>
<th>Preliminary</th>
<th>Pre-contract</th>
<th>Post contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical role(s)</td>
<td>Feasibility studies</td>
<td>Health safety and the environment</td>
<td>Project Construction management</td>
</tr>
<tr>
<td>Commercial role(s)</td>
<td>Cost engineering and estimating</td>
<td>Commercial management and procurement</td>
<td>Financial accounting and forensic auditing</td>
</tr>
</tbody>
</table>

The need for quantity surveying services world over cannot be overemphasised, and the Zambian mining sector cannot be an exceptional to this phenomenon. The benefits of utilising the quantity surveyor are cumulative and vary from project to project, and ultimately outweigh the cost of paying professional quantity surveying fees by the client.

7. RECOMMENDATION

The potential improvement of project performance through cost control is attainable by financial management. Engineering consultants should advice the mining owners about the utilisation of quantity surveying services which not only would improve cost, quality and time but also the overall project success. The adoption of the Engineering, Procurement, Construction Management (EPCM) procurement contract, according to Loots and Henchie (2007:8) is a viable procurement route for international infrastructure and major construction projects. The role of the PQS who’s not necessarily the constructor, will be to advise the owner on the strategy of procurement and implementation of the strategy.
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Factors Contributing to Cost Overruns of Construction Projects

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ABSTRACT AND KEYWORDS

Purpose

The primary objective of this study is to attempt to identify the major cost overrun factors in the construction sector of the Free State Province of South Africa, which can serve as the way forward for future projects in dealing with these cost overruns.

Design/methodology/approach

The study is based on a literature review investigating factors which have a significant influence on cost overruns and also a survey, consisting of a questionnaire and personal interviews, was conducted among professionals of the construction industry. The survey investigated factors that have significant influence in construction cost overruns of public sector projects. This includes misinterpretation of the client’s brief, incomplete design at tender stage, procurement strategies and contractual claims such as contract instructions. The results were analysed and compared against the literature review.

Findings

Results indicated that indicated that the factors that has an influence in cost overruns of construction projects can be grouped into three categories i.e. very critical factors, moderately critical factors and less critical factors. It is important to
note that major attention still need to be given to all these factors collectively as they all contribute to cost overruns of construction projects

Value

This paper recommends that there is a significant need to identify factors that may influence construction cost overruns and to address these factors as early as the inception of the project. The results thereof will bring about a significant decrease in the occurrence of cost overruns and improve the cost performance on public sector projects.

Keywords

Cost overrun, construction; public sector projects

1. INTRODUCTION

In the past several decades, large construction projects have been known for their cost overruns and late completion times (Pickrell 1990; Flyvbjerg Holm & Buhl, 2003). Many factors are responsible for these cost overruns such as underestimation of costs to make the projects more viable, addition of scope during later stages of project planning and even during construction, changed conditions, etc. One of the most important contributing factors to the magnitude of cost overrun in large transportation projects are project delays. Furthermore, the length of project development phase from planning to construction seems to be a major factor in the extent of cost overrun (Flyvbjerg, Holm & Buhl, 2004). The longer, larger projects tend to be more prone to cost overruns (Touran and Lopez, 2006:1).

Maher and McGoey-Smith, (2006: 2) indicated that large transportation infrastructure projects are often significantly over budget. This phenomenon has been dubbed in the media as the “Big dig Syndrome” in reference to the Boston Central Artery system which was originally slated to cost $3 billion and is now heading towards $15 billion, as it reaches completion.

Not only is this syndrome solely a North America one; Europe’s Channel Tunnel and London Underground’s Jubilee Line were notoriously over budget. Budget overruns are common in other industries; almost all of Canada’s recent oil sands infrastructure projects have been reported as being significantly over budget. Note that these projects are owned and financed within the private domain.

Flyvbjerg and colleagues have studied the phenomenon of cost overruns on transportation mega projects systematically (Flyvbjerg, Holm & Buhl, 2002; Flyvbjerg et. al., 2004; Flyvbjerg, 2005). In a study of 258 transportation mega projects spanning 80 years and several countries, the authors report that:

- costs are underestimated in almost 90% of projects,
• actual costs are on average 28% higher than estimated costs,
• cost overruns are independent of geographic location
• percentage overruns increase with the size of project and
• cost estimation has not improved over time Maher & McGoey-Smith, (2006: 3)

1.1 Which Projects get Built?

Flyvbjerg, (2005: 1) found it isn’t necessarily the best ones, but those projects for which components best succeed in conjuring a fantasy world of underestimated costs, overestimated revenues, undervalued environmental impacts and overvalued regional development effects.

Flyvbjerg survey, the first and largest of its kind, looked at several hundred projects in more than 20 countries. Marchiavelli seems to have been Chief Adviser on these projects with his observation that “prices who have achieved great things have been those ... who have known how to trick men with their cunning, and who, in the end, have overcome those abiding by honest principles”.

In fact there seemed to be a formula at work:

(underestimated costs) + (overestimated revenues) + (undervalued environmental impacts) + (overvalued economic development effects) = (project approval)

Many project proponents don’t hesitate to use this Machiavellian formula for project approval, even if it means misleading parliaments, the public and the media about the costs and benefits of projects. The result is an unhealthy “survival of the unfittest” for large public works and other construction projects Flyvbjerg, (2005:1).

1.2 Do Projects Grow Larger over Time?

Project size matters to cost escalation, as found above for bridges and tunnels. But even for projects where increased size correlates with neither bigger percentage cost escalations nor larger risks of escalation, as found for rail and road projects, it should be pointed out that there may be good practical reasons to pay more attention to – and use more resources to prevent – cost escalation in larger projects than in smaller ones.

For instance, a cost escalation of, say, 50% in a US$5 billion project would typically cause more problems in terms of budgetary, fiscal administrative and political dilemmas than would the same percentage escalation in a project costing, say, US$5 million. If project promoters and owners wish to avoid such problems, special attention must be paid to cost escalation for larger projects Flyvbjerg, Holm and Buhl, (2004: 10-11).
1.3 Project Risk

Lee, (2008: 2) said that projects are inherently risky due to their long planning horizons and complex interfaces. The project scope or level of ambition will often change significantly during project development and implementation.

1.4 The Influence of Design on Cost

Kirkham (2007:4), considered the relationship between costs of buildings and procurement, where procurement is the method by which buildings are delivered to the client. Whereas Flanagan & Tate (1997:8) consider cost planning as a system that relates the design of a building to its cost, taking full account of quality, utility and appearance, the cost is planned to be within the economic limit of expenditure. Cost planning procedures are applied in an attempt to reduce the amount of recourses (and therefore cost) incurred during each stage of the development process, including design, construction, operation and maintenance, and subsequent replacement. Kirkham (2007:3) referred back to biblical times in order to trace the origins of cost planning, and the reading they quoted from St Luke (Ch.14) gives a fascinating insight:

"Would anyone think of building a tower without first sitting down and calculating the cost, to see whether he/she could afford to finish it? Otherwise, once the foundations have been laid and he/she cannot complete it, all the onlookers will. “There is the man” they will say “who started to build and could not finish”.

Whilst there are clearly metaphorical connotations within this reading, the point is pretty clear. To build well you must first plan. Interestingly, the final part of the reading is a harrowing reminder to many clients and builders in today’s society who have not taken heed of good budgetary management (Kirkham, 2007:3).

The UK in particular has seen a rapid increase in construction output since the year 2000, but allied to this has been an increasing focus on project budgets, and moreover the ability to deliver these projects at the projected cost. Sadly, several high profile construction projects in the UK have been plagued with problems over programme and budget. With public sector construction projects there is a strong emphasis on meeting the budget, so when the project runs into financial difficulties, the taxpayer and media become rather unsympathetic. Some recent examples include the following (Kirkham, 2007:3):

1.5 Causes of overruns

Love (2011: 2) indicated that high profile infrastructure projects that experience cost and time problems or contractual disputes attract media attention as the community contribute to funding their delivery. Several notable projects in recent
times include Denver’s US$5 billion airport that experienced a cost overrun of 200%, the DKK 800 million Oresund bridge that experienced a 68% cost overrun (Flyvberg et al., 2003), and the Scottish Parliament Building which was over 3 years late and experienced more than a 900% cost overrun (Love, 2011). In Australia, several large scale social infrastructure projects (i.e., hospitals, law and order, museums, schools, recreational facilities), have experienced considerable delays due to poor project governance and design errors (Love, (2011: 2).

More contemporary examples of this phenomenon include the Western Australian Perth Arena that had an original contract value of A$168 million but is forecast to cost more than three times this amount, and be delivered at least three years later than expected.

South Africa, has also experienced some recent notable cost overruns in several large scale projects, examples are the soccer city stadium in Johannesburg built for R3,3 billion and experienced a cost overrun of 58% (Davie, 2010: online). Greenpoint stadium in Cape Town experienced a 50% cost overrun (Van Gass, 2007: online). Moses Mabhida stadium in Durban also experienced a cost overrun of 38% (Venter, 2009: online and Piliso, 2009: online).

Flyvberg et al. (2005) has suggested that average cost overruns for infrastructure projects can range between 20.4% for roads, 33.8% for bridges and tunnels and 44.7% for rail. In contrast, Love et al. (2010) report significantly lower levels of average cost overrun, with roads 13%, and bridges 5.5%. This observed differential can be explained by the monetary value of projects. Flyvberg et al.’s (2005) research focused on mega-projects with contract values in excess of US$1 billion, whereas the contract value of Love et al.’s (2010) work was considerably smaller with an average contract value of A$33 million. Credence should therefore be given to Flyvberg et al.’s (2004) assertion that a positive correlation exists between contract value and cost overrun.

According to Flyvberg et al. (2009) there are two rudimentary reasons why projects experience cost overruns. Firstly, strategic misrepresentation, which is an Orwellian euphemism for describing deceptive actions used by politicians and planners to ensure that projects proceed. Secondly, optimum bias, which encapsulates the systematic tendency for decision makers to be over-optimistic about the outcome of, planned actions. This includes over-estimating the likelihood of positive events and under-estimating risk and loss. The United Kingdom (UK) government has acknowledged that optimism bias is a problem in the planning and budgeting infrastructure projects and developed measures for dealing this with problem.

Love, (2011:12) many pathogen errors in engineering firms are based on practices (i.e. those pathogens from people’s deliberate practices) that attempted to solve a particular problem. Further individuals may repeat inappropriate practices, such as taking short cuts and not following due processes. When a practice provides an individual with a satisfactory outcome then this practice is used again on future projects irrespective of its suitability.
1.6 Causes of error

The relationship between strategic misrepresentation and optimum bias with cost overruns implicitly assumes causality in terms of counterfactual dependence of the effect on the cause: the cause is rendered counterfactually necessary for the effect (Love, 2011:13). For instance, to say that strategic misrepresentation caused a cost overrun is to say if the misrepresentation had not occurred, then the cost overrun would not have ensued. To be more precise, causality can be defined by reference to a causal chain of counterfactually dependent events, where a sequence of events \((C,E,F,..)\) is a chain of counterfactual dependence if \(E\) counterfactually depends on \(C\), \(E\) counterfactually depends on \(F\) and so on. Basically, Love (2011) asserted that "one event is a cause of another if and only if there exists a causal chain leading from the first to the second" (Love, 2011:13).

Flyvbejerg, Holm and Buhl, (2002:282) conclude that the error of underestimating costs is significantly much more common and much larger than the error of overestimating costs. Furthermore Flyvbejerg et al (2002:285) ask the question of whether project promoters and forecasters have become more or less inclined, over time, to underestimate the costs of transportation infrastructure projects. If underestimation were unintentional and related to lack of experience or faulty methods in estimating and forecasting costs, then we would expect underestimation to decrease over time. Better methods have been developed and more experience gained through the planning and implementation of more relevant complex projects. It is therefore concluded that cost underestimation has not decreased over time. Underestimation today is in the same order of magnitude as it was 10, 30 and 70 years ago.

2. OBJECTIVE OF THE STUDY

The objective of the study was to identify the factors influencing cost overruns and rank them in order of significance to raise the level of awareness. The objective was achieved through a questionnaire survey. From the existing research finding, it was possible to identify the factors that influence cost overruns. These were organised in a questionnaire designed to enable respondents to add any other factor that they considered necessary for inclusion in the list of 21 factors. The questionnaire was supported by, informal interviews and discussions with some of the respondents.

3. RESEARCH: SURVEY ON FACTORS CAUSING COST OVERRUNS

The purpose of the survey was to establish the factors causing cost overruns and to evaluate the influence these factors have on cost overruns. The survey was sent to 25 professionals in the construction industry, comprising architects, engineers, quantity surveyors, project managers and contractors.
These professionals comprised consultants in the private sector and professionals in public service, with some experience of the Free State situation. Responses to the questionnaire were received from twenty one (84%) of these professionals. The identification of the factors as well as evaluation of their impact is seen as important for future management of projects. This knowledge will enable project managers and project facilitators to concentrate on the most critical influences in respect of the control of costs on property development projects.

4. RESULTS AND FINDINGS

The first question was directed towards the establishment of whether construction cost overrun is seen as a problem in the Free State Province of South Africa. All the respondents considered cost overruns as a problem that needs to be addressed. Respondents did not consider all the factors listed to have a significant or equally important influence. According to respondents, the importance of factors on cost overruns may be divided into three categories i.e. very critical factors, moderately critical factors and less critical factors. However, all these factors should not be ignored in any given project.

Five factors were considered to be very critical, (valued at between 70% and 80%) contributing to cost overruns (Figure 2).

![Figure 2: Five very Critical Factors of cost overruns](image)

The five critical factors considered by the respondents and indicated by them as very critical, is shown in Figure 1 with importance of between 65% and 85%. Changes in scope of work on site by the client seemed to be the one with the most influence according to the respondents, but cannot be seen as controllable by the design team and is thus not seen as cost overrun related to budget items and must be equated for through an approval process driven by the client body.
One of the perennial causes of claims for additional payment are defects in the design or documentation issued for a project at the outset. Just as design may change for technical reasons there will be instances where the client's requirements may change, often for unpredicted or unanticipated reasons (Davison, 2005:18).

Figure 2 clearly shows the important influence of design, claims, lack of cost planning and delays in costing of extras. The factor, “delays in costing of variations and additional works” is not seen itself as a factor causing cost overruns, but influences planning related to budgets because of the lack of timeous information.

Figure 3a & 3b shows the moderately critical factors of cost overruns as considered by the respondents. (50% to 64% importance)

Figure 3a shows factors directly influencing cost

![Moderately Critical Factors](image)

**Figure 3a:** Moderately Critical Factors of cost overruns (factors directly influencing cost)

**Figure 3b:** shows factors influencing cost information
Classifying the various influencing factors under the above categories, narrows the problem and helps to deal with it more effectively. In these categories the responses were grouped between 50% and 64%, and were regarded as moderately critical with the variation orders scoring 65% in this category. It is not realistic however to believe that all the factors that influence cost overruns can be brought under control.

Figure 3 must be considered carefully because it may be divided into two categories; Figure 3a contains the factors that directly influence costs, and Figure 3b the factors that influence cost information.

In respect of factors influencing costs and therefore cost overruns the following factors are seen as fundamentally important:

- **Variation orders**: If variation is caused by change of scope or clients’ changes then it becomes a budget change decision and cannot be seen as a cost overrun item in the “unexpected” category.
- **Provisional Bills of Quantities**: The effect of provision of quantities may cause cost overruns where to original quantities were under evaluated.
- **Unexpected conditions caused by lack of prior investigation or natural influences.**
- **Completeness of design and specification is most important especially when Figure 1, results are considered.**

Important factors influencing the availability of information are:
- **Delays in issuing information to the contractor**
- **CIDB ratings**
- **Cost reporting**
- **Communication**
• Ignorance of abnormal rates: However if rates that are too high are ignored and items so priced are increased in number or volume cost overruns will occur.

Figure 4: shows the less critical factors of cost overruns.

![Less Critical Factors](image)

In the less critical categories, the respondent’s responses were grouped between 0% and 50%. These less critical factors indicated clarity of drawings and documentation as scoring 45%. On any given project, the factors under this category should be considered before dismissing them as insignificant. All these factors do contribute to cost overruns although the impact is minimal. It is however important to note that the adjustment to preliminaries and increases in respect of provisional sums due to under estimation may become critical if not planned and controlled well and are dependent on time and value rated pricing of the preliminaries bill.

5. CONCLUSION

It may be seen that most of the above factors, emanate from actions and omissions by both the client and the professional team. In this regard the first step towards minimising cost overruns may be to deal with the human factors first. The factors that were studied make it difficult to control cost overruns during the construction stage alone. Instead, there should be sufficient planning of the project at the inception stage. Drawings and other tender documents should be well detailed before going out to tender Chimwaso, (2000).

If imperfect techniques, inadequate data, and lack of experience were main explanations of the underestimations, we would expect an improvement in forecasting accuracy over time. Underestimating the costs of a given project leads to a falsely high benefit-cost ratio for that project, which in turn leads to two problems. First, the project may be started despite the fact that it is not economically viable. Or, secondly, it may be started instead of another project that would have yielded higher returns had the actual costs of both projects been...
known. Cost underestimation cannot be explained by error and seems to be best explained by strategic misrepresentation, i.e. lying, which is defined in the conventional fashion as making a statement intended to deceive others.

In conclusion, the factors that influence cost overruns have been identified and ranked in order of significance. These factors have further been classified into categories, to help deal with them effectively. The three categories are: very critical factors, moderately critical factors and less critical factors. However it is important to note that some factors cause cost overruns and others cause only the lack of information to enable parties to act upon timeously.

From the results of the questionnaire, it can be deduced that public sector projects in the Free State Province of South Africa, like in any other developing countries, are not free from cost overruns. It is still evident that:

- Cost overruns appears to be a global phenomenon
- Cost overrun appear to be more pronounced in developing nations
- Cost overrun has not decreased over the past 70 years. No learning seems to take place
- Cost underestimation and overrun cannot be explained by error and seem to be best explained by strategic misrepresentation, namely, lying with a view to getting projects started (Flyvberg, Holm and Buhl, 2004:3-4).

6. RECOMMENDATIONS

From the above findings the following recommendations are seen as applicable:

1. Client involvement is critical and client (employers) must recognise the importance of their influence on the effectiveness of cost planning and cost control. The design team cannot budget for items that are still in the clients’ mind that are added to the project during the construction phase.

2. The budget must be updated when external influences like additions and variations are implemented by the employer and should not be seen by them then as cost overruns, unfortunately this perception is still present.

3. There is a need to identify the factors that may influence cost overruns and deal with them from the inception stage of each project. This will decrease the occurrence of cost overruns.

4. Since design changes may be a result of insufficient planning, a careful study should be done to determine the appropriate time scale in which to produce designs and other tender documents. This will help improve the quality of tender documents and lessen changes during the construction stage.

The implementation of a discipline involving a formal budget control, cost planning and cost control regime is seen as an important process to limit cost overruns of construction projects. Unfortunately formalisation of such a regime is
currently not seen as an important priority in relation to a government project as it is not implemented well by design teams.

7. REFERENCES


Identification of the Causes of Non-Value-Adding Activities during the client briefing process

Xolani Nghona¹, Jonathan Crowe², Ruben Ndihokubwayo³

ABSTRACT AND KEYWORDS

Purpose of this study

This study endeavours to identify the causes of non value-adding activities during the construction client briefing process in order to minimise the occurrence of them in design process.

Methodology

A literature review focusing on the identification of the causes of non-value adding activities during the client briefing phase was conducted. Close-ended questionnaires were distributed and interviews were conducted with purposively sampled registered architects, structural designers, project managers, contractors and quantity surveyors in the Central Business District of the City of Cape Town.

Findings

The study reports that the construction client briefing process fails to identify and minimise the causes which give rise to activities that do not add value to the design process. It was revealed that an inadequate design
brief resulted from the failure on accurate interpretation of building services, inadequate scope of work resulted to changes in drawing specifications, unnecessary redesign drawings arose due to failure in accurate interpretation of the building services and design briefs that did not take complete consideration of client’s requirements resulted in changes in design drawings, hence the existence of non-value adding activities.

Practical implications

The study increases the knowledge and understanding of the causes of non-value adding activities during client briefing process. This potentially will reduce the occurrence of non-value adding activities during the design process which will subsequently reduce waste during construction stage.

Originality/value

The identification of the causes of non-value adding activities during the construction client briefing process provides a step forward towards the reduction of the non-value adding activities in design process.

Keywords

Causes, client briefing process, non-value adding activities, design process

1. INTRODUCTION

The client’s briefing process of construction initiation phase consists of identification and understanding of needs, wants and expectations of the clients’ development objectives. Kamara and Anumba (1999) stated that the process of collecting information from a client under the premises of interviews and workshops during the early stages of construction projects seeks to identify the client’s development objectives. A briefing process permits clients to communicate their intentions about the project and together with the project team outline project objectives (Yu, Shen, Kelly and Hunter, 2005). One of the aims of this process is to provide a project team an opportunity to translate client’s requirements into architectural concepts that other designers can use to develop their own design activities (Gray and Hughes, 2003). Unfortunately, clients communicate their needs and requirements in non-design terms which necessitate the project team to capture and translate into design terms (Kamara Anumba, and Evbuomwan, 2000). Smith et al., (2000) asserted that the pre-design stage of construction projects is the source of problems such as rework and change orders. This is because the inadequacy in understanding and
translating accurately the clients’ requirements by the members of the project team is likely to occur. Thus, the lack of identification of client requirements and the lack of a complete framework to capture the client requirements are still considered major problem factors in the client briefing process (Yu et al., 2005). Consequently, poor understanding of the client’s requirements leads to project delays and high variation costs (Ree and Meel, 2007). Tzortzopoulos et al., (2005) argue that project delays arise as a consequence of non-value adding interactions due to poor definition of requirements.

Non-value adding activities are referred to as activities which absorb resources without adding value to the customer (Saukkorippi, 2005). Koskela (1992), Alarcon (1994) and Love et al., (1997) defined non-value-adding activities as all those activities that absorb time and resources and generate direct or indirect costs but do not contribute value to the product. Moreover, in construction terms non-value adding is synonymously to waste (Buzby et al., 2002). Saukkorippi (2005) argued that in order to be capable to define what non-value adding is the term value has to be described. In other words, value-adding and non-value adding activities can best be realized if the term value can be interpreted and expressed in what it actually means to those to whom value is to be delivered.. Knuf (2000) described value as everything a customer is willing and satisfied to pay for. Evans (2002) observed value as the relative amount of the customer’s perceived benefit to perceived cost. Alwi (2002) opined that the moment the client first decides to invest in the construction project, prevention of non-value adding activities should be considered. This study aims at identifying the causes of non-value adding activities during the construction client briefing process in order to minimise the occurrence of non-value adding activities in design process.

2. BACKGROUND

For many years, waste in construction has been known as the loss of productivity due to labours, inefficient use of materials, repairs and reworks that result in projects running over budget and over time. According to Alwi et al. (2002) activities which do not add value (waste) to construction work such as repairs, reworks and time delays etc. contribute to the reduction of construction work productivity. However, waste goes beyond the loss of productivity due to inefficient use of labour and materials on site.. For example, Lam et al. (2001) argue that the construction industry is associated with collective efforts spent on producing unusable or impractical project information which collectively creates waste. According Burke (2003) a misleading scope definition (scope of work) resulted from the failure to accurately interpret the clients’ needs and problems. Arguably, a misleading scope definition is deficient project information which leads to erratic decision making. Furthermore Burke (2003) argued that if this
misleading definition causes rework and additional effort, both the cost and time implications of the project are affected. The reworks and additional effort stated here does not only apply to construction process on site, but also to the building design process in the form of redesigns and design changes. Both the redesigns and design changes absorb time and resources of the project.

3. LEAN CONSTRUCTION PRINCIPLES

According to Abdelhamid (2004), lean is a strategic method-process concerned with shortening time period between the client order and the product delivery by eradicating waste and maximizing value of the paying client. This argument is supported by Garcia and Drogosz (2007) in their study on lean engineering principles when illustrating the product development lead-time. As shown in the figure below the “lead time of a process is directly related to the part of waste which slows down the development process and absorbs the main engineering resources”. The longer the non-value adding time the more waste is accommodated during the process.

![Figure 1: Product Development Lead Time](source: Lean engineering principles (Garcia and Drogosz, 2007))

Lean thinking approach attempts at identifying and eliminating waste. The development of a product includes not only value added time such as for
example defining and designing a product but also non-value added times such as for example design changes and modifications.

Typically, non-value adding activities arise following alterations demanded by the clients to design drawings. However, Koskela (1998) listed the principles of lean production as having to do with:

- reducing the non-value adding activities, leading to simplification, reduction of variability and increase of flexibility;
- increasing the efficiency of value adding activities associated with improvement of production technology and production skills;
- ensuring the product specifications thus improving customer value;
- improving a comprehensive and integrated way and balancing actions oriented to implement lean production principles in design, control and production system.

Above all, the lean design management principles aim at reducing or eliminating the non-value adding activities, thus increasing awareness of project participants about activities that add value to the project. Arguably, any effort aiming to reduce non-value adding activities (e.g. redesigns, change requests) can be achieved first by clear identification of the causes of non-value activities.

4. CAUSES OF NON-VALUE ADDING ACTIVITIES ON CLIENT BRIEFING STAGE

4.1 Poor definition and translation of client requirements

The construction industry has been struggling to identify causes which give rise to non-value adding activities within the activities performed during the client briefing process. These activities lead to project budget overruns, over time overwhelmed with rework, variations and disputes (Love and Li 2000; Tilley, et al., 2002; Andi and Minato 2003; Tilley and McFallan 2000a, b & c; Gallo et al., 2002). Because clients do not communicate their requirements in design terms compelling the project team to capture, interpret and translate into design terms (Kamara, et al., 2000), inadequacy in understanding and translating precisely the client’s requirements by members of the project team is likely to occur. Cooper and Kleinscmidt (1996) pointed out that the failure to clearly define building characteristics and services before design begins might be a major cause of poor design quality and project process delays. Tzortzopoulos et al., (2005) argued that the long project delays arise as a consequence of non-value adding interactions due to poor definition of requirements. Tzortzopoulos et al.,
(2005) further opined that poor requirements definition is a value related issue that leads to inadequate project brief resulting in design proposals which fail to sufficiently consider requirements. The poor considerations of the client’s requirements result in failure of accurate interpretation of the building functions and services. Ultimately, this failure results in construction designs which are confronted by redesigns and modifications.

4.2 Poor consideration of client requirements

From the construction perspective, briefing is a process inclusive of the client informing the project team about the requirements that can satisfy the specific project stated need (Yu et al., 2005). In order for client satisfaction to be achieved, the client’s needs have to be translated into construction designs which specify technical characteristics, performance criteria and quality standards (Seymour and Low, 1990). If client requirements are inadequately considered concerning the function, the anticipated quality standards, the use of space and the whole working environment of the proposed building, non-value adding activities occur in the form of changes in design drawings and specifications. Thus, poor consideration of requirements results in unnecessary redesigns (Tzortzopoulos et al., 2005). The construction activities are inter-reliant, for an example;” changes made during the pre-design phase, proportional could have an impact of $1 to the project, and if not identified early enough the cost could increase to $10 during the design phase and up to $100, if left until construction had begun”(Tilley, 2005).

Moreover, the uncertainties provided by project initiation or conception stages due to insufficient information at hand and making of major design decisions too early in the project development process contributes to the failure to maximize overall project value (Othman et al., 2004). Nevertheless, Gray and Hughes (2003) opined that the start-up meeting during the briefing stage is intended to generate ideas through discussions in order to give understanding of the client’s objectives. Ultimately, a briefing process product is used to evaluate options and to articulate clearly the project requirements (Blyth and Worthington, 2001). However, construction clients believe that to ensure that the final product (building) meets and fulfils their requirements, an extended version of the briefing process that almost lasts until the final stages of construction could better do the job (Rezgui et al., 2001). This is because during the early stages of the construction project clients cannot always state their requirements clearly (Gray and Hughes, 2002). However, construction consultants view the briefing process as a well-defined process with a start and end, to ensure records of changes in order to be able to claim fees for any extra work activity (Rezgui et al., 2001). Arguably, non-value adding activities occur due to traditional focus by the briefing and design teams on converting client’s requirements into design solutions. This traditional transformation of clients needs (input) into design drawings and
specification (output) is undertaken without an accurate consideration of the client’s position concerning the function, the anticipated quality standards, the use of space and the whole working environment of the proposed building. Nonetheless, the consecutive analysis of the management of client’s requirements behind the spectacles of marketing discipline has presented the distinction between the focuses of selling and marketing as follows: “Selling is preoccupied with the seller’s needs to convert his service or product into cash, marketing with the idea of satisfying the needs of the customer by means of the service or product and the whole cluster of things associated with creating, delivering, and finally consuming it” (Levitt, 1991:10).

Traditionally, the client briefing and construction design teams stand over the counter as sellers of construction “service-activities” with the sellers needs in converting their services or product (drawings & specification) into cash. Arguably, poor consideration of the client’s requirements leads to failure in the accurate interpretation of the product (building) functions and services. The client, “as the purchaser of services from the construction industry” (Kamara et al., 2000) is served on the other side of the counter without a proper analysis of the end-user of the facility when the project is completed.

4.3 The construction clients and the building end-users

Change requests originate from a lack of clear definition and mutual in-depth understanding between the client’s development objectives and the building end-users services. The table below presents a “Change Request” format utilized by construction project managers during the design and construction phase, if and when changes are requested by clients.

<table>
<thead>
<tr>
<th>Change Request</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number:</td>
<td>Date Raised:</td>
</tr>
<tr>
<td>Initiated by:</td>
<td></td>
</tr>
<tr>
<td>Change requested (related drawings/work package)</td>
<td></td>
</tr>
<tr>
<td>Reason for change:</td>
<td></td>
</tr>
<tr>
<td>Approval:</td>
<td></td>
</tr>
<tr>
<td>Name:</td>
<td>Position:</td>
</tr>
<tr>
<td>Approval:</td>
<td>Date:</td>
</tr>
</tbody>
</table>

Source: Project management (Burke, 2003)
The existing gap between the end-user clients and the paying clients in determining accurately the requirements of the client “body” has been identified by Ziesel (1981) as one of the major problem factors in the briefing process. Unfortunately, this problem still hunts, hinders and obstructs the success of the construction performance in recent times. Thus, Ryd (2001) argues that in the early stages of construction projects the co-operation between the consultants, clients (owners) and end-users (customer) are not accurately documented. Believing that the clients normally have a tendency to change their thoughts on various aspects of the project proposal during the project brief, CIOB11 (2002) advocate that identification and control of needs and objectives of the client and those of the project through careful examination to minimize future changes to the project brief is essential.

Ryd (2001) opined that construction clients do not only represent his own needs, but also the needs of those who are going to rent or let out the building premises. Thus, during the development of the functional brief the “business objectives” of the project and the “statement of needs” have to be translated into a researched and comprehensive brief document which precisely defines the client’s requirements (Gray and Hughes, 2003). Arguably, accurate understanding of the client’s needs should be translated to solve the identified business opportunity which later the end-user will carry out in a form of rendering their own services. This suggests that clients’ requirements should not be confused with end user’s needs. Hence, Ryd (2001) argued that the construction client has a responsibility to ensure that all desires and preferences of the end-user are met. In addition, interviewees during a study to identify the incidence of non-value adding activities within the Indonesian and Australian constructing companies confirmed that changes in designs arise due to owners or clients requesting changes to designs in pursuit to meet new preferences and needs (Alwi et al., 2002). These new preferences by clients are initiated through desire to meet end-users needs in relation to the building services. The pre-design stage has an influence on the design stage. The design stage has an influence on construction stage. The construction activities are interdependent.

5. METHODOLOGY

A purposive approach was adopted in the selection of participant companies in the Central Business District of the City of Cape Town. Questionnaire survey was used to identify the causes of non-value adding activities and to substantiate the theoretical framework. A questionnaire consisting three sections was drafted. The first section collected the
biographical profile of the respondents. The second section collected the views and opinions of respondents concerning the causes of the non-value adding activities during the client briefing phase. The third section collected the views and opinions of respondents concerning the possible link factors which influence the prevalence of non-value adding activities. According to Walliman (2005), a questionnaire enables a researcher to organize the questions and receives replies without actually having to talk to every respondent. Most of the questionnaires were hand-delivered to the selected respondents who were instructed to read and answer the questions. Other questionnaires were mailed. The hand-delivered questionnaire yielded high response rate than the mailed questionnaire. Out of the 100% of the questionnaires which were completed and returned, the hand delivered questionnaires amounted to 70% and the mail questionnaires amounted to 30%.

Closed-ended questions were sent out to purposive sampled registered quantity surveyors, architects, structural engineers, project manager and contractors to obtain opinions on the causes of non-value adding activities during the design phase. A purposive sampling is a useful method consisting of getting information from a sample of the population that one thinks knows most about the subject matter (Walliman, 2005). According to Creswell et al., (2007) purposive sampling refers to the chosen respondents whose experience and knowledge are relevant and required for the study. Due to time constrains the population was stratified and divided into characteristics of importance of research, for an example positions of participants, experience and the selection of the traditional project team organisations. Accordingly, the sampling design adopted was a stratified purposive sampling. The answers of the closed-ended questions from the respondents were captured and analyzed using the Statistical Package for Social Scientific (SPSS). A quantitative approach deals with data that is mostly statistical (Welman and Kruger, 2004). Internal consistency reliability for the scale questions was determined. Cronbach’s alpha coefficient of reliability was determined for scaled questions. The coefficient of 0.7 is acceptable as a rule of thumb. The construction companies selected are conducting their business in the Central Business District of the City of Cape Town.

6. FINDINGS

6.1 Research participation

Due to time constrain the targeted sample size was twenty (20) construction companies. However, out of twenty (20) companies 18 (90%) completed and returned the questionnaire. Participant companies included cost consultants (17%), project managers (22%), contractors (17%), structural designers (22%) and architects (22%). Positions of respondents
within their organizations included general managers (22%), assistance managers (16.7%), senior project managers (11.1%), structural engineers (16.7%), directors (11.1%), mechanical engineers (11.1%), candidate architects (5.6%) and senior architect assistants (5.6%). The experience of the respondents in the construction industry ranged from 1 - 10 years (33.6%), 10 – 20 years (27.9%), 20 – 30 years (27.9%) and 30 - 40 years (11.2%). The median length of experience in construction industry was 15 years. While respondents had been in their present companies for a period ranging from six months to 29 years, the median length of time they had worked there was 3 years and six months. All respondents had been involved in the building client briefing and design process of the construction projects.

6.2 Discussion of findings

6.2.1 Identification of the causes of non-value adding activities during client briefing process

A 5 point Likert scale established to what extent respondents agreed with given statements, namely Strongly disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, and Strongly disagree = 5. The findings are presented in Table 1. All respondents (100%) agreed that the lack of understanding precisely the client’s needs and requirements was the major problem during the client briefing process. Majority of (72.2) agreed that the poor definition of client requirements during client process resulted to construction designs which were confronted by redesigns. More than a half of respondents (66.6 %) agreed that the poor identification of client requirements during the client briefing process resulted long project delays. More than a half of respondents (65.2%) agreed that a lack of proper framework to capture and translate the client needs and expectations resulted in project delays.

Table 2: Causes of non-value adding: poor definition and translation of client requirements (N=18)

<table>
<thead>
<tr>
<th>Statements</th>
<th>SD %</th>
<th>D %</th>
<th>N %</th>
<th>A %</th>
<th>SA %</th>
<th>Mean</th>
<th>Std</th>
</tr>
</thead>
<tbody>
<tr>
<td>The lack of understanding precisely the client’s needs and requirements is the major problem during the client briefing process</td>
<td>0</td>
<td>0</td>
<td>61.1</td>
<td>38.9</td>
<td>4.0</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Poor identification of client requirements during the client briefing process causes long project delays</td>
<td>11.1</td>
<td>22.2</td>
<td>44.4</td>
<td>22.2</td>
<td>3.8</td>
<td>0.9</td>
<td></td>
</tr>
</tbody>
</table>
A lack of proper framework to capture and translate the client needs and expectations result to a misleading definition of scope of work

<table>
<thead>
<tr>
<th>Statements</th>
<th>SD %</th>
<th>D %</th>
<th>N %</th>
<th>A %</th>
<th>SA %</th>
<th>Mean</th>
<th>Std</th>
</tr>
</thead>
<tbody>
<tr>
<td>A lack of proper framework to capture and translate the client needs and expectations result to a misleading definition of scope of work</td>
<td>0</td>
<td>5.6</td>
<td>27.8</td>
<td>38.0</td>
<td>27.2</td>
<td>3.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Poor definition of client requirements during client briefing process result to construction designs which are confronted by redesigns</td>
<td>0</td>
<td>22.2</td>
<td>5.6</td>
<td>50.0</td>
<td>22.2</td>
<td>3.7</td>
<td>1.1</td>
</tr>
<tr>
<td>Poor definition of client requirements result to poor design quality</td>
<td>5.6</td>
<td>16.7</td>
<td>33.3</td>
<td>27.8</td>
<td>16.7</td>
<td>0.5</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Less than half respondents believed that the poor definition of client requirements result to poor design quality. However, the survey also reports that more than a half respondents agreed that poor definition of client requirements during client briefing process resulted in construction designs which were subjected to redesign. Proper definition of client requirements by the project team members requires proper understanding of them. Poor definition of the client requirements originate from the lack of precise understanding of client requirements. Arguably, failure to interpret precisely the client's requirements results in construction designs which attract the clients to request revisions and modifications. These revisions and modifications will lead to redesigns which consume time and resources. Changes in designs arise due to clients requesting changes to designs in pursuit to establish what was lost from the interpretation by the project team members. Potentially, failure in the accurate interpretation of the building functions and services, poor consideration of the client's requirements and a misleading definition of scope of work result to non-value adding activity in a form of redesigns. Accordingly, a survey reports that lack of understanding precisely the client's needs and requirements is the major problem during the client briefing process. Given that clients don't communicate their requirements in design terms, capturing and translating their requirements is the major problem. If clients' requirements are not captured and translated properly they produce a misleading definition. Thus, it was found that a lack of proper framework to capture and translate the client needs and expectations result to a misleading definition of scope of work. Project long processes arise due to poor identification of client requirements and lack of proper framework to capture the client needs and expectations. The poor definitions of requirements originate from inadequacy in understanding and translating precisely the client's requirements by the members of the project team.
### 6.2.2 Identification of the causes of non-value adding activities during client briefing process

A 5 point Likert scale established to what extent respondents agreed with given statements, namely Strongly disagree = 1, Disagree = 2, Neutral = 3, Agree = 4 and Strongly disagree = 5. As shown in Table 3, majority of the respondents (88.8%) agreed that changes in project briefs originated from a lack of clear definition and mutual in-depth understanding between the client’s development objectives and the building end-users services. A large number (83.3%) of the respondents agreed that the basics in satisfying the needs of the client's had a lot to do with understanding the project priorities and the business case of the end-user’s services. Most of the respondents (77.8%) agreed that the gap between construction client’s needs and the building end-users services was very important in relation to a clear understanding of the project requirements.

**Table 3: Causes of non-value adding: Construction clients and the building end-users**

<table>
<thead>
<tr>
<th>Statements</th>
<th>N</th>
<th>SD</th>
<th>D  %</th>
<th>N  %</th>
<th>A  %</th>
<th>SA %</th>
<th>Mean</th>
<th>Std</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change requests in project briefs originated from a lack of clear definition and mutual in-depth understanding between the client's development objectives and the building end-users services</td>
<td>18</td>
<td>0</td>
<td>11.1</td>
<td>0</td>
<td>44.4</td>
<td>44.4</td>
<td>4.2</td>
<td>0.6</td>
</tr>
<tr>
<td>The gap between the client’s needs and the end-user services regarding a complete understanding of the project requirements is very important.</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>22.2</td>
<td>38.9</td>
<td>38.9</td>
<td>4.2</td>
<td>0.8</td>
</tr>
<tr>
<td>The basics to satisfy the needs of the client’s have so much or a lot to do with understanding the project priorities and the business case of the end-user’s services</td>
<td>18</td>
<td>0</td>
<td>11.1</td>
<td>5.6</td>
<td>55.6</td>
<td>27.7</td>
<td>4.0</td>
<td>1.2</td>
</tr>
</tbody>
</table>

It was reported that the lack of understanding the client requirements and the end-user services lead to change in project briefs. This is because understanding clients’ requirements does not necessary indicates the understanding of the building end-user’s services. The clients’ requirements should not be confused with end user’s services. If there is a poor distinction in understanding between the client’s development objectives and the end-users services in relation to the function, the
anticipated quality standards, the use of space and the whole working environment of the proposed building, non-value adding activity will occur in the form of changes in project briefs. Hence, non-value adding activity in a form change orders originate from a lack of clear definition and mutual in-depth understanding between the client development objectives and the end-user services. Furthermore, a large number of respondents agreed that the basics in satisfying the needs of the client have a lot to do with understanding the project priorities, and the business case of the end-user services. This is due to a fact that accurate understanding of the client needs has to be identified and translated to solve the identified business opportunity, which later the end-user will carry out in the form of rendering their own services. The accurate identification and classification of the client requirements and the end user services is imperative for the accomplishment of the project objectives.

6.2.3 Identification of the causes that influenced existence of non-value adding activities

A 5 point Likert scale established to what extent respondents agreed with given statements, namely Strongly disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, and Strongly disagree = 5. The findings are presented in Table 1. A large number of respondents (77.8%) agreed that inadequate design brief resulted in poor design drawings. Majority of the respondents (72.2%) agreed that failure in accurate interpretation of the product characteristics or services lead to inadequate design brief. Majority of the respondents (72.2%) agreed that inadequate working drawing details arise due to poor design management. Most respondents (66.7%) agreed that unnecessary redesign drawings arose due to failure to accurately interpret the products (building) characteristics and services.

Table 4: Causes of non-value adding activities (N = 18)

<table>
<thead>
<tr>
<th>Statements</th>
<th>SD%</th>
<th>D%</th>
<th>N%</th>
<th>A%</th>
<th>SA%</th>
<th>Mean</th>
<th>Std</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate scope of work result to changes in drawing specification</td>
<td>0.0</td>
<td>11.1</td>
<td>22.2</td>
<td>44.4</td>
<td>22.2</td>
<td>3.8</td>
<td>0.9</td>
<td>1</td>
</tr>
<tr>
<td>Unnecessary redesign drawings arise due to failure on interpretation of the building services</td>
<td>0.0</td>
<td>5.6</td>
<td>27.8</td>
<td>38.0</td>
<td>27.2</td>
<td>3.8</td>
<td>0.9</td>
<td>2</td>
</tr>
<tr>
<td>Poor design management results in change of design schedules</td>
<td>5.6</td>
<td>5.6</td>
<td>16.7</td>
<td>50.0</td>
<td>22.2</td>
<td>3.8</td>
<td>1.1</td>
<td>3</td>
</tr>
<tr>
<td>------------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>-----</td>
<td>-----</td>
<td>---</td>
</tr>
<tr>
<td>Inadequate design brief result in poor design drawings</td>
<td>5.6</td>
<td>16.7</td>
<td>0.0</td>
<td>38.9</td>
<td>38.9</td>
<td>3.8</td>
<td>1.3</td>
<td>4</td>
</tr>
<tr>
<td>Poor design suffers from poor identification of the clients' needs and requirements</td>
<td>22.2</td>
<td>5.6</td>
<td>5.6</td>
<td>38.9</td>
<td>27.8</td>
<td>3.8</td>
<td>1.5</td>
<td>5</td>
</tr>
<tr>
<td>Failure in the accurate interpretation of the building characteristics or services leads to inadequate design brief</td>
<td>5.6</td>
<td>0.0</td>
<td>22.2</td>
<td>50.0</td>
<td>22.2</td>
<td>3.8</td>
<td>1.7</td>
<td>6</td>
</tr>
</tbody>
</table>

| Inadequate working drawings details arise due to poor management | 0.0 | 22.2 | 5.6 | 50.0 | 22.2 | 3.7 | 1.1 | 7 |
| Design briefs that do not take complete consideration of the client’s requirements result(s) to changes in design drawings | 0.0 | 22.2 | 22.2 | 16.7 | 38.9 | 3.7 | 1.2 | 8 |

The inadequate design briefs were reported to be responsible for poor design drawings. When designs are poor, contractors are supplied with impractical working drawings that demand future revisions during the construction process. The interdependence of design activities requires a chain production of value adding activities during the design development. Inadequate design briefs were reported to occur due to failure on accurate interpretation of building characteristics and services. The failure in accurate interpretation of building services originated from poor project requirements definition. In construction projects there are three requirements that need to be outlined. First, the clients requirements, second the end user’s services and third the project requirements. Failure in accurately identifying and categorizing these requirements leads to poor definition of requirements. Poor definition of requirements results to unnecessary work.

It was reported that inadequate working drawing details emanated from poor design management. Given that there are a large number of activities undertaken and many stakeholders (project team members) that need to be coordinated during the development of design, a failure to effectively plan, coordinate and control the design progress to ensure
information of an appropriate quality is delivered to meet the practical construction result to the obstruction of the project performance with redesign, rework, delays and disputation. Coordinating the design development for production rather than for excellence needs to be the major role of the design manager. Failure in above-mentioned issues will result to inadequate working drawings due to poor design management.

7. CONCLUSIONS

The paper presented that some of the non-value adding activities arising during the design process emanated from the pre-design stage. These non-value adding activities include redesigns and changes in designs. These activities absorb time and resources hence, non-value adding costs. The causes which influenced the prevalence of these non-value adding activities included inadequate design briefs. The inadequate design briefs emanated from the incomplete consideration of requirements. The incomplete consideration of requirements originated from a failure to accurately interpret the client product (building) services. The pre-design stage has an influence on the design stage. The design stage has an influence on construction stage. The identification of the causes of non-value adding activities will lead to the potential reduction of waste and promotion of activities that add value in construction productivity.

8. RECOMMENDATIONS

Construction clients are seeking for a “one-stop shop” service that offers certainty of cost and time in the project delivery process. A clear identification of the causes which influence existence of non-value adding activities is required. The identification of the causes of non-value adding activities at an early stage would provide useful information that would allow project members to reduce their occurrence. Workshops for project team members on lean design management approach needs to be conducted. By adopting effective implementation of appropriate methodology of lean construction principles when preparing the design brief, non-value adding activities can be minimized. By understanding the penalties of non-value adding activities all participants will be able to execute their roles as facilitators of a concise, clear and comprehensive brief process, thus ensuring the elimination of non-value adding activities. The overall result will lead to improve a chain production of value adding activities during a design phase.
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Mediation and conciliation as methods of Alternate Dispute Resolution (ADR) in the construction industry

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ABSTRACT

Purpose

Research conducted by Povey (2005: 2) indicates that mediators in the construction industry are inclined to unilaterally resolve a dispute for disputing parties rather than assisting such parties in negotiating their own settlement. This raises the question of the understanding, application and effectiveness of Alternate Dispute Resolution (ADR) methods in the construction industry. The purpose of the paper is to investigate the understanding professionals in the construction industry have regarding the methods of conciliation and mediation and the application thereof.

Method

The various methods of ADR were sourced from literature and a study on the application thereof in the construction industry, in order to determine which methods are currently actively applied to the construction industry, in order and to illustrate the positioning and the application of conciliation and mediation in the ADR context. A questionnaire survey was conducted on established practicing professionals and their staff/employees who are active with conciliation and mediation methods and procedures in the construction industry, after which the results were analysed.

Conclusion

Professionals in the construction industry are lacking the knowledge, skills or experience to effectively apply ADR methods which in turn may have a negative influence on project time and cost.
Value

ADR forms an integral part of the management and resolution of claims, differences and disputes which stem from the provisional nature of contracts in the construction industry. However, the effective application of the conciliation and mediation methods may have a profound impact on project time and cost when differences are settled before they develop into a dispute.

Practical implications

Knowledge of the different methods of ADR in the construction industry as well as the associated processes and procedures may improve the overall effectiveness in handling disputes, and may result in time and cost savings.

Key words

Alternate Dispute Resolution (ADR), practicing professionals, methods

1. INTRODUCTION

The nature of the construction industry harbours an inherent threat of dispute risk which invariably has a negative impact on project cost and time goals (Verster, 2006: 13). The potential negative impact of disputes may in all probability have a direct correlation on how effectively dispute resolution methods are applied.

The application of an appropriate dispute resolution method requires knowledge of the Alternate Dispute Resolution (ADR) processes and the ability to assess and compare the processes (Pretorius, 1993: 6). The selection of an appropriate ADR method may also impact on cost and time in order to prevent unnecessary delays that may result from disputes. Principal agents and professionals in the industry fulfilling the role of project manager (hereafter referred to as practicing professionals) such as Architects, Engineers and Quantity Surveyors, may find it more beneficial to settle differences themselves rather than seek the assistance of external facilitators. This may avoid unnecessary disputes which would inevitably lead to delays in contract time. The practicing professional may therefore need a good knowledge of the ADR context and the application of conciliation and mediation, in order to avoid differences developing into a dispute.
2. THE ALTERNATIVE DISPUTE RESOLUTION CONTEXT

Alternate Dispute Resolution offers various methods of resolving disputes other than the more formal methods of litigation and adjudication through the courts.

Pretorius (1993: 2) and Verster, (2006: 13) suggest the original goals of ADR are intended to supplement court adjudication and are listed as follows:

- To prevent undue cost and delay
- To relieve court congestion
- To facilitate access to justice
- To provide effective dispute resolution.

The goals of ADR are therefore particularly favourable to the construction industry in terms of prevention of undue cost and delay and effective dispute resolution. Dispute resolution in the construction industry may be placed in a category of its own due to the use of adjudicative methods with non-binding decisions which are characterised with consensual and control features.

According to Loots (1991: 8-13) and Verster (2006:13), ADR facilitators in the construction industry may need to bear in mind the basic fundamental features of the non-adjudicative methods of ADR; known as the Four Cs and are listed as follows:

- Consensus
- Continuity
- Control
- Confidentiality

2.1 Consensus

It is essential that consensus must be reached by the parties without which it would be an impossible task to facilitate or resolve a dispute (Bevan, 1992: 2). Although consensus is part of the Four Cs features, it forms the basis of the ADR context.

Boulle & Rycroft (1997: 14) suggest that ‘mandatory mediation’ eliminates consensus and therefore undermines the integrity of mediation. Educating parties on the importance of reaching consensus prior to signing the contract may prove to limit any complicated issues and delays when a dispute arises. Parties may realize that heading in opposite directions will not effect a settlement.
2.2 Continuity

A continuous, healthy, business relationship is imperative in today’s competitive construction industry. Loots (1991:8) suggests that irreparable harm to the ongoing business relationship should be avoided. Boulle & Rycroft (1997:37) suggest that mediation preserves and improves relationships by applying the “gentle art” of reconciliation rather than the confrontation approach by the courts. A healthy relationship established by a win-win outcome may well develop into an ongoing and steadfast business relationship. Continuity between contractors and sub-contractors is important because they depend on established relationships for performance of future contracts, hence the need for a concessionary attitude in the negotiation process (Finsen, 2005: 221).

In view of the above it would be reasonable to conclude that relationships are not only important to a specific project but also to continued performance within the industry itself. It is suggested that the functional professional place considerable emphasis on the importance of the relationship and that the loss of continuity may have a greater impact on the industry than the project itself.

2.3 Control

Parties are self empowered because they determine their own settlement and do not rely on a third party to make a decision for them; leaving them in control of the outcome (Brown & Marriott, 1993:10). ADR practiced in the construction industry allows for parties to be in control of the outcomes of a dispute resolution process at all times; thus creating a win-win situation. The adversarial system on the other hand uses evidence to argue against each other to impose a decision which normally leads to a win-lose result (Bevan, 1992:1-2).

Guidance by the facilitator of the ADR methods may therefore allow the parties to understand the situation better, to view the dispute on a broader context and to see the opposite point of view. This makes it possible for the parties to make a decision based on the whole dispute and allows them to be in control and satisfied with their decisions.

2.4 Confidentiality

Confidentiality is very important to the parties in respect of the ethics and integrity of their business. However, based on ethics practiced by the practicing professional fulfilling the role of project manager, confidentiality is considered to be a norm. Facilitators need to regard confidentiality as a top priority in terms of withholding confidential information from the respective parties in a relaxed and unnoticeable manner (Bevan, 1992: 78).

Boulle & Rycroft (1997: 39) are of the opinion that confidentiality is controlled by the disputing parties and no recordings and transcripts are made. However, the JBCC Clause 40.6.3 (2007: 31) states that if an
agreement is reached, it should be put in writing and signed by the parties and considered final and binding.
It is suggested that the functional professional be well informed of the application of the Four Cs to ensure the requirements for the ADR processes are met.

3. ADR METHODS

ADR methods provide for a neutral third party who only assists the parties in reaching a mutual agreement. The third party may only make suggestions of a solution and point out the consequences thereof. The agreement should take place between the parties themselves.

Finsen (2005: 32), Verster & van Zyl (2007: 1-3) and Pretorius (1993: 2-5), suggest that the more common methods of ADR include:

• Adjudication
• Arbitration
• Negotiation
• Agent Resolution
• Mediation
• Conciliation.

According to Pretorius (1993: 3), dispute resolution is categorized as follows:

• Dispute resolution processes involving private adjudication by third parties and arbitration.
• Dispute resolution processes involving adjudication by public authority, including administration decision making and formal litigation.
• Dispute resolution processes involving private decision making by the parties including negotiation and mediation.

3.1 Adjudication

Adjudication in South Africa differs from adjudication in the UK which is based on legislation. In South Africa adjudication is adopted by the contracting parties according to the agreement they have concluded (Finsen 2005: 223).

Clause 40.6 of the JBCC (2007: 31) provides for the entitlement of parties to submit a dispute to mediation. Adjudication is supported by the Construction Industry Development Board (CIDB) and is now included in most construction agreements. Unlike the British method of adjudication where a binding decision is made; the decision in the South African construction industry is not final and binding and may be submitted to arbitration or mediation by the parties (Finsen, 2005: 223; Brown & Marriott, 1993: 19).
Adjudication forms the basis of ADR in the South African construction industry and has been adjusted to conform to a unique industry.

3.2 Arbitration

According to Finsen (2005: 33) arbitration has become more formal with an improved decision making process however; the cost and pace of arbitration has resulted in a move towards the more informal and speedy methods of dispute resolution. One may appreciate the similarities that exist between arbitration, the oldest method of ADR, and mediation. New methods were developed for the purpose of speeding up the arbitration procedure so as to provide a more informal and cost effective way of resolving disputes. It may be assumed that the practicing arbitrators of the industry would also have moved on to keep abreast of a changing industry.

Research conducted by Povey (2005: 4) on mediation in the engineering field indicates that 24% of the facilitators in the consulting engineering field are retired senior professionals, recalled to provide a mediation service. This may have a correlation to the similarities of arbitration, founded in the mediation process; hence the referencing of mediation by Boulle & Rycroft (1997: 66) as a quasi arbitral function, and Dison (2006: 23), as non-binding arbitration.

On the other hand, in spite of the application of new methods to speed up the dispute resolution process; the unique and expeditious nature of the construction industry may lend itself to even more time saving applications. Hence the inconsistency indicated in Povey’s (2005: 2) research with the principles relating to an accepted standard mediation process and the evolution of a mediation process unique to the construction industry.

3.3 Negotiation

ADR facilitators need a sound theoretical and practical knowledge of negotiation which is fundamental to all consensual ADR activity (Brown & Marriott, 1993: 88; Anstey, 1993: 12). Although negotiation is considered to be a specific method of ADR, the truth is that negotiation is a critical element that should be applied in all methods of ADR. Due to the lack of negotiation skills education, relatively little is known of the science and art of the subject (Anstey, 1993:12).

Negotiation skills may be considered to be a natural skill that one develops from childhood however, according to Brown & Marriott (1993: 88) learning negotiation skills will improve on any natural skills that one may have. Negotiation skills in the past have however been acquired by experience and perfected by trial and error.

Negotiation which takes place between the disputing parties alone may also be referred to as unassisted or direct negotiations. On the other hand,
mediation is the main form of assisted negotiation (Boulle & Rycroft 1997: 61).

Negotiation may be applied as two separate methods of ADR, where on the one hand, the mediator is involved, and the parties themselves on the other. Disputing parties may need to be well informed on the issues of dispute and a relationship which is based on trust in order to be successful with the negotiating process however; it is suggested that this relationship be built from the initial meeting with the parties. In view of the above Loots (1991:8) suggests that it is better to resolve disputes at the point where the relevant information is best understood.

It is preferable that the professional encourages the option of facilitated negotiation in order to inform the parties of the correct procedures, so that they may better understand the dispute, failing which, they may enter into negotiations based on uninformed principles (Tiruneh, Verster & Kotze, 2007: 5). The natural way to resolve differences is through negotiation however; in the case of disputes in a complex industry one may rather look for guidance in terms of correct procedure and expert knowledge.

Negotiation as a method of ADR may therefore prove to be more effective when facilitated by persons with expert knowledge and experience. It is however; advisable that direct negotiation resolution be limited to differences, and only if it be the request of the parties.

### 3.4 Agent Resolution

Before the role of the project manager took effect in the South African construction industry, the architect was normally appointed as the principal agent and authorised accordingly by the employer for the general management of the project.

To provide for the resolution of these disputes the architect was often empowered to arbitrate in the first instance, with the right of appeal from his award to another arbitrator (McKenzie & McKenzie, 1994: 3). Today it is possible for both the principal agent in an authoritative context, and a project manager in a managerial context, to have respective roles in a project; an architect would normally fill this role. There may be times when a quantity surveyor is appointed as a principal agent. This may normally occur in an alteration type of project where extensive costing is involved (Verster, 2006: 15).

According to Lipshitz & Malherbe (1979: 69), the role of the architect had changed due to the influence of the 1909 Form which was quoted in the 1931 RIBA (Royal Institute of British Architects) conditions of contract; wherein the architect, was in addition to being appointed as the agent of the employer, also fulfilled the role of quasi-arbitrator. This was in accordance with British Law. However; in South Africa, the architect’s discretion was never considered to be final and binding which refers us to the adjudicator’s role. The employer and contractor may, however, on
consensual terms, appoint the architect fulfilling the role of Principal Agent, as arbitrator.

The practicing professional of today may well be adequately experienced and therefore equipped to fulfil the role of quasi-arbitrator. However, due to its popularity in regard to the Four Cs, mediation may well be the method of choice as opposed to arbitration. Due to the resemblance of mediation and arbitration, this may also be possible to achieve by those professionals who have arbitration qualifications and experience. An agreement as such may however be to the advantage of the parties as the principle agent, provided he/she remains impartial, may be the most informed and qualified person on the issues of the project, and may be ideally suited to fulfil the role of mediator.

Today’s functional professional, fulfilling the role of the project manager therefore compares favourably to that of the principle agent being in the position of quasi-arbitrator; this may well add value to the project. The arbitrator may however be referred to when the functional professional faces a deadlock, or the parties are not satisfied with a decision.

One may question the impartiality of the functional professional as an employer of the client. However, Finsen (2005: 76) suggests that although under obligation, it is a matter of professional honour for the principal agent to be fair and impartial to both parties. The contractor however, under unfavourable circumstances may revert to the initial dispute resolution conditions of contract should he/she not be satisfied with the decision taken by the principal agent.

Agent resolution therefore meets the criteria specified in the four Cs.

3.5 Mediation and Conciliation

The distinction between the facilitated consensual methods of mediation and conciliation in the South African construction industry is questioned. Various authors are of the opinion that conciliation and mediation are very similar methods of ADR and that the terms are sometimes interchangeable and are normally used synonymously in most discussions (Brown & Marriott, 1993: 19; Boulle & Rycroft, 1997: 62; Business Law, 2000: 247).

Having inherited its legal system from England and Holland, the South African construction industry contracts as well as the 1950 Arbitration Act, are based on English prototypes (Butler & Finsen, 1993: 11).

In the South African construction industry, mediation is a process whereby the mediator is expected to recommend a non-binding solution if the mediator fails to guide the parties to an agreed solution. However, this is at the discretion of the parties. Where the mediator is not expected to make a recommendation, such mediator is referred to as a conciliator (Butler & Finsen, 1993: 10-11; Bevan, 1992: 15 & Pretorius, 1993: 4).

According to the Principal Building Agreement 1991 and the General Conditions of Contract for Works of Civil Engineering Construction (1990) the mediator may be required to offer his opinion on the dispute however;
the opinion is binding if it is not rejected by the parties within a stipulated
time (cited in Finsen, 2005: 232).

On the other hand, the JBCC Principal Building Agreement 2005
edition has no mention of the mediator expressing his own opinion and it is
submitted that he not be too hasty to offer his opinion of a possible solution.
Having a certain respect for the mediator’s authority and expert knowledge,
parties may well request his opinion for a solution to settlement (Finsen,

Published guidelines for mediation by the Association of Arbitrators and the
South African Institution of Civil Engineers deliberately avoid any set fixed
rules of procedure. One of the advantages of mediation is that the
procedure should be elastic (Finsen, 2005: 232).

Conciliation as with mediation is a structured negotiation process
facilitated by a neutral third party (Pretorius, 1993: 4). Negotiation on the
other hand is considered to be a primary method of ADR and as such
cannot be reduced into constituent elements and may rather be termed a
critical element of all methods of ADR (Boulle & Rycroft, 1997: 60).
According to Butler & Finsen (1993: 10) there are two basic types of
mediation procedure; referring to the methods of conciliation and
mediation.

As with negotiation, conciliation may be considered to be a primary
method of mediation however; it may also be applied as a method of ADR.
Conciliation is referred to as mediator activities that minimize unnecessary
conflict and build a positive psychological relationship between disputing
parties and is viewed as the psychological component of mediation, where
the neutral third party will attempt to create an atmosphere of trust and
cooperation which is conducive to constructive negotiation (Moore, 1986: 4,
124).

Conciliation and mediation can be regarded as a collection of
techniques to promote more effective negotiations and the aim is to rather
use a cooperative as opposed to a competitive problem solving procedure,
in order to achieve a win-win outcome (Moore, 1986: xi – xii).

As with conciliation, mediation is an extension and elaboration of the
negotiation process facilitated by an impartial and neutral third party
selected by the disputing parties (Moore, 1986: 6). A better understanding
by the functional professional of the conciliation method of ADR may
therefore be regarded as imperative in the industry as a difference may be
resolved with improved interaction between the parties; thus avoiding the
possibility of disputes.

Conciliation is by no means considered to be an inferior process to
mediation; it is based on the same principles and procedures up to the
point where an impasse is reached and the dispute is referred to
adjudication; only then may mediation be requested by the adjudicator
according to the contractual agreement or alternatively be referred to
arbitration (JBCC, 2007: 31).
When considering the differences between the conciliation and mediation methods of ADR, one realizes the extent of overlapping similarities and how difficult it is to clearly define the two methods. Brown & Marriott (1993: 19) suggest that the distinction between conciliation and mediation is that conciliation tends towards a more facilitating approach whereas mediation tends to favour more of a proactive role.

Evaluative mediation is a quasi-arbitral function and the boundaries with arbitration are blurred (Boulle & Rycroft, 1997: 60). It may therefore be assumed that this is so because mediation in the industry has evolved from arbitration.

The method of conciliation may therefore be best suited to the non technical type of dispute and mediation to the technical type of dispute where expert advice and guidance is required. Boulle & Rycroft (1997: 63) suggest that conciliation is defined as a natural, voluntary and interventionist process. On the other hand, the evaluative model referred to as mediation fits the same definition.

Mediation and conciliation may appear to be similar up to the point where evaluative intervention is required; thereafter the proactive role of mediation begins.

In the case of conciliation intervention may refer to the facilitative procedure when parties need assistance in understanding the negotiation process. Intervention in the case of evaluative mediation may refer to technical guidance which may only be given by a creditable technical expert.

The practicing professional may not be an expert in all the fields of dispute, in which case the dispute would be referred according to the contractual agreement. The professional who is initially able to apply the conciliation method to disputes in the course of practice may find that delays may possibly be avoided by settling differences before a dispute develops.

Candidate professionals, who have not yet acquired the required technical knowledge to facilitate evaluative mediation but have a good understanding of the application and facilitation of conciliation, may still make a contribution to the completion of a project by settling a difference before it develops into a dispute requiring mediation or arbitration.

4. THE RESEARCH

Due to the evolution of a unique method of mediation being practiced in the construction industry, a literature review was conducted on various methods of ADR and the application thereof, to compare practice in the industry to the accepted standard practice of mediation. A questionnaire survey was conducted to determine the application and the understanding of mediation and conciliation practice in the industry and the individual’s
competence in the application of the processes and methods. A model was
developed depicting the results of the research.

Fifty (50) questionnaires were distributed to established practicing
professionals and their employees who are active with the application of
conciliation and mediation methods and procedures in the industry, with a
62% response. The questionnaire survey was not limited to senior
practicing professionals in the construction industry. This was done in order
to get a balanced response between experienced and less experienced
practicing professionals. The inclusion of the younger and perhaps less
experienced members of the industry was intended to give an indication of
all participants in projects, whether big or small, and the application of the
knowledge of ADR that was acquired at tertiary institutions.

In order to compare the competence levels of the younger and
perhaps less experienced to the more experienced professionals in the
industry, the respondents were divided into under and over forty age
groups to conduct an analysis based on competencies relating to age.
5. FINDINGS

Table 1 shows the results of the questionnaire survey.

Table 1: Results of questionnaire survey

<table>
<thead>
<tr>
<th>Questionnaire survey results</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of respondents registered as arbitrators</td>
<td>0</td>
</tr>
<tr>
<td>Respondents in favour of direct negotiations</td>
<td>77%</td>
</tr>
<tr>
<td>Importance of using direct negotiations</td>
<td>83%</td>
</tr>
<tr>
<td>Facilitated negotiations are more successful than direct negotiations</td>
<td>58%</td>
</tr>
<tr>
<td>Importance of control by the disputing parties</td>
<td>84%</td>
</tr>
<tr>
<td>Different ADR methods should be applied to different disputes</td>
<td>100%</td>
</tr>
<tr>
<td>ADR process always starts with conciliation</td>
<td>67%</td>
</tr>
<tr>
<td>Mediation and conciliation are similar and interchangeable</td>
<td>74%</td>
</tr>
<tr>
<td>Competent mediators are more effective</td>
<td>84%</td>
</tr>
<tr>
<td>Low rate of experience as a mediator</td>
<td>58%</td>
</tr>
<tr>
<td>Frequency of disputing parties requesting expert opinion of a solution</td>
<td>75%</td>
</tr>
<tr>
<td>Facilitator offers his/her opinion of a solution without being requested by disputing parties</td>
<td>68%</td>
</tr>
<tr>
<td>Believe that facilitators in the construction industry’s way of resolving disputes are more effective than standard practice in other industries</td>
<td>53%</td>
</tr>
<tr>
<td>Believe that your opinion is more beneficial rather than upholding the Four Cs</td>
<td>53%</td>
</tr>
<tr>
<td>Apply ADR differently to the generally accepted practice</td>
<td>46%</td>
</tr>
<tr>
<td>Believe accepted standards and processes of mediation are lengthy and a waste of time</td>
<td>51%</td>
</tr>
</tbody>
</table>

Although respondents are aware of effective mediation practice; it did not change their opinion of standard practice. Just more than half (51%) consider it to be a waste of time.

Respondents were in favour of direct negotiations; however, 58% reported that facilitated negotiations were more successful. This contradiction may be due to the fact that direct negotiations are comparatively cheaper than that of facilitated negotiations.

The importance of control was rated at 80%. However, contrary to this finding, 68% of respondents stated that they offer their opinion without being requested to do so from the disputing parties. The questionnaires were completed by a variation of age groups, however, 12.9% of respondents rated their experience as high, and 58% rated their experience as low. It was interesting to note that there was a correlation with the senior
members in the industry in terms of age and experience. However, there was no clear correlation between age and low or medium rate of experience.

Figure 1 represents the competence levels of the ADR Facilitators

![Spider web model for competence levels of ADR Facilitators](image)

**Figure 1**: Spider web model for competence levels of ADR Facilitators

The spider web model reflects the average competence level of functional professionals facilitating ADR in the methods and Four Cs procedures at 62.34%. This was derived from a calculation of all responses. The confidentiality rating at 69% was marginally higher in comparison to the other ADR features and methods measured.
Table 2: Results of questionnaire survey in under and over forties categories

<table>
<thead>
<tr>
<th></th>
<th>UNDER Forties</th>
<th></th>
<th>OVER Forties</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitative</td>
<td>57.14</td>
<td>51.42</td>
<td>44.28</td>
<td>50.95</td>
</tr>
<tr>
<td>Evaluative</td>
<td>55.71</td>
<td>47.14</td>
<td>47.14</td>
<td>50.00</td>
</tr>
<tr>
<td>Methods</td>
<td>57.14</td>
<td>48.57</td>
<td>44.28</td>
<td>50.00</td>
</tr>
<tr>
<td>Consensus</td>
<td>61.42</td>
<td>60</td>
<td>51.42</td>
<td>57.61</td>
</tr>
<tr>
<td>Confidentiality</td>
<td>74.28</td>
<td>68.57</td>
<td>58.57</td>
<td>67.14</td>
</tr>
<tr>
<td>Control</td>
<td>62.85</td>
<td>58.57</td>
<td>51.42</td>
<td>57.61</td>
</tr>
<tr>
<td>Continuity</td>
<td>65.71</td>
<td>58.57</td>
<td>47.14</td>
<td>57.14</td>
</tr>
</tbody>
</table>

Table 2 clearly indicates a higher competence level for practicing professionals who are over forty however; the under forties indicate higher knowledge ratings in the features of ADR than the more senior members in the industry. This may imply that although they do not have the theoretical knowledge of the features of ADR, the over forties group is unconsciously applying these features.

6. CONCLUSIONS

The evolution of new procedures in ADR is inevitable in a diverse industry however; the integrity of the ADR processes in the industry need to be upheld with professionals who are knowledgeable in ADR methods and procedures.

The features of the Four Cs are required in all methods of ADR practiced in the construction industry however; the research suggests that it is not effectively applied in practice. Confidentiality is rated at 69% which suggests that ethics are practiced and the integrity of the industry is upheld.

In view of the above it would be reasonable to conclude that practicing professionals facilitating conciliation and mediation are aware of the procedures and standard practice within the industry. However, the expeditious nature of the construction industry often demands a speedy resolution to the disputes resulting in common practice being adapted. This suggested that practicing professionals are aware of the requirements; however, the younger and perhaps less experienced professionals’ skills may need to be improved to gain experience.
7. **RECOMMENDATIONS**

The features of the Four Cs are rated between 60 and 69% and it is recommended that more emphasis is placed on the effective application thereof. The features of ADR should however be applied effectively in order to foster trust and create win-win situations in the process.

It is furthermore recommended that institutions provide opportunities for more experienced professionals to update their knowledge of ADR as a method of Continuous Professional Development (CPD). Tertiary institutions may consider giving more consideration to the needs of ADR in their curriculums, with emphasis on negotiation skills, in developing professionals for the industry.

8. **REFERENCES**


Production and process improvements in Eastern Cape architectural practices

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ABSTRACT AND KEYWORDS

Purpose

Increased problems and work load, and continuous criticism of the architectural profession has led to increased demand for research into improvement of production and processes. Architectural practices need to consider production and process improvement in order to minimise risks endemic to projects, and offer clients and the professional team reasonable value, certainty and predictability. This research was conducted to determine the production and process improvement philosophies implemented by Eastern Cape (EC) architectural practices.

Methodology

A questionnaire was designed to acquire primary, factual and attitudinal data from architectural practices while secondary data was acquired through a survey of literature.

Findings

The main findings were that EC architectural practices are not using similar continuous improvement philosophies and lean production principles.

Research limitations

The survey was limited to EC architectural practices registered with the Eastern Cape Institute of Architects (ECIA) and Border-Kei Institute of Architects (BKIA).
Practical implications

The study revealed that it is important for practices to implement effective production and process improvement practices.

Value

The paper will be valuable to architectural practices wishing to increase their efficiency by adopting continuous improvement philosophies and lean production principles.

Keywords

Architectural practice, process improvement, lean production.

1. INTRODUCTION

The South African construction industry has been frequently criticised for its less than optimal performance by several institutional and governmental reports such as Bruce (2003), Gasa, Barnes, Nqaleni and Hodgson (2003), and Gymahl, van Wyk and Hodgson (2003). Some of the reasons for the construction industry’s poor performance are: firstly, the use of outdated industrial processes; and secondly, the industry has not kept pace with innovations and developments as compared with other industries. Cull (2004) reports that the South Africa construction industry would be required to double its output over the next 10 years. This is due to major infrastructural investments by South African government, and construction of 2010 World Cup stadiums, infrastructure projects and maintenance.

In order for the construction industry to double its output and improve its image, it will need to improve its production processes. Pheng and Tan (1998) note that production improvement in the construction industry may well be a significant strategy for getting the right product to the right market at the right time, cost and quality. The above point is further justified by Kagioglou, Cooper, Aouad, Lee, Wu and Fleming (2005) by stating that process has been identified by the construction industry as an important issue to address.

The architectural profession is an integral part of the construction industry’s supply–chain, and will have a major impact on the construction industry’s performance. Increased workload has necessitated research into production and strategies implemented by architectural practices.
2. PROCESS AND PRODUCTION IMPROVEMENT

Jorgensen (2009) proposes that production should be understood as consisting of both design and making. Soto (2007) states that considering production as designing and making allows construction to be understood as a type of production. Koskela (2000) argue that production consists of three core phenomena namely: product development (which refers to design), order-delivery (which refers to procurement), and production proper (which refers to making or constructing).

Kagioglou et al. (2005), Oakland (1995), and Thompson and Strickland (2004) note that production and process improvement is usually achieved by:
• Management and continuous improvement of existing processes;
• Designing and redesigning of new processes, and
• Concurrent engineering

The first method aims to optimise and continuously improve the operational processes within an organisation, the second method changes the organisational structures, and the third method aims to cut costs by making the business more efficient and responsive to market needs. These methods are briefly discussed below:

2.1 Management and continuous improvement of existing processes

Management and continuous improvement of existing processes can be achieved by the application of two techniques namely lean production (LP) and continuous improvement (CI).

Koskela (1997) defines LP as a systematic approach to identify and eliminate non-value added activities through continuous improvement. Adams et al. (1999) define LP as a way of thinking where all employees continuously look for ways to improve the process with the philosophy of eliminating non-value added activities. Diekmann, Krewedl, Balonick, Stewart and Won (2004) define it as a continuous process of eliminating waste, meeting or exceeding all customer requirements, focusing on the entire value stream and pursuing perfection in the execution of projects. Liker (2004) defines it as a five step process composed of defining customer value and value streams, making process flow smoothly, allowing processes, information and materials to be delivered just in time, and striving for excellence.
Koskela (1997) notes that non-value adding activities in production processes should be reduced or eliminated, and value adding activities should be made more efficient. According to Koskela (1997), principles of LP are as follows:

- Reduction of non-value-adding activities, variability and cycle times, and increasing value through consideration of customer requirements;
- Increased output flexibility and process transparency;
- Focused control on the complete process;
- Integration of continuous improvement into process;
- Balanced improvement between flow and conversion, and
- Benchmarking.

Koskela (1997) concludes that the aforementioned principles can be applied to physical production and information production. He further states that the principles could be applied to mass production and one-of-a-kind products. Cooper (2006) notes there is a challenge in implementing LP to services industry due to the lack of implementation references, and the lack of translation of LP techniques and tools into services. Despite this, Soto (2007) notes that LP has been successfully implemented in the retail and airline industries.

Kagioglou et al. (2005) note that CI originates from the field of quality management, and is sometimes referred to as continuous quality improvement, business improvement, or process improvement. CI therefore refers to an ongoing effort to improve organisational processes, products and services. According to Kagioglou et al. (2005), it as an incremental change process that focuses on performing existing tasks more effectively or breakthrough improvements that occur at once. Deming (1990) notes that the purpose of CI is to identify, reduce and eliminate suboptimal processes. CI adopts the stance that creating process improvements is never complete, and constant evaluation and improvement are necessary for realising efficiency, effectiveness and flexibility.

Improvements occur if attempts are made to learn from new information generated by the process rather than the product. Oakland (1995) states that the CI process is commonly associated with the Plan-Do-Check-Act (PDCA) cycle which is composed of four phases. Oakland (1995) concludes that each phase of the cycle plays an important role in sustaining the ongoing improvements and that the PDCA cycle could be repeated. He also states that performance can be improved by between 10%-15% using CI. Kagioglou et al. (2005) note that CI gave rise to the philosophy known as Kaizen which has been successfully implemented in the manufacturing and service industries.
2.2 Designing and redesigning of new processes

According to Fujimoto (1999) Business Process Re-engineering (BPR) originated from the private sector as a technique used by organisations to rethink their delivery processes in order to dramatically improve customer service and cut operational costs. Hammer and Champy (1993) define BPR as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service, and speed. Therefore, in essence, BPR is the ability to rethink the organisation as a set of processes oriented to enlighten the end user and that all available technologies are harnessed to drive the effectiveness of new processes. Fujimoto (1999) notes that the development of information technology (IT) has been fundamental to the successful implementation of BPR, as IT has enabled organisations to redesign innovative business processes. Thompson and Strickland (2004) and Kagioglou et al. (2005) state that when BPR is implemented properly, it can produce dramatic results.

2.3 Concurrent Engineering (CE)

CE is a NPD process where designers, manufacturers and specialists concerned with product life-cycle work together in the design so that they are collectively and concurrently designing the product together. CE is a workflow that carries out tasks in parallel and in contrast to the traditional sequential stages. Dym and Little (2004) state that teams are concerned with understanding and optimising the product development for the entire life of the product. The advantage of CE is that manufacturing can start before final design, which results in decreased development time. The other advantage is that it improves communication between designers and manufacturers which reduces late changes to design.

Kagioglou et al. (2005) conclude that CE delivers new products more efficiently accompanied by decreased development time and costs. Unfortunately, in South Africa the traditional sequential design to construction approach is used, and most times the contractor is appointed at the end of the design stage. This approach makes it impossible to adopt CE. Langford and Murray (2004) note that new procurement routes have emerged to ease some of the problems, namely: management contract, design and manage, design and build, and develop and construct.
3. RESEARCH METHOD

The primary data for this research was collected through the use of a questionnaire survey, and secondary data through a survey of the literature. A quantitative research approach was adopted for the questionnaire survey. The questionnaire survey was conducted in the EC amongst architectural practices registered with the ECIA and BKIA.

Walliman (2001) notes that research ultimately aims to solve problems and that research must obtain data that can be analysed and interpreted to inform strategic decision-making. The descriptive statistics in the form of frequencies were computed using Excel software.

A comprehensive survey of literature was undertaken and was used to establish criteria and theories against which the primary data was measured.

3.1 Survey results

Questionnaires were distributed to 12 ECIA and 12 BKIA practices which were randomly selected from 81 registered practices, all 24 practices responded, which equates to a 100% response rate.

3.2 Increasing efficiency in architectural practices by rethinking of production and service delivery processes

Altogether 50% of respondents indicated that they implement the CI philosophy, and the other 50% indicated that they did not implement any improvement philosophy or LP. No respondents indicated that they implemented BPR, CE and LP principles, the reason could be that the respondents were unfamiliar with the terminology. These findings indicate that there is great scope for improvement in EC architectural practices if they adopt the production and process improvement philosophies and that practices will not only realise dramatic initial increases in efficiency and quality, but they will obtain the greatest value through sustained improvement.

3.3 Investment in research and development

67% of respondents indicated that they invested 0% of their annual business volume in research and development, while 33% indicated that they invested between 0.1 to 0.5% and no respondents invested more than 0.6%. The findings indicate that there is a lack of investment in research and development, which is likely to have contributed to a lack of innovation, strategic thinking and efficiency in the architectural practices. Investment in
research and development is important for the profession as its success will depend on its ability to match its supply side to future demands for quality services and products.

3.4 The extent to which process improvement is addressed at board meetings

Respondents were required to indicate the extent to which process improvement is addressed at board meetings in terms of a rating ranging between 1 (Never) and 5 (Always). It is notable that all the ratings are below the midpoint rating of 3, which indicates that in general the respondents can be deemed to not address process improvement regularly during board meetings. This finding indicates that managers of the practices are not committed to improving production and processes within their organisations. Therefore, an opportunity exists for managers of practices to improve process performance by creating and maintaining a culture of process improvement. This culture will in turn influence the actions and behaviours of employees, which will lead to both improved process performance and organisational competitiveness.

3.5 The extent to which employees are encouraged to make suggestions to improve production and office processes

42% of respondents indicated that they do not encourage employees to make suggestions about improvements of office processes. Only 16% indicated that they encourage employees, and 42% indicated that they ‘somewhat’ encourage employees. Therefore, the combined average of respondents that encourage their employees to improve office processes is 58%. The finding indicates that slightly more than half of the respondents have recognised the contribution that employees make to improving production, office processes, and innovation.

Further, no respondents indicated that there was a reward system in place to motivate their employees and that 58% of respondents indicated that there was no reward system. Altogether, 42% of respondents indicated that the question did not apply to them as they indicated that they do not encourage employees to improve production and office processes. A reward system reflects managers’ commitment to improvement of office processes and it can therefore be concluded that the managers are not committed to production and office process improvement.
3.6 The identification and elimination of non-value adding activities

Respondents were also required to indicate the extent to which practices identify and eliminate non-value adding activities in delivery processes in terms of a rating ranging between 1 (Never) and 5 (Always). The average rating is 2.54, which is below the midpoint rating of 3, which indicates that in general the respondents ‘seldom’ identify and eliminate non-value adding activities in production and delivery processes. The findings show that the respondents have not stream-lined their processes. EC architectural practices can become more efficient by focusing on clients’ needs and eliminating the activities that do not add value to clients.

3.7 The extent to which practices benchmark and transfer processes from other industries

Respondents were also required to indicate the extent to which they ‘benchmark’ other design practices to gain competitive advantage, and the extent they transfer processes from other industries in terms of ratings ranging between 1 (Never) and 5 (Always). Relative to benchmarking, it is notable that the average rating is 2.46, which is below the midpoint rating of 3, which indicates that in general the respondents ‘seldom’ benchmark other practices. This finding indicates that the respondents do not know how their performance measures up to their competitors and to ‘world class’ standards.

Relative to transferring processes from other industries it is notable that the average rating is 1.8, which is below the midpoint rating of 3, which indicates that practices ‘seldom’ transfer processes from other industries. The manufacturing industry has been a constant reference point and source of innovation for the construction industry for many decades. It is believed that EC architectural practices could improve efficiency and competitiveness if they transferred processes from manufacturing.

4. CONCLUSIONS

The review of the literature revealed that practices could implement CI to improve existing processes, redesign current processes, or use CE to improve service delivery and lower costs of production.

The review revealed that the traditional design to build approach is not favourable for adoption of CE. The review also highlighted removing wasted time and effort, represents the biggest opportunity for performance improvement in construction.

The following can be concluded from the survey results: 50% of respondents indicated that they implemented CI, 67% indicated that they
invested 0% of their annual business volume in research and development, and that process improvement is not adequately addressed in board meetings. 58% indicated that they are encouraging employees to make suggestions to improve production and office processes, and 58% indicated that they are not rewarding employees for improvement of office processes. The majority of respondents indicated that they are not adequately identifying and eliminating non-value adding activities, that they are not adequately transferring processes from other industries, and that they are not adequately benchmarking other design practices and industries. These results indicate that process improvements are not taken seriously by practices. Therefore this indicates that practices are not well positioned to implement CI, LP, and BPR.

5. RECOMMENDATIONS

It is recommended that EC practices should implement CI, LP, and BPR in order to improve project delivery processes, reduce development time and increase quality of products. Alternative procurement approaches should be adopted in order for contractors and suppliers to be involved in the development of the designs.

6. REFERENCES


Condition of the South African Construction Industry as evaluated by Contractors, Employers and Agents

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ABSTRACT AND KEYWORDS

Purpose of this paper

Annual monitoring of the condition of the South African construction industry is vital to enable government and other role players to evaluate the impact of current interventions and to timely and pro-actively implement revised legislation, strategies and development programs to act as an updated roadmap for the future well-being and growth of the industry.

Methodology

A database with contact particulars of employers, contractors and agents involved in 3441 projects completed in 2008 was compiled. Three separate survey forms were faxed or e-mailed to the contractors, employers and agents of these projects. Their responses were captured in a Microsoft Access database.

Findings

The main findings were that only 42% of all contractors and 47% of all agents were paid on time. The national departments were performing worst with regards to timeous payment. The contract price adjustment provisions used were not sufficient to compensate contractors for rising costs. The overall performance of the majority of employer bodies was satisfactory. Contractors were not satisfied with the management of
variation orders and claims by national departments. Some employer bodies allocated many tenders without considering the quality of the contractors. There was a strong indication of political intervention in the adjudication of tenders.

Value of the paper

This research contributes to the understanding of the construction industry and highlights existing problems to solve on the way forward. Government can make use of the results obtained to timely and pro-actively implement revised legislation, strategies and development programs to ensure the well-being and growth of the industry.

Keywords

construction industry indicators, cii, key performance, kpi

1. INTRODUCTION

The Construction Industry Development Board (cidb) Act (Republic of South Africa, 2000) was passed in 2000 to establish a statutory body aimed at driving an integrated construction industry development strategy. This body was required as the construction industry plays an indispensable role in the South African economy in providing the physical infrastructure which is fundamental to the country’s development. The construction industry operates in an uniquely project-specific and complex environment, combining different investors, clients, contractual arrangements and consulting professions. It impacts directly on communities and the public at large and its improved efficiency and effectiveness will enhance quality, productivity, health, safety, environmental outcomes and value for money to the South African society. In terms of this act the cidb ‘may develop target and performance indicators related to those best practice standards and guidelines and establish mechanisms to monitor their implementation and evaluate their impact’.

Construction Industry Indicators (CIIs) have been developed by the Department of Public Works and the cidb with assistance from the CSIR (van Huyssteen, van Heerden, Perkins and Gyimah, n.d.: Online) to play a useful role in developing a sustainable industry and to be adopted as a tool for improving performance in the South African construction industry. The CIIs of the cidb rely heavily on international experience and particularly those indicators adopted in the United Kingdom. In the United Kingdom the first Key Performance Indicators (KPIs) were published in 1999 in response to the Rethinking Construction report by Egan (1998). These KPIs had three objectives, namely (Rethinking Standards in Construction, 2006: 3):
• To provide companies and projects with a simple method of establishing a performance measurement system;
• To provide organisations with a straightforward method of benchmarking their performance against others in the construction industry; and
• To track long term trends in performance, and specifically, to demonstrate whether the construction industry was achieving the targets set out in Rethinking Construction.

Cost, time and quality are the three basic and most important performance indicators in construction projects followed by others such as safety, functionality and satisfaction (Chan and Ada, 2004: 203-221). Based on the Egan report the Movement for Innovation and Construction Best Practice Programme (CBPP) was formed and is now recognised as a leading organisation involved in the production of KPIs within the industry (Beatham, Anumba and Thorpe, 2004: 93-117). The KPIs launched by the CBPP are: client satisfaction, product and service, profitability, productivity, defects, safety, predictability of time and cost, construction time and construction cost. These KPIs were benchmarked within the construction industry and have been very successful in introducing many companies to the subject of performance measurement (Beatham et al., 2004: 93-117).

The cidb CIIs measure the performance of the South African construction industry by measuring employer satisfaction with the project milestone dates achieved, construction costs versus tender amount, contractors’ performance, agents’ (consultants’) performance, and the quality of materials used. The contractors’ satisfaction is measured by their profitability, the quality of the contract documentation, the efficiency, openness and transparency of the contract adjudication process, the management of variation orders and claims, payment delays and the performance of their materials suppliers. The procurement indicators measured are obtained from the agents involved and include contractor performance issues utilised in the adjudication of tenders, the type of procurement procedure used, and the contracting strategy adopted.

The cidb CIIs described above have been captured since 2003, and are currently being captured in partnership with the Department of Quantity Surveying and Construction Management of the University of the Free State. This paper is part of a series of annual papers (Marx 2008; 2009) presenting the results of this continuous survey project. It is a report on the results of the 2009 survey for projects completed in 2008.

2. METHODOLOGY

A database, with contact particulars of employers, contractors and agents involved in 3441 projects completed in 2008, was compiled. Three separate survey forms were faxed or e-mailed to the contractors,
employers and agents of these projects. Their responses were captured in a Microsoft Access database. All questionnaires made use of the following scale to measure different satisfaction levels: A score of 10% to 30% means dissatisfied, 40% to 70% means neither satisfied nor dissatisfied and 80% to 100% means satisfied.

3. SCOPE

The CIIs of the cidb need to evolve from the lessons learned from previous surveys, and are therefore subject to change and refinement. Furthermore, the CIIs used were only mainline indicators. Questions were not asked to pin-point the exact reasons for all problems experienced. The CIIs considered were only the project related indicators. The cidb also measures health and safety and empowerment progress which are not discussed in this paper. Other economic indicators such as production prices, and building plans passed are published elsewhere.

From the 3441 completed projects in the database, 1169 survey forms were received back from contractors, 602 from agents and 332 from employers. This paper is limited to the most significant results obtained.

4. DISCUSSION OF THE SURVEY RESULTS

4.1 Contractor profitability for different project types

Table 1 indicates the distribution of contractor profitability for different project types and shows that for 4% of all the projects completed the contractors made a loss. The project types, with the highest percentage of projects with profitability of more than 10% were special work (52%) and mechanical work projects (51%).

If the percentage of projects completed with 6-10% and more than 10% profit are combined for each project type, the results show that the residential building and non-residential building projects were much less profitable than all other project types. This may be due to the complexity of building projects and the large number of parties involved.

Table 1 shows that only 31% of all contractors made a profit of more than 10%. This implies that the contract price adjustment provisions used to compensate contractors for rising costs were not sufficient, as fifteen percent of the value of the work completed was excluded from escalation. This 15% is considered to be profit and other costs that should not escalate.
4.2 Performance of the employer and the employer’s agents

The contractors’ satisfaction with the employer and agents (consultants) was tested with regard to overall performance, the quality of the tender documents and specification, efficiency, openness and transparency of the contract procurement/adjudication processes followed, and the management of variation orders and claims.

Table 1: Profitability of projects for different project types 2008

<table>
<thead>
<tr>
<th>Profitability</th>
<th>% of Projects in each Project Type</th>
<th>% of all Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss</td>
<td>4 5 4 3 5 - 4</td>
<td>4</td>
</tr>
<tr>
<td>0 – 5%</td>
<td>32 29 20 23 20 14 14</td>
<td>22</td>
</tr>
<tr>
<td>6 – 10%</td>
<td>44 51 45 23 40 34 43</td>
<td>43</td>
</tr>
<tr>
<td>&gt; 10%</td>
<td>20 15 31 51 35 52 31</td>
<td>31</td>
</tr>
</tbody>
</table>

Table 2 shows the results obtained. The best overall employer categories were public corporations and public private partnerships with an average satisfaction level of 83% followed by provincial departments with 82%.

Table 2: Contractors’ level of satisfaction with the employer’s and agent’s performance 2008

<table>
<thead>
<tr>
<th>Satisfaction level %</th>
<th>Employer Overall</th>
<th>Agent Overall</th>
<th>Documentation / Specifications</th>
<th>Procurement / Adjudication</th>
<th>Management of VO’s</th>
<th>Management of claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Projects</td>
<td>79 83 80 82 80</td>
<td>79 81 79 78 79</td>
<td>78 81 78 81 78 77 77 77</td>
<td>82 82 83 83 83 81 81</td>
<td>76 80 73 77 80 80</td>
<td>76 79 71 75 78 76 76</td>
</tr>
</tbody>
</table>
The worst overall performance was achieved by the private sector and regional / district councils, with a satisfaction level of 79%. Bearing in mind that a score of 80% means satisfied, then the lowest score achieved is of no concern.

The average overall performance of the agents, in the eyes of the contractors, was slightly lower than the performance of the employers. The contractors were satisfied with the quality of the documentation and specifications, but the private sector and national departments received a slightly lower score of 78%, and regional / district councils the lowest score of 77%. The contractors were satisfied with the procurement/adjudication of the tenders.

The contractors’ satisfaction levels were definitely lower for the management of variation orders (VO’s) and claims with the national departments receiving the lowest score of 73% and 71% respectively.

4.3 Contractor payment delays

The average number of days delay between certification and receipt of contractor payment of interim and final certificates is shown in Table 3. The national departments were the worst early payers, with payments made within 30 days on only 37% of their projects. The best performing client categories with 62% and 54% of project payments made within a month were public private partnerships and metropolitan councils respectively. The different contract documents used for projects had different requirements regarding timeous payment of certificates but payment within a month was considered to be reasonable.

<table>
<thead>
<tr>
<th>Avg. Days Delay</th>
<th>% of Projects in each Employer Category</th>
<th>% of all Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 14</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>14 to 30</td>
<td>29</td>
<td>49</td>
</tr>
<tr>
<td>30+ to 60</td>
<td>45</td>
<td>34</td>
</tr>
<tr>
<td>60+ to 90</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>90+ to 120</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>120+</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

It is of great concern that only 42% of all contractors were paid on time within 30 days. The worst performing employers were the national and
provincial departments who paid 23% of their contractors only after three or more months.

Contractors refrain from standing up to their contractual right to be paid on time for fear of losing job opportunities in the future. This creates major cash flow problems for contractors and the cidb should communicate this with client bodies.

These payment results are also shown in Table 4 as timeous payment (< 30 days) by the employer bodies in different provinces. The results are disturbing as many employer bodies in various provinces pay only 0 to 20% of their contractors on time.

<table>
<thead>
<tr>
<th>Employer Category</th>
<th>% of Projects where contractor is paid within 30 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Sector</td>
<td>31(13) 29(101) 33(115) 44(18) 50(16) 32(19) 31(13) 58(83) 37(41)</td>
</tr>
<tr>
<td>Public Corporation</td>
<td>33(9) 42(65) 58(33) 15(13) 41(32) 80(10) 0(6) 26(23) 50(14)</td>
</tr>
<tr>
<td>National Department</td>
<td>0(3) 62(13) 58(12) 20(5) 0(6) 13(8) 100(1) 50(8) 27(11)</td>
</tr>
<tr>
<td>Provincial Department</td>
<td>18(17) 17(24) 17(36) 57(23) 0(20) 50(4) 0(2) 58(38) 35(26)</td>
</tr>
<tr>
<td>Metropolitan Council</td>
<td>75(4) 63(40) 53(15) 100(6) 50(2) 0(3) 0(2) 39(23) 44(6)</td>
</tr>
<tr>
<td>Regional / District Council</td>
<td>40(10) 60(15) 10(10) 63(8) 45(11) 9(11) 0(8) 59(29) 70(19)</td>
</tr>
<tr>
<td>Public Private Partnership</td>
<td>- 50(4) 80(5) 67(6) 25(4) - - 83(6) 33(3)</td>
</tr>
</tbody>
</table>

The value in brackets is the number of projects involved

<table>
<thead>
<tr>
<th>Province</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free State</td>
</tr>
<tr>
<td>Gauteng</td>
</tr>
<tr>
<td>KwaZulu-Natal</td>
</tr>
<tr>
<td>Limpopo</td>
</tr>
<tr>
<td>Mpumalanga</td>
</tr>
<tr>
<td>North West</td>
</tr>
<tr>
<td>Northern Cape</td>
</tr>
<tr>
<td>Western Cape</td>
</tr>
<tr>
<td>Eastern Cape</td>
</tr>
</tbody>
</table>

4.4 Performance of materials suppliers

Contractors were requested to indicate their overall satisfaction level with their materials suppliers, the ability of the suppliers to keep to their quoted/agreed upon delivery schedules and whether the materials delivered on site complied with the specifications. The results are indicated in Table 5. Only the materials suppliers of building projects received an overall performance score of slightly less than 80% (satisfied). The problem was their capability to stick to the agreed upon delivery schedules (77% to 78%) and not with the quality of the materials delivered, as the scores received for materials delivered as per specification were above 80%.
4.5 Contractor performance issues utilised in the adjudication of tenders

Agents were requested to indicate which contractor performance issues were taken into account during the tender adjudication process and the results are indicated in Table 6 for different employer categories.

Table 5: Materials suppliers’ performance 2008

<table>
<thead>
<tr>
<th>Contractors’ Level of Satisfaction % with Materials Suppliers for each Project Type</th>
<th>Overall Performance</th>
<th>Keep to agreed upon Delivery Schedule</th>
<th>Material delivered as per Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>78</td>
<td>79</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>77</td>
<td>78</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>81</td>
<td>82</td>
<td>85</td>
</tr>
</tbody>
</table>

Table 6: Contractor performance issues used in the adjudication of tenders 2008

<table>
<thead>
<tr>
<th>Performance Issues</th>
<th>% of Projects in each Employer Category using different Performance Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial offer</td>
<td>29 10 10 16 9 10 13</td>
</tr>
<tr>
<td>Financial offer and preference</td>
<td>10 33 27 53 44 57 12</td>
</tr>
<tr>
<td>Financial offer and quality</td>
<td>23 17 7 5 11 3 25</td>
</tr>
<tr>
<td>Financial offer, quality and preference</td>
<td>38 40 56 26 36 30 50</td>
</tr>
</tbody>
</table>

Table 6 shows that even the private sector incorporated preference in 48% of all their projects. No longer are price and quality the only issues...
evaluated and tender allocation based on financial offer, quality and preference was most popular (38%). Table 6 shows that there were still a large number of projects where financial offer and preference were the only criteria used to allocate tenders. It is alarming that financial offer and preference were the only criteria considered in 53%, 44% and 57% of projects for provincial departments, metropolitan councils and regional/district councils respectively. In other words, the quality i.e. capability, training, performance and track record, of the contractors, were considered as being of no importance. This political strategy to support and build emerging contractors should be re-evaluated by government.

4.6 Deviation from the tender adjudication procedures

Agents were posed the question whether the employer awarded the tender to the responsive tenderer who achieved the best tender score during the tender evaluation process.

The tenders were evaluated by the agents according to the employer’s tender evaluation procedures. Non-responsive tenders received were ignored. Table 7 shows the percentage of contracts that were not awarded to the responsive tenderer with the best tender evaluation score per employer category and province. This possibly indicates some form of political intervention, manipulation of results or corrupt / fraudulent practices. The results are quite shocking bearing in mind that it is not based on perceptions of the aggrieved renderers, but on the knowledge of the independent agents of the employers. In Table 2 the contractors who obtained the tenders indicated that they were very satisfied with the procurement / adjudication processes followed. Here the agents’ responses indicate a different opinion. The national departments, except in the Gauteng province, performed very well. Table 7 shows in which provinces and for which employer categories tender adjudication practices should be investigated.
Table 7: Contracts not awarded to the tenderer with best tender score

<table>
<thead>
<tr>
<th>Employer Category</th>
<th>% Contracts not awarded to the responsive tenderer with best tenderer score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Sector</td>
<td>0 25 9 11 9 0 67 37 38</td>
</tr>
<tr>
<td>Public Corporation</td>
<td>0 7 0 80 43 0 0 33 0</td>
</tr>
<tr>
<td>National Department</td>
<td>0 20 0 0 0 - 0 0 0</td>
</tr>
<tr>
<td>Provincial Department</td>
<td>0 50 29 63 33 0 0 33 0</td>
</tr>
<tr>
<td>Metropolitan Council</td>
<td>25 3 20 0 0 0 0 0 0</td>
</tr>
<tr>
<td>Regional / District Council</td>
<td>14 14 10 8 0 13 0 3 7</td>
</tr>
<tr>
<td>Public Private Partnership</td>
<td>- 0 - 0 - 0 33 0 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Province</th>
<th>Free State</th>
<th>Gauteng</th>
<th>KwaZulu Natal</th>
<th>Limpopo</th>
<th>Mpumalanga</th>
<th>North West</th>
<th>Northern Cape</th>
<th>Western Cape</th>
<th>Eastern Cape</th>
</tr>
</thead>
</table>
| Province                          | 4.7 Agent payment delays
The average number of days delays between submission of professional fee accounts and receipt of payment is shown in Table 8. The agents' fees were paid within 30 days for only 47% of all projects completed. The provincial departments were the slowest payers of fees with fees only paid after more than 90 days on 17% of all their projects. Late payment of agents' fees cause cash flow problems.
Table 8: Payment delay of agents’ fees for different employer categories 2008

<table>
<thead>
<tr>
<th>Avg. Days Delay</th>
<th>% of Projects with Payment Delay per Employer Category</th>
<th>% of all Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 14</td>
<td>9 8 10 3 2 18 50 9</td>
<td></td>
</tr>
<tr>
<td>14 to 30</td>
<td>36 36 48 44 39 32 25 38</td>
<td></td>
</tr>
<tr>
<td>30+ to 60</td>
<td>38 48 26 29 45 41 25 38</td>
<td></td>
</tr>
<tr>
<td>60+ to 90</td>
<td>10 3 10 7 9 9 - 8</td>
<td></td>
</tr>
<tr>
<td>90+ to 120</td>
<td>3 2 3 2 3 - - 2</td>
<td></td>
</tr>
<tr>
<td>120+</td>
<td>4 3 3 15 2 - - 5</td>
<td></td>
</tr>
</tbody>
</table>

4.8 Construction commencement milestone dates

Table 9 shows the actual project commencement and completion times achieved for different project types. It is not known whether the reason for a late start was because of contractors who could not produce their guarantees on time, or because of employers who did not have the sites ready to hand over to the contractors. Table 9 shows that only 73% of all residential building projects were completed on time. It is not known if the reason for this is lack of contractor capacity, managerial skills, finances, know-how or perhaps unrealistic construction periods specified by agents or employers.

Table 9: Project start and completion milestone dates 2008

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Start on time %</th>
<th>Finish on time %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Building</td>
<td>88</td>
<td>73</td>
</tr>
<tr>
<td>Non-residential Building</td>
<td>96</td>
<td>86</td>
</tr>
<tr>
<td>Civil Works</td>
<td>95</td>
<td>82</td>
</tr>
<tr>
<td>Mechanical Works</td>
<td>96</td>
<td>87</td>
</tr>
<tr>
<td>Electrical Works</td>
<td>96</td>
<td>92</td>
</tr>
<tr>
<td>Special Works</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>Overall</td>
<td>95</td>
<td>84</td>
</tr>
</tbody>
</table>

4.9 Employer satisfaction

Table 10 shows the average level of employer satisfaction for different project types. These are the performance levels of their agents and contractors and the quality of materials used. Bearing in mind that a score of 80% means satisfied, Table 10 shows that employers were satisfied with
the overall performance of their agents (except for special works) and the quality of materials used on site. For all the contractor related indicators the contractors for non-residential building projects received the lowest score throughout, ranging from 66% to 75%. Generally speaking the average satisfaction levels expressed by the employers were high.

Table 10: Employer satisfaction 2008

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Employers’ % Level of Satisfaction with</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall performance of Consultants</td>
</tr>
<tr>
<td>Residential Building</td>
<td>82</td>
</tr>
<tr>
<td>Non-residential Building</td>
<td>82</td>
</tr>
<tr>
<td>Civil Works</td>
<td>82</td>
</tr>
<tr>
<td>Mechanical Works</td>
<td>83</td>
</tr>
<tr>
<td>Electrical Works</td>
<td>87</td>
</tr>
<tr>
<td>Special Works</td>
<td>79</td>
</tr>
</tbody>
</table>

5. CONCLUSIONS

The main findings of the 2009 survey of contractors’ opinions for projects completed in 2008 were as follows:
1) Contractors made a loss on 4% of all projects completed.
2) Mechanical work (51%) and special work projects (52%) showed the highest percentage of projects with contractor profit of > 10%.
3) The overall performance of the majority of employer bodies was satisfactory (≥80%) but the agents received a slightly lower score.
4) Contractors were satisfied (≥80%) with the procurement / adjudication procedures followed, but the quality of the documentation / specifications received a slightly lower score.
5) The national departments received the lowest satisfaction level for the management of variation orders (73%) and claims (71%).
6) Only 42% of all contractors and 47% of all agents were paid on time, within 30 days, with the national and provincial departments being the worst performers.
7) Contractors gave materials delivery for building projects the lowest score.
8) Employers were, generally speaking, satisfied with the overall performances of their agents and contractors except for residential
building contractors. The contractors' performances on residential building projects received the lowest scores throughout.

9) It is of great concern that contractor quality was discarded as being of any importance in 53%, 44% and 57% of tenders allocated for provincial departments, metropolitan councils and regional/district councils respectively.

10) There was a strong indication of political intervention in the tender adjudication procedures of many employers.

6. REFERENCES


Targeting Strategies for Contractor Development Programmes (CDPs)

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ABSTRACT AND KEYWORDS

Purpose

The paper examines the underlying assumptions used in the development of the \textit{Guidelines for Targeting for Contractor Development Programmes} developed for the \textit{National Contractor Development Programme (NCDP)}, and presents a cursory overview of the impact of these guidelines.

Design/methodology/approach

This study is an analysis of contractor development in South African, using information obtained from the cidb Register of Contractors, the cidb Register of Projects, the cidb publications dealing with the state of the industry.

Findings

A cursory overview of the impact of these \textit{Guidelines} is also presented in this paper, and it is concluded that most contractor development programmes (CDPs) currently do not comply with these \textit{Guidelines}. 
Research limitations/implications

The study was limited to information obtained from the cidb Register of Contractors, the cidb Register of Projects, and the cidb publications dealing with the state of the industry.

Practical implications

In response, through various structures established as part of the NCDP, the cidb is working with various CDPs in promoting compliance with the Guidelines.

Originality/value

The study demonstrates the state of contractor development and how targeting strategies would assist in the development of the emerging contractors.

Keywords

Contractor Development Programmes (CDPs), cidb Register of Contractors, National Construction Development Programme (NCDP), Targeting Strategies.

1. BACKGROUND AND INTRODUCTION

Contractor Development Programmes (CDPs) are becoming increasingly common in South Africa, ostensibly as a mechanism to unlock the growth constraints experienced by emerging contractors. Government has taken a leadership role in this regard, and many of these CDPs are housed within national and provincial works departments, with the participants within these CDPs receiving some form of preferential access to public sector projects from within those departments.

More information on CDPs can be obtained from an assessment of CDPs recently undertaken by the cidb (2008), of which an overview of the more well know CDPs is given in Table 1.1. From this assessment undertaken by the cidb, it appears that there are about 18 public sector sponsored CDPs with a total enrolment of around 1 300 contractors (cidb, 2008). (However, more recently, it appears that around 18 000 contractors have been enrolled into a single Programme in KZN – the implications of which are discussed in this paper!)
Table 1.1 Overview of Selected Contractor Development Programmes

<table>
<thead>
<tr>
<th>Programme</th>
<th>Number of Contractors</th>
<th>Grades</th>
<th>Number Graduated</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDPW CIP</td>
<td>134</td>
<td>3 to 7</td>
<td>na</td>
</tr>
<tr>
<td>DPW EC CIDP</td>
<td>140</td>
<td>1 to 5</td>
<td>1</td>
</tr>
<tr>
<td>DPW KZN Masakhe ECDP</td>
<td>150</td>
<td>2 to 5</td>
<td>0</td>
</tr>
<tr>
<td>KZN eThekwini Vukuphile</td>
<td>25</td>
<td>1 to 3</td>
<td>21</td>
</tr>
<tr>
<td>KZN eThekwini Large Contractor Model</td>
<td>17</td>
<td>2 to 4</td>
<td>0</td>
</tr>
<tr>
<td>ECDC IECDM</td>
<td>62</td>
<td>2 to 5</td>
<td>na</td>
</tr>
<tr>
<td>ESKOM Construction Academy</td>
<td>162</td>
<td>1 to 3</td>
<td>38</td>
</tr>
<tr>
<td>KZN SECI</td>
<td>126</td>
<td>2 to 7</td>
<td>no</td>
</tr>
</tbody>
</table>

Key:
- na: not available
- nc: not a criteria for the Programme objectives

Recognising the importance of CDPs in the development of contractors, the South African government has initiated the National Contractor Development Programme (NCDP) (cidb, 2009a). Led by the Minister of Public Works and the Provincial MEC’s, the NCDP is geared at enhancing capacity and promoting equity ownership across the different contracting categories and grades, as well as improving skills and performance in the delivery of capital works and maintenance across the public sector. The NCDP is a government programme comprising of a partnership between the cidb, national and provincial public works and other willing stakeholders, in which the participating stakeholders commit their resources to develop previously disadvantaged contractors.

The NCDP also provides leadership and guidance to CDPs, including the development of Guidelines for Targeting for Contractor Development Programmes (cidb, 2010a), which provides guidance on identifying target groups that should be the focus of CDPs (the “who”), and guidelines for the number of contractors that could be enrolled into CDPs (the “how many”).

The present paper examines the underlying assumptions used in the development of these Guidelines, and presents a cursory overview of the impact of these guidelines.
3. GUIDELINES; TARGET GROUPS

The Guidelines for Targeting for Contractor Development Programmes (cidb, 2010a) has identified four guidelines for identifying target groups, which are presented below:

3.1 Ownership

The Guidelines recommend that CDPs should target the development of black, women, disabled, and youth-owned companies – and specifically those Classes of Works (CoWs) and Grades where imbalances in such ownership exist.

An assessment of the current state of black ownership is given in Table 3.1, where the ownership information obtained from the cidb Register of Contractors, where a black owned company is defined here as equity ownership by black owners of 51% ownership or higher. For convenience and for analysis, the data has been grouped into various categories of grades. It is seen that, for example, around 80% of all GB and CE companies in Grades 1 to 5 are black owned – whereas black ownership of around 80% in the EB, EP, ME and SW Classes of Works does not extend much beyond Grades 1 or 2.

<table>
<thead>
<tr>
<th>Grades</th>
<th>GB</th>
<th>CE</th>
<th>ME</th>
<th>EB</th>
<th>EP</th>
<th>SW</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>14%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>5%</td>
</tr>
<tr>
<td>7 &amp; 8</td>
<td>60%</td>
<td>39%</td>
<td>27%</td>
<td>55%</td>
<td>21%</td>
<td>24%</td>
<td>44%</td>
</tr>
<tr>
<td>5 &amp; 6</td>
<td>80%</td>
<td>72%</td>
<td>44%</td>
<td>56%</td>
<td>55%</td>
<td>45%</td>
<td>69%</td>
</tr>
<tr>
<td>2 to 4</td>
<td>92%</td>
<td>90%</td>
<td>56%</td>
<td>77%</td>
<td>63%</td>
<td>71%</td>
<td>86%</td>
</tr>
<tr>
<td>1</td>
<td>98%</td>
<td>97%</td>
<td>88%</td>
<td>86%</td>
<td>89%</td>
<td>93%</td>
<td>96%</td>
</tr>
</tbody>
</table>

Similarly, women ownership of 40% and higher extends up to Grade 6 in GB and Grade 4 in CE, but again the depth of women ownership is lower in EB, EP, ME and SW as illustrated in Table 3.2.
Table 3.2 Female Ownership; South Africa (end December 2009)

<table>
<thead>
<tr>
<th>Grades</th>
<th>GB</th>
<th>CE</th>
<th>ME</th>
<th>EB</th>
<th>EP</th>
<th>SW</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>7 &amp; 8</td>
<td>23%</td>
<td>19%</td>
<td>4%</td>
<td>14%</td>
<td>8%</td>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td>5 &amp; 6</td>
<td>44%</td>
<td>32%</td>
<td>29%</td>
<td>30%</td>
<td>26%</td>
<td>30%</td>
<td>35%</td>
</tr>
<tr>
<td>2 to 4</td>
<td>49%</td>
<td>45%</td>
<td>35%</td>
<td>40%</td>
<td>37%</td>
<td>42%</td>
<td>46%</td>
</tr>
<tr>
<td>1</td>
<td>49%</td>
<td>48%</td>
<td>41%</td>
<td>33%</td>
<td>38%</td>
<td>44%</td>
<td>48%</td>
</tr>
</tbody>
</table>

Applying the guideline of targeting the development of (in this case) black and women owned companies, it can be concluded that targeting of black and women owned GB and CE companies in, typically, Grades 1 to 5 may not necessarily be a priority. Rather, the emphasis should be on targeting of Grades 6 and above in GB and CE in all grades in EB, EP, ME and SW. This broad recommendation however tends to conflict with the current dominant focus of CDPs situated within Provincial Works Departments that focus largely on GB and CE companies in Grades 1 to 4 (see Table 3.3 below) – and the almost complete lack of focus on targeting of GB and CE in Grades 5 and above, as well as targeting the more specialist Classes of Works of EB, EP, ME and SW.

Table 3.3 Target Grades of Selected CDPs

<table>
<thead>
<tr>
<th>Programme</th>
<th>Target Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDPW CIP</td>
<td>3 to 7</td>
</tr>
<tr>
<td>DPW EC CIDP</td>
<td>2 to 5</td>
</tr>
<tr>
<td>DPW KZN Masakhe ECDP</td>
<td>2 to 5</td>
</tr>
<tr>
<td>KZN eThekwini Vukupile</td>
<td>1 to 3</td>
</tr>
<tr>
<td>KZN eThekwini Large Contractor Model</td>
<td>2 to 4</td>
</tr>
<tr>
<td>ECDC IECDM</td>
<td>2 to 5</td>
</tr>
<tr>
<td>ESKOM Construction Academy</td>
<td>1 to 3</td>
</tr>
</tbody>
</table>

3.2 Supply and Demand

The Guidelines recommend that CDPs should target the development of new contracting capacity where demonstrable shortages exist that are aligned with the service delivery objectives of the Department. Various measures can be used as indicators of capacity constraints, such as:

- ongoing non-responsive tenders in selected contractor Grades and Classes of Works;
• low tendering competition; or
• high business confidence.

For example, the business confidence index and index of contractors rating insufficient demand for work as a constraint is shown in the following figures for the South African average for General Building for all contractor grades surveyed (Grades 4 to 8, Fig. 3.1), and for Grades 5 and 6 (Fig. 3.2) (cidb, 2009b).

These graphs suggest high levels of competition due to insufficient work – which suggests that at a national level, there are currently no shortages of GB contractors. Similar results also apply to CE contractors.
Again, this tends to conflict with the current dominant focus of CDPs situated within Provincial Works Departments that focus to a large extent on the development of new capacity in GB and CE in Grades 1 to 4 (see previous Table).

3.3 Performance Improvement

The Guidelines recommend that strong consideration should be given within CDPs to improving the performance of contractors – in particular in those areas which are aligned with the service delivery objectives of the Department.

While in many cases it is likely that sufficient capacity exists that is aligned with the service delivery objectives of a client, it is likely that there will always be a need to improve the performance of the contractors serving a client – to be able to deliver better value to the client.

Where such a focus exists within a CDP on performance improvement, the CDPs would need to incorporate (amongst other) the following elements in order to ensure that contractor development aligns with the NCDP tenets:

- contractors must be assessed on entrance to the CDP to determine their development potential and needs;
- appropriate quality control and training (on-site and theoretical) must be provided;
- programmes should aim to graduate contractors from the programme with measurable improvements (e.g. NQF level and/or improvement in contractor grading); and
- exit from the CDP is based on predetermined criteria.

Notwithstanding this, the assessment of selected CDPs undertaken by the cidb (2008) suggests that most CDPs do not conform to the above basic requirements.

It should also be noted that the need to improve the performance of contractors is however not limited to the lower contractor grades. For example, Fig. 3.3 extracted from the cidb Construction Industry Indicators (CIIs) (cidb, 2010c) show that client satisfaction tends to decrease with increasing project size, suggesting the need to improve the performance of contractors across all grades – including for example Grades 5 and 6.

Notwithstanding this, it is again noted that the current focus of CDPs is largely on contractors in Grades 1 and Grades 2 to 4.
3.4 Local Economic Objectives

Where feasible, targeting of contractors can reflect local economic objectives i.e. job creation, use of local resources, skills development etc.

4. AFFORDABILITY AND SUSTAINABILITY

As noted in the Framework for the NCDP (cidb, 2009a), “government will use its procurement of infrastructure in order to achieve contractor development”. There are several mechanisms for government to use its procurement of infrastructure to support contractor development, including direct and indirect contractor development strategies, namely:

- directly through a structured public or private sector contractor development programme together with direct preference models; or
- indirectly through a procurement model with targeted development outcomes.

In addition to identifying target groups to be targeted for contractor development (see Section 3), it is therefore also necessary to identify how many contractors can be developed within a specific budget.

Specifically, the number of contractors to be enrolled into CDPs should be limited by the affordability of the client to provide:

- work opportunities that will sustain all participants;
- the necessary training and mentoring for all participants, as well as
- programme overheads.

Applying the above guidelines and in the absence of a more detailed assessment, the Guidelines for Targeting for Contractor Development
Programmes proposes that the following should be used for the number of contractors to be enrolled and supported annually in a CDP per R1 billion of construction spend per year by the client department:
• Table 4.1 for direct targeting of contractors in Grades 1 to 6;
• Table 4.2 for indirect targeting of contractors of Grades 2 to 6 through sub-contract or JV relationships with contracted targeted development outcomes:

<table>
<thead>
<tr>
<th>Contractor Grade</th>
<th>Number of Contractors per R1b</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 &amp; 6</td>
<td>2</td>
</tr>
<tr>
<td>2 to 4</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Grade</th>
<th>Contractor Grade</th>
<th>Number of Contractors per R1b</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>5 &amp; 6</td>
<td>4</td>
</tr>
<tr>
<td>7 &amp; 8</td>
<td>2 to 4</td>
<td>12</td>
</tr>
</tbody>
</table>

The background to the development of the guidelines given above for contractors to be enrolled and supported in CDPs is given in the Background to Targeting for Contractor Development Programmes (cidb, 2010b). Specifically, one of the key assumptions made is that between 10% to 20% of the infrastructure budget is allocated to direct or indirect targeting within a CDP.

Now, to place the above targets for the number of contractors to be enrolled into CDPs into perspective, it should be noted that the construction budget for a province can vary typically between R3b to R15b per annum. For example, according to the MTEF, the infrastructure budget for 2009/10 is around R12b for Gauteng and around R5b for the Eastern Cape.

For a construction budget of R10b, the number of contractors that could be sustained is shown in Table 4.3
It can be seen from Table 4.3 above that in total, around 60 contractors could be sustained in CDPs per year in Grades 5 and 6 and around 170 contractors in Grades 2 to 4 per year for a R10b budget. Similarly, around 100 Grade 1 contractors could be sustained per year. This is significantly less than the number of contractors currently enrolled in most CDPs – suggesting that most CDPs are not providing sustainable work opportunities to contractors that have been enrolled into these CDPs (see Table 1.1).

5. CONCLUSIONS

This paper has presented the Guidelines for Targeting for Contractor Development Programmes (cidb, 2010a) developed for the National Contractor Development Programme (NCDP) (cidb, 2009a). These Guidelines provide guidelines on identifying target groups that should be the focus of CDPs (the “who”), as well as guidelines for the number of contractors that could be enrolled into CDPs (the “how many”). Specifically, the Guidelines recommend that the number of contractors to be enrolled into a CDP should be limited by the affordability of the client to provide sustainable work opportunities that will sustain all participants within the CDP.

A cursory overview of the impact of these Guidelines is also presented in this paper, and it is concluded that most CDPs currently do not comply with these Guidelines.

In response, through various structures established as part of the NCDP, the cidb is working with various CDPs in promoting compliance with the Guidelines.
6. REFERENCES

cidb, 2010b, Targeting for Contractor Development Programmes; Background (Construction Industry Development Board, Pretoria).
Overcoming Construction Constraints through Infrastructure Delivery

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Coega Development Corporation, Port Elizabeth, South Africa

ABSTRACT AND KEYWORDS

Purpose of this paper

The purpose of this paper is to propose an infrastructure delivery approach that can be used to address contractor transformation challenges and skills deficiencies in the construction industry while optimising the socio-economic benefits.

Design/methodology/approach

A total of 50 young people who were sourced through targeted procurement were trained in construction and given school projects as contractors through the government Expanded Public Works Programme to increase the construction contractor base. An assessment tool was developed to grade contractors. One-on-one meeting between the individual contractor, the Client, Training Institutions, Implementing Agents and Mentors were held monthly to assess and grade contractors.

A number of Further Education and Training and University students were placed with the contractors and Consultants respectively for practical training and to develop artisans and built professionals for the contractors and Consultants respectively.

Findings

The paper suggests that:

- Targeted procurement can be used to transform the Construction Industry
- Assessment of contractors and one on one meetings improved the performance of contractors
- Contractors that performed better were largely those whose post graduate qualifications and previous employment was from the built environment.
• The placement of FET College students with contractors and University students has resulted in their exposure to construction increasing the skills base and ensure that both Contractors and Consultants have a succession plan.

• Socio-economic aspects such as employment creation and the address of diseases such as HIV/AIDS can best be measured when standard reporting tools are enforced.

Research limitations/implications

As the programme for the FET/University graduate students and contractor development is relatively new, future research need to trace the progress of the FET and University graduates, the ability of contractors to get more work through their own means and the impact of HIV/AIDS campaigns on the families of workers.

Practical implications

The findings provide a basis for the construction industry not only to build and provide physical infrastructure such as schools, clinics etc, but to use the processes of developing as a tool to address both the construction and the socio-economic challenges.

Keywords

Infrastructure Delivery, Targeted Procurement, Socio-Economic, Skills,

1. INTRODUCTION

The purpose of this paper is to propose an approach on how to achieve socio-economic aspects through the development of infrastructure to contribute towards achieving the Millennium Development Goals (MDGs). The aim is to share experiences with those who are grappling with poverty and to assist governments that implement infrastructure in packaging their assistance to not only achieve the intended physical infrastructure, but to use the infrastructure delivery processes to achieve favourable socio-economic conditions. Developing nations are constrained by a number of deficiencies such as underdevelopment, lack of requisite skills to implement their infrastructure and inadequate construction capacity. The Millennium Development Goals (MDGs) provides an international framework to eradicate poverty and its manifestations.
This paper explores the extent of poverty in both the developing and developed nations. It covers the challenges facing the South African construction sector regarding skills and the ability to deliver especially on the contractor level. The MDGs which provide a framework for addressing poverty is explored. It is concluded that by training, placing students in the built environment and developing contractors, developing nations can build their skills base. The study indicated that preferences for contractor development should be with those whose post graduate training has been in the built environment, and have had previous exposure in the construction industry as they are likely to succeed. It is also concluded that some of MDG indicators such as the reduction of hunger through optimizing employment creation by the use of labour based specifications, parity between men and women through procurement targeting, arresting and managing the spread of HIV/AIDSs by dictating the use of HIV/AIDS specification in construction works can be achieved through infrastructure delivery processes. It is also concluded that by dictating a prescribed standardized reporting framework throughout the various reporting structures, the intended infrastructure objectives can be achieved.

2. CHALLENGES AFFECTING DEVELOPING AREAS WITH REFERENCE TO SOUTH AFRICA

2.1 Poverty Challenges Facing the Poor and the Millennium Development Goals

Developing areas are confronted by the scourge of poverty that is beyond the income means of most developing nations. The African Development Bank (2004) reported that close to 50% of people in Southern Africa, who reside largely in rural areas, live in poverty levels of less than $1/day. Sanchez et al (2005) reported that 852 million people, mainly in the developing world, are still chronically or acutely malnourished. Most of them are in Asia, particularly India (221 million) and China (142 million). Sub-Saharan Africa has 204 million people in poverty and is the only region of the world where poverty is increasing. This calls for various strategies to counteract this, of which one of them is investment in infrastructure with the aim of addressing the poverty issues. These manifest themselves in unemployment, and lack of requisite skills amongst other things. The poverty challenges also offer opportunities on the other hand. Watermeyer (2006) reported that recent forecasts for the demand for new infrastructure expressed at the American Society of Civil Engineers’ convention in Baltimore, 2004, indicated that approximately 80% of the world’s new
infrastructure in 15 to 20 years time will be constructed in developing countries.

The global fight against poverty was enhanced by the 189 countries who adopted the Millennium Development Goals (MDGs) (United Nations 2000). This means that the Poverty Reduction Strategy Papers (PRSPs) which Stewart and Wang (2003) described as policy documents produced by borrower countries outlining the economic, social and structural programmes to reduce poverty, that they claim explicitly incorporate participation into the International Monetary Fund/World Bank (IMF/WB) lending framework for poor countries had to be adjusted to the (MDGs). The African Bank (2004) in its policy noted that PRSPs provide an opportunity to implement the new poverty policy, as they represent an effective mechanism for channelling domestic and international resources for poverty reduction in a coordinated manner. The United Nations Development Programme (UNDP) (2008) noted that in Ethiopia, as in nearly 70 other countries, the PRSP is becoming the operational framework to translate the global MDG targets into national action. Watermeyer (2001) remarked that in the absence of an environment that attracts foreign investment and promotes the development of a domestic investment, many countries become reliant on foreign donor funds for up to 50% of their national budgets. Thus, it is critical that the budgets from donors and domestic investments be linked to specific MDG indicator deliverables.

The review of the Eastern Cape Provincial Development Strategy (PGDP) (2003) indicates that there are at least seven common MDG indicators with resolution 55/2 of the United Nations Millennium Declaration, adopted by the United Nations Assembly during of the 8th plenary session on the 8 September 2008. It can be concluded that the Eastern Cape Provincial Government PGDP is in line with the MDGs which form the accepted national and international core framework for strategies to reduce poverty. Thus, every policy development, implementation should be aligned to achieving the MDGs. This paper is based on a case study on implementing MDGs in the implementation of infrastructure in the Eastern Cape.

Given the MDGs intention to fight poverty, many donor nations are linking their funding of infrastructure to the achievement of socio-economic goals. Nahusenay, a World Bank Senior Transport Specialist quoted by Pringle (2009) noted that bilateral donors have lost interest in investing in road infrastructure in Africa, as they are not seeing the benefits of such investments because not enough employment was being created and that such investments were not helping to improve rural access and alleviating poverty. It can be concluded that it is critical for infrastructure provision to demonstrate that it meets the objectives of the MDGs.
2.2 Challenges Regarding Skills in the Construction Sector

Perry (2009) quoted the Organization for Economic Cooperation and Development, reported that foreign investment in Africa reached $48 billion, overtaking foreign aid for the first time. The same report mentioned that Chinese engineers are at work across the continent, mining copper in Zambia, and cobalt in the Democratic Republic of Congo and tapping oil in Angola. The implementation of this infrastructure is not done by Africans, indicating both skills constraints and the contracting ability. Watermeyer (2001) noted that sustainable development in the context of developing countries should ensure that the roles of “outsiders” must be time bound and the scope of assistance limited to the provision of alternatives and, if necessary, towards the provision of “seed capital”, including human capital. The skills constraints need to be addressed as part of eradicating poverty, so that it’s not the Chinese or other foreign skills that come and implement infrastructure to the developing world, but the indigenous population as they may know better how they can be able to use the infrastructure implementation as a tool to address poverty. This means that outsiders should be given timeframes to transfer knowledge to the indigenous groups.

The South African economy expanded for 20 consecutive quarters - the longest period of continuous growth for over fifty years (Manuel, 2004). This growth is a result of the general consolidation of policies that have been put in place after the first democratic elections in 1994. Although the current financial crisis has affected growth, South Africa is to a certain extent shielded from its effects by amongst others its infrastructure expenditure. According to the South African State of the Nation address, Motlanthe (2009), the South African government would increase its public investment programme whose value is R690 billion for the next three years. However, the national projected expenditure is dampened by the shortage of skills. According to the Business Group Secretariat (2004), the Construction sector is at its lowest level of capacity since the early 1960s. The explanations are many and varied. The Construction Industry Development Board (2004) gave the aspects of capacity erosion within the industry as:-

- The low tech image of the industry together with deteriorating profitability which is discouraging bright young people from entering the built environment professions preferring the “lifestyle” careers in the Information Technology and financial services sector.
- The potential intake to tertiary education is restricted by the low percentage of matriculants with higher grade in mathematics and science.
There is a direct correlation between skills and jobs, Behar (2006) reported that most skill types complement unskilled labour such that a rise in skill supply would boost demand for unskilled labour. Thus the provision of work and the presence of skills can be regarded as two sides of the same coin. However, the greatest concern is the fact that a high standard of quality in major engineering and commercial work is reliant on an aging skills base, with much of the industry’s activity lying on semi-skilled workforce (CIDB 2004).

2.3 Shortage of Skills within South African Skills Sector and Government State Owned Enterprises

The South African local government which is represented by the District and Local Municipalities has recently seen an increase in community protests due to the lack of service delivery. There might be a correlation between these and the acute shortage of skills in this sector. Lawless (2005) who conducted a study in the local government sector found that there are no civil engineers, no technicians employed in 34% of South Africa’s local municipalities and 9% of district municipalities, and only 19% of local municipalities and 53% of district municipalities have at least one civil engineer.

The Eastern Cape Department of Public Works (2005) in South Africa is operating at about 29% capacity with respect to professionals from the built environment such as Architects, Civil Engineers, etc and 38% with respect to artisans such as bricklayers carpenters etc. The worst affected areas are those from the poorest and rural regions who were close to 2% capacity and 0% in professionals and artisans respectively. Various advertisements on vacant posts have yielded no response from the built environment professionals. In the midst of these shortages, Public Sector entities such as the Coega Development Corporation, which has attracted over $30 billion dollars in investment, (Coega, 2005) indicated that it is in dire need of some 16 000 artisans.

The shortage of skilled personnel requires that government has to acquire the planning capacity elsewhere to fulfil its mandate. Although there has been dwindling of skills in general, some of the skills have moved to the private sector, hence the logical need to use consultants to complement government. Watermeyer et al (2009) (quoting Terblanche (1971) and Lawless (2005) compared the distribution of engineers and technologists in South Africa in 1967 and 2005 as shown in Table 1. as follows:-

Table 1: Change in distribution of technologists and engineers in South Africa over time
The lack of skilled personnel and the enormous task of ensuring service delivery mean that infrastructure projects are largely planned and conceptualized by consultants as Table 1 suggests. The disadvantage of this is that the government might lose its strategic control as consultants might prioritize what is best for them. The other aspect is that consultants are not individually involved at high level planning as the socio-economic aspects are conceptualized at a political and government level, where Consultants are not represented.

To mitigate against this challenge, it has to be realized that the outcomes of the measure of any objectives are determined at the planning level and reflected at the reporting level. What is not measured cannot be achieved. Mbande (2004) states that the challenge facing the Eastern Cape Government, South Africa is that although policies are in place, there is no effective prescribed monitoring and reporting mechanism. This denies the policymakers the opportunity to review the information that ought to come out of projects and to revise and align their objectives and targets. As a consequence, the Eastern Cape Provincial Treasury (2004) prescribed to accounting officers and authorities throughout the provincial government that they should provide the Treasury with monthly reports in a prescribed format as part of measuring the fulfillment of their objectives. To ensure that consultants align their work to achieve government objectives, government has to define the end state by prescribing a standardized reporting format/template. The role of government would thus be to articulate its objectives, define the key performance indicators and prescribe the frequency and the template on how it requires the information to be outlined.

However, reliance on the use of Consultants should be temporary, government in general has to use its budget and buying power place and mentor students as part of experiential training to build their capacity.
2.4 Capacity Constraints in the Construction Sector

According to the CIDB (2008), the South African Building and Investment sector employs about 450000 people in the formal sector and 320000 people in the informal sector, which amounts to R158.6 million per year. The recognition of the ability of the construction sector to create more jobs is recognised by the President of the United States of America who promised to develop more Public Works programmes to create more jobs (Allen and Martin (2008). Milford et al (2008) noted that the South African construction industry is characterized by a few (5% of the total number of companies) reasonably large, internationally competitive companies which are currently undertaking about 84% value of the public sector construction work in South Africa. According to the CIDB (2007), the black or indigenous ownership is largely in lower construction Grades 1 to 6 that share about 16% of construction work value which calls for measures to transform the industry by developing more indigenous contractors towards a higher grading. Comparing with other countries, Watermeyer (2004) reported that the activities of black Zimbabwe contractors accounted for less than 1% of the construction work available 10 years after independence, despite measures being adopted to provide contractors to such contracts. The South African Construction Industry has to develop strategies to ensure that the bottom level contractors that are largely black owned are developed to move to the top so as to be able to share the large part of the construction budget. A large effective contractor base will increase competition, thus reducing the cost of implementing infrastructure. This capacity constraint has to be addressed as part of socio-economic considerations. Watermeyer (2001) reported that targeted procurement, a system that utilizes procurement as an instrument of policy which provides employment and business opportunities to target groups and labour based which describes production processes and technologies that are designed and managed so as to promote employment creation with predetermined socio-economic benefits, should be used to develop and create contractor base that is largely indigenous. These targeted procurement and labour based will optimize employment and capacity building to target groups such indigenous people, women and youth as part of meeting the MDG indicators.

The Economic Commission for Africa (2004) reported that Africa’s poor labour force, which is not very healthy and not well educated, is a major source of its low competitiveness. Lawless reported that HIV/AIDS has largely affected both the semi-skilled and unskilled labour force in South Africa. This calls for decisive actions to be taken to counteract the effect of HIV/AIDS and general education by the Construction Industry to
systemically complement the national education and health strategies. The South African government has developed HIV/AIDS specification (www.dpw.org.za) as part of construction which should form part of any construction work, in meeting the MDG goals.

While Askari (2004) noted that the problems of today’s developing economies are poverty, financial instability, debt and institutional deficiencies of monumental proportions, it can be concluded that regarding infrastructure, these institutional deficiencies relate to the skills shortages, employment creation, unhealthy workforce, lack of contracting and consulting ability, which any infrastructure funding donor has to address within the MDG framework.

3. METHODOLOGY ADOPTED IN THE PAPER

The approach adopted in this paper is based on reviewing some case studies. These studies are covered below briefly:-

(a) The Eastern Cape Department of Public Works (DPW) placed 422 students that passed the national qualification authority standard N2 in bricklaying, Carpentry, Painting, Electrical Engineering, Mechanical Engineering from Further Education and Training (FET) colleges with its own teams over a period of two to three years to develop them to full time artisans. The aim was to train, mentor and take them to the government skills testing centre in Olifantsfontein, Gauteng Province, South Africa.

(b) On the other hand, Coega was responsible for developing 50 contractors as part of an Expanded Public Works Programme (EPWP). The students got in the programme through advertisements as per the DPW guidelines DPW (2004) on targeted procurement. No involvement in infrastructure or contracting was required from the students. After short-listing and writing of the tests, the students were trained for two months in technical, administration, financial and the regulatory environment using the Construction Sector approved syllabus. They were then each awarded contracts initially of about R1.5m in Phase 1 building a three classroom block, an admin office and a storeroom. The students were promised that those who performed better would be given bigger programmes of R2m and R10m work in phase 2 depending on their phase 1 performance which was based on labour Intensive methods and technologies for intensive construction works (www.cidb.org.za) that included HIV/AIDS specification (www.publicworks.gov.za). During construction, monthly meetings were held between each contractor with a panel from Coega Development Corporation, Mentors, Consultants and Training Providers. The Consultants would present their reports based on technical, scope, time and ability to
take and execute instructions and quality to the meeting. The mentor would also present their separate report based on finance, quality, and administrative ability. The Training Service Providers would present their report based on contractor translation of the training syllabus to work. The contractor would be given the chance to respond to the assessment and do his/her assessment. An agreed scorecard where each participant with the exception of the contractor would score was developed and amended from time to time. The four scorecard categories are summarized as follows:-

- Business Administration that outlined the general business and site administration, adhering to the Regulatory environment such as Occupation Health and Safety Act (OHS), taxes, etc.
- Financial management that included understanding and implementing measures to ensure that expenditure is within the timeframes, less reliance on overdraft, understanding and knowledge of profit areas and actions taken to on site to improve/optimize the financial situation.
- Project management which included quality, interpretation of drawings, managing the foreman and general implementation of technical aspect of the project on site.
- The overall performance regarding progress on site which included the contractor's ability to take instructions, continuous improvement compared to the previous assessment and time spent on site. This assesses whether the contractor can be able to execute work if it were to be left on its own.

The panel graded each contractor according to poor, fair, good and excellent. The panel agreed that a candidate would score say $\frac{3}{4}$ (3 being scored as poor, fair, good, excellent in three categories out of 4 categories, then the candidate is poor, good, fair, excellent). Any scores in between would be extrapolated and the panel would agree on the nearest score.

(c) A standard reporting template that was issued in terms of Eastern Cape Treasury Notice 38 of 2004 was adhered to in the monthly monitoring of the projects. Monitoring included two site meetings per month and a compulsory monthly monitoring meeting. The Consultants reported as per the template on progress regarding budget/expenditure, Time, Quality and socio-economic aspects including employment regarding the gender/youth, training on HIV/AIDS and Occupational Health issues, progress on EPWP contractors, and placement of FET College and University students on a monthly basis. The prescribed templates were such that both the Consultants and Contractors had their own reports with the Contractors submitting names of people employed and trained including wage rate per day, age, gender and disabled. The Consultants reported on numbers.
employed, trained and placed students in addition to Time, cost and quality. These reports were monitored, evaluated and acted upon by the panel.

4. RESULTS OF THE METHODOLOGY ADOPTED IN THE PAPER

4.1 Placement of FET College Students and Professionals

Bricklayers constituted about (38%) of the placed students, followed by carpenters (28%). These are from the fact that Eastern Cape, South Africa is a rural Province. The people who chose these trades do so on the understanding that they would not only depend on formal jobs, but would also be able to be contracted by individual families to build their rural houses.

The plumbing (14%) and electrical (9%) enrollment can be explained by the fact that these services are beginning to be widely needed by both the urban and rural communities. The South African government has since the advent of democracy ensured that rural communities have access to water and electricity. It is then on the understanding that this infrastructure will need to be serviced and repaired, hence it is anticipated that there will be a growing demand of these services.

About 13 percent of students absconded/resigned students which could be attributed to the lack of proper supervision by the Department of Public Works (DPW), lack of powers by the regional staff as the disciplinary issues are handled at Head Office which is not as fast as it would be required regarding disciplinary issues. The lack of mentoring skills by Department of Public Works supervision staff also contribute to the disillusionment of the students.

The high failure rate (97%) of these students can be attributed to the fact that the students have been placed in projects for two years instead of the three planned, lack of systemic mentoring, non-alignment between what is taught at the college and lack of equipment and requisite skills at such colleges amongst others. While the lecturers are trying, these colleges are rural; as such they struggle to attract many senior experienced lecturers. Some of these students arrive at the DPW depot, unable to identify equipment they are supposed to use. The lack of mentoring skills at the DPW due to the fact that the experienced artisans that are responsible for the students have never been trained as mentors and there is misalignment between what is expected at Olifantsfontein (where students are tested) and what is thought at FET Colleges also contribute to the failure rates. A closer look at the qualification of those who have passed
indicate that they have on average passed grade 4 at least, meaning that the qualification for work purposes need to be raised from N3.

The major concern is that despite the fact that these students passed some six months to a year ago, only one is employed points to systemic issues within the South African economy. In the light of the pronounced lack of skills in the economy, 29 artisans should have been employed by now. An urgent marketing drive is needed to ensure that this happens.

The students at Coega have just been placed over the past six months, thus no meaningful analysis of their progress will take place.

4.2 Contractor Development

The results of contractor analysis taken in July 2008 and December 2008 are as follows:-

4.2.1 Effect of Contractor Grading

The monthly grading of contractor learners resulted in them competing with each other leading to innovation. For instance, one of the learner contractors motivated by the desire to increase productivity and achieve excellent results used to buy bread for his employees every Monday after there had been a payment on the previous Friday. This was done in order to lure his workers back to work on a Monday, otherwise they normally would commence on Tuesday. It soon became clear that the foreman was playing a critical role in the business. This led to the contractors spending more time looking for the right foreman, sometimes giving offers to foremen from large construction firms. One contractor terminated the services of about three foremen in a space of four months, until she was satisfied about their performance. This assertion of her authority and ownership of activities on site became the norm on every site. As a result, on average contractors assessed as excellent increased from 14 to 26 percent in July and December 2008 respectively.

There was a good correlation between a good foreman and the progress/quality of work. There was also a correlation between the Consultant and the performance of the contractor. Consultants that were not spending more time on site in guiding the learner contractor had their contractors scoring lower than those that were spending more time assisting the learner contractor. As some of these areas are remote, there was a noticeable tendency of some consultants not spending more time on site in these areas. It was easier for contractors closer to Consultant and mentor’s offices to continually visit the consultants and mentors, than those who were in remote areas. This called for extra efforts to be put in place.
and a consultant scorecard be developed that would be graded by contractors.

4.2.2 Male and female performance

Overall, about 30 percent of contractors were female. While there were no discrimination practices, the low level of entry for the female contractors could be attributed to the past history of dominance by males in the construction sector. Although there had been a deliberate minimum prescription of female involvement in the programme, not many women were accepted. Moving forward, the government need to make a deliberate effort to make the programme biased towards women. Of these female contractors, 7 percent attained excellent results as opposed to their male counterparts who obtained 49 percent. Overall, the female performances were 20 percent poor as opposed to 9 percent of their male counterparts. However, 73 percent of the female contractors were considered good as opposed to the 34 percent of their male counterparts. This indicated the ability to learn faster when given tasks. This trend was consistent in Business Administration where 13 percent of female and 19 percent of males were considered excellent. An overwhelming 80 percent of female contractors were considered good as opposed to 40 percent of male counterparts in Business Administration. In project management, the trend continued as in overall approach and business administration where 7 percent of female contractors were considered excellent as opposed to 46 percent of males. Overall, 67 percent of females were considered good as opposed to 43 percent of their male counterparts, while 13 percent of the female contractors were considered poor as opposed to the 9 percent of their male counterparts. In conclusion, the female contractors tended to crowd around being good as opposed to their male counterparts that tend to be consistent in being good and excellent. The largely overall good effect (between 67 and 80%) of females can be explained by the fact that not many of them were familiar with the construction work. Thus, learning has been gradual as opposed to the male counterparts that have been in the construction business for a longer period. The reason for the large number of male contractors in the good/excellent category can be attributed to their choice of qualification and work. About 70 percent of male contractors had a post matric qualification from the built environment as opposed to the 50 percent of their female counterparts. Also, 28 percent of male contractor’s previous employment was from the built environment as opposed to the 17 percent of their female counterparts. The technical qualification from the built environment and previous work within the construction sector probably explains the reason why so many male contractors are within the excellent
and good category as opposed to their female counterparts. It is recommended that the development of both the male and female contractors should largely be drawn from those whose qualification and/or exposure is from the built environment.

4.2.3 Qualifications and Previous Place of employment

Overall, 52 percent of contractors had post matric qualification from the built environment of which 42 percent were assessed as excellent, 50 percent good and 8 percent poor. This means that when choosing to develop contractors, the success rate is likely to depend on whether the individual had access to technical education and exposure. Of the 16 percent contractors that had post graduate qualification that was not from the built environment, 25 percent excelled, 50 percent considered good and 25 percent were considered poor. Those who did not have the technical background would be considered to be less successful than contractors with technical background as they are not familiar with construction; however, those with the post graduate qualification not from the technical field have shown to be fast learners judging by the 50 percent that are considered good and 25 percent excellent.

On previous employment, 22 percent were emerging contractors, of which 45 percent were considered excellent, 36 percent good and 18 percent poor. The results on excellent and good from previous emerging contractors are considered low considering that these contractors had run their businesses before and should actually be better. The explanation for the low score might lie in the fact that most of them might had just registered their businesses and as such were at Grade 1 of the CIDB before being taken in the programme. The other explanation is that those who were excellent were not getting the opportunity as the Grade 1 CIDB level is crowded, thus not allowing those with potential to express their full potential. The 45% excellent score is the highest in the whole sample followed by those who were previous employees with technical experience that constituted 18 percent of the total contractors. In this group, overall 44 percent achieved excellent results, 56 percent were good and 0 percent poor. This is largely because 78 percent of this group had a technical post matric qualification. These results are expected from a group that had familiarity with construction as employees. Considering further analysis, 55, 27 and 18 percent of those with emerging contractor background were considered excellent, good and poor respectively in Financial Administration compared with 56, 33 and 0 percent of those who were employees with technical experience with excellent, good and poor. Yet, contractors who were unemployed constituted 14 percent of the sample
and those who were employees without any technical qualification constituted about 12 percent. Those who were unemployed were 43 percent excellent, 43 good and 14 percent poor. The reason for positive nature of these results is that 86 percent of the unemployed had a technical post matric qualification compared with 14 percent who had a non-technical post matric qualification. This also indicates that action needs to be taken to deliberately place and nurture the technically qualified unemployed graduates as their potential lies dormant. For a country that has committed R700 billion on infrastructure, with a skills crisis, the unemployment of graduates from the technical field cannot be justified. The overall score for those who were employees without any technical background was that 17, 50, and 33 percent were considered excellent, good and poor respectively. This means that for the future plans, any contractor development has to be biased towards those with the technical qualification and those that have worked in technical jobs.

4.3 Socio Economic Aspects as part of Standardized Reporting on Infrastructure

The results of the 50 schools that Coega has implemented are outlined in Table 2 as are as follows:-

Table 2: Employment in Coega schools which included 46 schools that are distributed among the 50 learners

<table>
<thead>
<tr>
<th>Category</th>
<th>No of employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>People Employed</td>
<td>1502</td>
</tr>
<tr>
<td>Women employed</td>
<td>375</td>
</tr>
<tr>
<td>Youth Employed</td>
<td>738</td>
</tr>
<tr>
<td>Disabled People</td>
<td>23</td>
</tr>
<tr>
<td>Training – HIV/AIDS and OHS</td>
<td>1033</td>
</tr>
<tr>
<td>FET/University Interns placed</td>
<td>54</td>
</tr>
</tbody>
</table>
Out of a total of 50 schools, about 25 job opportunities were created per school. The employment of women, youth and people with disabilities, although they are outstripped by men, needs to be encouraged. The monthly monitoring meetings provided a platform to advocate for their inclusion and to question and address the traditional indigenous stereotypes some of which stated that women are unable to push wheelbarrows etc. The HIV/AIDS training also provided another front to tackle this scourge. In deep rural areas, the contractors encouraged foremen especially those that are affected by HIV/AIDS to open the day by preaching to the workers about HIV/AIDS. The HIV/AIDS training given on site workshops included teaching workers how to use condoms. However, the message given on site needed to be the same as the clinic, thus a two hour visit by the nurses to the site was encouraged and pursued.

The use of targeted procurement has ensured that the 50 contractors from the indigenous population are fully fledged businesses, while artisans and students from the built environment get practical experience to take over the construction industry. About 13 percent of them stand ready to move to higher grades due to their excellent results, and this is possible due to targeted procurement.

The use of Labour intensive and HIV/AIDS specifications have also ensured the optimum job creation for both men and women with gaps such as stereotypes regarding women working on labour intensive projects and gaps between the HIV/AIDS messages on site and in clinics identified and acted upon. These contribute in meeting the MDG indicators on employment equity and HIV/AIDS.

The statistics in Table 4 is possible as all the projects used a standard reporting template which covered Budget expenditure, cash flows, time, quality and demographic information such as people employed according to youth, women and disabled as well as people trained. On the other hand the contractor template had information that had the names of people, their age, gender and wages paid. This also covered project related information and was enforced by the tender approach which stipulated that if the report is not submitted there would be no payment. It is in this context that the enforcement of reporting ensures that everyone focuses on reporting on the outcomes of the objectives.
5. CONCLUSIONS AND RECOMMENDATIONS

Achieving MDG’s has many dimensions; multi-faceted interventions are required to achieve them. Plans at achieving these targets have increasingly become tied to access to skills development. The development of technical skills provides such a conduit. It pushes policy makers to design interventions that uplifts society

This involves –

- identifying infrastructure gaps that affect the development of society
- deciding on specific steps to mobilise skilled resources
- development of Small Medium Enterprises and
- removing the obstacles that prevent society from achieving MDG’s

The poverty that the global community is grappling with manifests itself in many ways such as the lack of requisite skills. While there are positive news relating to the fact that investment exceeded foreign aid in Africa, the infrastructure investment is still implemented by foreign workers. The lack of skilled personnel in South Africa within and outside of government is a barrier to the ambitious plans by the government that has declared its intentions to invest in infrastructure. This also affects the planning and implementation of government programmes which necessitates that Consultants be involved as they have the resources and capacity in planning and implementation. The challenge with the Consultants is that they do not have the political insight and as such their assistance might not help in achieving the intended objectives. To counter this it is concluded that the authorities dictate the reporting templates that defines the end state. It is also concluded that the use of Consultants should be seen as a temporary measure while the government is developing its own requisite skills.

The challenges that confront organs of state requires them to use their resources, buying power to develop the requisite skills in the short, medium and long term to ensure that they meet their objectives, while addressing the poverty issues. The MDGs provide a framework for the global community to address poverty. The Eastern Cape PGDP is aligned to the MDGs, and it can thus be concluded that its fight against poverty is part of the global effort.

It is concluded that the process of developing infrastructure should not only be the physical product, but students such as those that are artisans and those from Universities should be placed in infrastructure projects under experienced and trained mentors until they qualify as professionals. The development of contractors together with skills development, and the employment of the targeted groups, the training of the workforce in
HIV/AIDS can be done simultaneously in one project. Contractor development candidates for both men and women have to be largely drawn from people who have had technical qualification and/or exposure to construction related activities as their chances of success are greater. It is concluded that this approach can address the challenges confronting the infrastructure provision while addressing the issues of poverty in contribution to the Millennium Development Goals.

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Improving Workmanship in the Low-Cost Housing Sector by Reintroducing the Artisan/Skilled Workers Trade Test of Yesteryear

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ABSTRACT AND KEYWORDS

Purpose

This research study investigates the problems arising from poor workmanship in construction phases of low-cost housing projects, proposing solutions which can address and reduce these problems.

Design/Methodology/Approach

A literature study was done but, confined to factors influencing quality of workmanship including factors as time and cost in the low-cost housing sector. In addition to this a questionnaire survey was conducted on purposive Further Education Training (FET) Colleges, construction companies and a professional in the Built Environment based in the Western Cape regions. The respondents were chosen due to their continuous involvement in the low-cost housing sector.
Findings

It was revealed that there are limited skilled workers in the construction industry (low-cost housing) at present. Consequently time, cost and ultimately quality related goals are difficult to achieve. Findings suggest the necessity of trade test of yesteryear for skilled workers.

Research Limitation/Implications

The survey was completed on three FET Colleges and two construction/housing companies and a professional of the Built Environment. However, there were time and logistical constraints, for example meeting each role player at a certain time and certain place was not always possible. This played a huge role in completing two of the surveys.

Practical Implications

The research study brings fourth to the low-cost housing sector as well as the construction industry as a whole, that by increasing the percentage of skilled workers, goals such as time, cost and quality could be easily met.

Originality/Value

The study illustrates that by implementing the trade test of yesteryear many problems experienced with poor workmanship in the low-cost housing sector, such as continued remedial works due to unskilled (makeshift) artisans will be eliminated thereby enhancing time, cost and quality goals.

Keywords

Cost, Low-cost housing, Time, Trade Test, Workmanship.

1. INTRODUCTION

Housing delivery and quality are two of the challenges faced in Southern Africa. Croome and Sherratt (1977) understood quality as a degree of excellence of a product. However, Barrie and Paulson (1984) viewed that quality assurance is considered generally to be a broader, more nearly all-encompassing term for the application of standards and procedures to ensure that a product or facility meets or exceeds the desired performance criteria. Powell (1976) further mentioned that quality in housing construction demands functional soundness and also demands subjective acceptability for it to be a marketable product.
According to Loots and Japie (2010) the construction trade testing of yesteryear brings fourth the word quality at its best. In addition it is mentioned that trade testing programmes such as Accelerated and Shared Growth Initiative for South Africa (Asgisa), Construction Education and Training Authority (Ceta) and Sector Education and Training Authority (Seta) were done in the 1970-1980s generating better skilled workmanship who in turn would produce a good end product. Presently, when focusing on low-cost housing within South Africa, it is evident that there are many threats to the workmanship and quality being produced. Arguably, factors affecting quality in low-cost housing are as follows:

- Housing backlog,
- Time constraints to house people adequately which give rise to overnight artisans and skilled labour being produced to accommodate the housing backlog and also community involvement, this intern gives rise to,
- Cost implications concerning the employment of skilled labours.

According to Griffith (1990) and Levey (2002) quality assurance within the construction industry was fraught with difficulty taking into consideration the skilled labour shortages. Arguably, the relatively unique aspect of each construction project and its temporary nature make the continuity and development of approach across projects far from easy. Griffith (1990) further postulated that quality assurance should try to address science and technology aspects of construction as well as manage the physical and psychological aspects of the human element. Therefore, quality assurance in construction represents a complex socio-technical managerial challenge (Griffith, 1990). In order to overcome these challenges, considerable efforts need to be made to achieve perfection at the very first attempt (Bennett, 1991). By focusing on the quality of the skilled workmanship and the conformance to low cost housing, quality to the constructed facility would be made possible (Barrie and Paulson, 1984). The purpose of this research study was to investigate whether a systematic focus on skilled workmanship in low cost housing projects can result in effective quality assurance hence an improved product.

2. REVIEW OF THE LITERATURE

2.1 Time

Time is a pivotal factor in everything that we do each and everyday of our lives. When considering the backlog in housing delivery in low cost housing in the Western Cape it is quite evident that time had aggravated the situation. South Africa's housing backlog has grown from 1.5 million in 1994 to around 2.1 million currently, meaning as many as 12 million South African households are living in substandard housing.
Africans, almost a quarter of the population are still in need of better shelter (Reuters, 2010).

In the low-cost housing sector this aggravation is vastly affected by the unskilled workforce and quality of housing delivery. Short courses currently being introduced for artisans and apprenticeships would be the measure to mitigate the pressures on time frame backlog for housing delivery (Loots and Japie, 2010). These courses however can be directly compared to those of yesteryear and comparisons based on quality of housing delivery can be distinctly made. The efficiency of these currently provide courses is not of a good standard. This is due to the syllabus of these courses being broad with very little time allocated for completion. Ultimately it gives rise to artisans and apprenticeships who are not as competent as those who spend more time covering and attaining the knowledge and practical experience which a full course provides. The time periods for short courses are 3 weeks whereas full-time courses cover a years’ activities (Loots and Japie, 2010).

Chan and Chan (2004), postulated that time in the construction industry refers to the duration for completing the project. It is scheduled to allow the building to be in use by a date determined by the client’s future plans. In addition time is related to effectiveness, which in construction refers to how well the project was implemented or the degree to which targets of time and cost were met from the start-up phase to full production. Ashworth and Hogg (2002), indicated that project duration or completion dates may be critical to the success of a project, and in some situations if these dates are not met due to time constraints and poor workmanship, it could lead to total failure in meeting the client’s objectives and affecting the quality in the final product. Ashworth and Hogg (2002) further state that while most clients desire early building completion, it is important to distinguish between this and true need since attempting to meet the objectives of early completion is likely to have consequences such as poor workmanship which is detrimental to the success of a project. In conjunction with this, unrealistic deadlines and bonus work encourages workers to rush their jobs, which often leads to unnecessary mistakes or skimping on standards (Douglas and Ransom, 2007). In general, clients could have the highest standards specified for their projects but through time constraints which contribute to poor workmanship; this will bring about a low quality product (Sawczuk, 1996).

2.2 Cost

In all walks of life, money or finance is a necessity. Arguably, unskilled labour and poor workmanship are influenced by the finance provided for a project. Taking the low cost housing situation in the Western Cape into consideration it is evident that many government tenders are won by relatively well established construction companies, which in turn utilise
unskilled subcontractors (makeshift artisans), unskilled labour and community members to compile the finished product, at the same time exploiting them by means of underpaying them (Loots and Japie, 2010). Loots and Japie (2010) lamented that such a situation creates an environment that prevents skilled artisans who are able to deliver a better quality product to get access to work. Oakland and Marosszeky (2006) mentioned that when manufacturing a quality product, providing a quality service, or doing a quality job – a product with a high degree of customer satisfaction - is not enough. The cost of achieving these goals however must be carefully managed; so that the long-term effect on the business, be it construction, is a desirable one. These costs are a true measure of the quality effort.

Sawczuk (1996) argued that when reducing cost in any construction project, workmanship and ultimately quality is compromised. Ashworth and Hogg (2002) however postulated that if a limited capital budget is the prime consideration of the client, then the quality in the form of reduced specifications as well as workmanship is likely to be restricted. If the client’s cost increases, a higher standard of workmanship will be specified (Ashworth and Hogg, 2002).

Regular cost reports should be produced throughout the construction stage of the project. From these, potential overspending can be identified before it occurs and corrective action taken. The client should however recognise that such corrective action is not always beneficial since it is likely that cost savings can be made only by a reduction in standard which includes a lower standard of workmanship (RICS Foundation, 2002).

2.3 Quality

The word quality has many meanings: a degree of excellence; conformance with requirements; fitness for use; delighting customers; freedom from defects; lack of imperfection or contamination (Hoyle, 2006). Chan and Chan (2004) defined quality as a totality of features required by a product or service to satisfy a given need (“fitness for purpose”). However the way in which quality is determined is by the extent to which a product or service successfully serves the purpose of the user during usage not just at the point of sale. Price and delivery are both transient features, whereas the impact of quality is sustained long after the attraction or the pain of price and delivery has subsided (Hoyle, 2006). Nowadays, quality is the guarantee or an assurance that convinces the customer or the end-user to purchase or use a product. The conformance with specifications matched with good workmanship is one way of measuring quality. Unfortunately, construction work is these days done at a quicker pace and at a tighter budget. These two factors exert tremendous pressures on the industry itself, more so the low cost housing sector in the Western Cape. It causes many loopholes in this area such as: unskilled workforce due to
constant demands, payment exploitation and most of all quality deterioration. According to Loots and Japie (2010) these concerns can be solved by better time management of tenders being awarded by government, generating the availability of more time allocated to apprenticeship programs at the same time producing skilled artisans as it was a couple of years ago. Loots and Japie (2010) further warned that it might put strain on the housing backlog that the Western Cape and South Africa is currently faced with, but ultimately quality price and skills cannot be jeopardized. Quality trade testing should be done as it was yesteryear.

3. METHODOLOGY

The data for this research was collected using primary and secondary sources. A semi-structured interview was adopted. A semi-structured interview consists of setting central questions in which the conversation will be articulated and other questions are posed for clarification as the conversation goes on. A questionnaire was intended to collect facts and perceptions of respondents vis-à-vis the quality status of low cost houses. A non-random sampling method was used to select respondents, specifically a purposive sampling. A purposive sampling consists of handpicking supposedly interesting people a researcher thinks know most about the subject under investigation. Respondents were from Further Education Training (FET) colleges, employers from construction/housing companies and professional in the Western Cape Province. Respondents to these interviews were the most appropriate candidates due the fact that they are currently involved with the development of low cost houses within the Western Cape Province. These respondents served as suitable candidates mainly because they are knowledgeable witnesses in this sector.

4. FINDINGS

Table 4.1 shows the research participation. All respondents concurred that the Western Cape low cost housing sector is threatened with by lack of quality workmanship. A common reasoning is that the Western Cape possesses many incompetent labour forces, and labour forces which are either semi-skilled or not skilled at all. The respondents also based their opinions on experience gained from short-courses offered to those learners (Labour) who wish to become skilled through their training. This however is done on a fast track basis not allowing the individuals to gain experience in their fields of expertise. This situation generally creates a problem when it comes to the quality of the end product produced (Low-Cost House).
Table 4.1 Participants

<table>
<thead>
<tr>
<th>Institution</th>
<th>Occupation/Position</th>
<th>Number of Respondents</th>
<th>Percentages</th>
</tr>
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<tbody>
<tr>
<td>FET College 1</td>
<td>Lecturer</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>FET College 2</td>
<td>Lecturer</td>
<td>2</td>
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</tr>
<tr>
<td>FET College 3</td>
<td>Lecturer</td>
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<td>10.0</td>
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<tr>
<td>Construction company 1</td>
<td>Contracts Manager</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>Construction company 2</td>
<td>Site Agent</td>
<td>2</td>
<td>20.0</td>
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<tr>
<td>Professional in the Built Environment</td>
<td>Quantity Surveyor</td>
<td>1</td>
<td>10.0</td>
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<tr>
<td>Total</td>
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</tbody>
</table>

In Table 4.2 respondents were asked whether the systems put in place for trade testing are sufficient systems allowing for quality workmanship outcomes on a 5 point Like scale where 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Disagree. A mean of 2.9 represented the outcome of this question. The majority of respondents, who had a neutral response to the question, justified their answer by stating that the trade testing system at present has not really changed from that of yesteryear. However, it has not shown any signs of upgrading itself with modern day developments taking place in the low-cost housing sector within the Western Cape. Respondents felt the need for trade testing facilities and systems to be updated in accordance with the demand for low cost housing delivery. This is giving rise to better skilled labour, artisans in today’s busy low cost housing sector.

Table 4.2 Efficiency of systems put in place for trade testing

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>10.0</td>
</tr>
<tr>
<td>Neutral</td>
<td>9</td>
<td>90.0</td>
</tr>
<tr>
<td>Agree</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

**Mean** 2.9
In Table 4.3 respondents were asked whether the old trade testing programs, with updated data are to be reinstated on a 5 point Likert scale. A mean of 3.9 represented the outcome of this question. A common reasoning for the respondents’ choices were that with the old trade testing system/programs, learners spent most of their time at institutions for trade testing. These days learners are more site orientated, exposed to more practical work, but at the same time possess lacking theoretical background and also being misled how to accomplish short-cuts in the trade they need to master. It was also found that these days learners (labour) on site working towards their trade are more production orientated, due to the pressures exerted on them by main contractors which in turn are pressurised by government for service delivery. This generally causes a lack of quality in the workmanship towards the end product (low-cost housing developments).

Table 4.3 Reinstatement of old trade testing programmes

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Neutral</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>Agree</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td><strong>100.0</strong></td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td></td>
<td>4.1</td>
</tr>
</tbody>
</table>

In Table 4.4 respondents were asked whether time constraints impact negatively on the workmanship quality in the low-cost housing sector within the Western Cape on a 5 point Likert scale. A mean of 4.3 represented the outcome of this question. A common reasoning for the respondents’ choices were that currently low-cost housing within the Western Cape became more production orientated placing the quality of workmanship as second to best. This reasoning is also justified by the current housing backlog within the province and the time constraints put in place to alleviate the backlog which the province is currently facing. With this findings it is also noted that due to the time constraints controlled by government pressure has been placed on the housing/construction industry making situations much more hectic due to the shortages of skilled workers and the forceful implementation of community involvement in the low-cost housing areas.
Table 4.4 The impact of time on workmanship quality within the low-cost housing sector in the Western Cape.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Neutral</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>Agree</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td></td>
<td>4.3</td>
</tr>
</tbody>
</table>

In Table 4.5 respondents were asked whether cost implications affect the workmanship qualities in the low-cost housing sector within the Western Cape on a 5 point Likert scale. A mean of 4.3 represented the outcome of this question. As for this figure a common reasoning from the respondents’ choices were that, government does not provide descent subsidies to contractors for building and developing the low-cost housing sector within the Western Cape. This in turn causes contractors to underpay their subcontractors (artisans-skilled labour). Further more no interest according to the respondents would be generated by these subcontractors and other youth members to attend and complete proper trade testing programs if the compensation remains the same. Another common reason that is found from the responses received is that if government continues to produce such small subsidies, more and more inferior products/materials are likely to be used.

Table 4.5 Cost implications

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Neutral</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>Agree</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>5</td>
<td>50.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td></td>
<td>4.3</td>
</tr>
</tbody>
</table>
5. CONCLUSION

The results indicated that the reason for poor workmanship qualities in the low-cost housing sector within the Western Cape, is due firstly to government which is under pressure by the housing backlog that the region is facing. In turn this places a lot of pressure on the housing/contracting companies which rely on labour force employed by them. This backlog is ultimately the cause of time constraints placed on the low-cost housing sector in general, generating semi to unskilled labour and poor quality works. This can is illustrated by the figure below.

Figure 5.1 Pressures being exerted on the various parties

Figure 1 gives a representation of the pressures being exerted on government due to human settlement considerations and backlog in housing. In turn Government exerts pressure on the Construction/Housing Companies for quicker service delivery. The diagram also illustrates the pressures exerted on Further Education Training FET Colleges for shorter
courses in order to contribute to the quicker service delivery of these Construction/Housing Companies. Findings also indicates how cost implications play a role in the poor workmanship qualities that is experienced in the low cost housing sector within the Western Cape. This can be illustrated by Figure 2.

**Figure 5.2** Low Government Housing subsidies producing cost cuts and poor workmanship quality.
All in all it is quite evident that both time and cost factors affect the workmanship qualities in the low-cost housing sector within the Western Cape. It is also quite noticeable how these two factors influence the Further Education Training (FET) Colleges and their implementation of short courses giving rise to overnight skilled workers and artisans. While the government cannot ignore the need to house people adequately due to tight time frames, more time should be set aside to train labour in the low cost housing sector adequately so that they are competent enough to deliver a good enough product. In mentioning this, a general view would be to reintroduce the skills artisans/skills workers trade testing program of yesteryear. This should coincide with better subsidies set aside for the low cost developments within the Western Cape, generating more indulgence to housing contractors and sub-contractors (skilled labour, artisans) in order for them to make a living out of the service delivery they provide.

6. REFERENCES


Reuters, (2010) *Government to spend R16bn to build houses*, www.realestateweb.mht, 8:30pm, 03/05/10.


Perceptions of Key Construction and Development Challenges Facing the Construction Industry in South Africa

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University of Cape Town  
Tel: 021 650 3443

ABSTRACT AND KEYWORDS

Purpose of this paper

The aim of this research is to identify the key challenges facing South Africa’s construction industry particularly residential building construction in order to proffer solutions and its implications for development of the construction industry.

Design/methodology/approach

A descriptive survey of randomly selected construction industry participants based in Cape Town was conducted in order to find out their perceptions of the key construction industry challenges. Interviews were carried out with the use of an eighteen-item questionnaire, which had open and close-ended questions.

Findings

It was found out that the key challenges in order of magnitude perceived to affect the Construction Industry in South Africa include: increase in the cost of building materials, insufficient mortgage markets, high interest rates and high rate of enterprise failure/delivery capacity and performance.

Research limitations/implications

The research was limited by the fact that some of the respondents viewed some questions as being sensitive and therefore did not want to comment on them. The fact that the research was based on the perceptions of only
the construction industry practitioners in Cape Town also limited the possible generalization of the findings of the study.

Practical implications

The research has practical implications for both the study of property and construction studies in higher institutions and also practice of the profession in the industry. The research shows that cheaper alternative materials have to be developed specified and accepted by research institutions, construction industry participants and end-users.

What is original/value of paper?

The paper is of value to the South African government, construction industry practitioners and construction and property studies students because it highlights the challenge currently facing the construction industry.

Keywords

Construction Industry Development and Perceptions.

1. INTRODUCTION

The construction industry plays a vital role in South Africa’s economy, being a significant contributor to economic growth accounting for 3.7% of the GDP in 2009 (Stats SA, 2010). This however does not take into account the finance and real estate sector of the economy, which contributed 24.5% to the GDP in the same period (Stats SA, 2010). The industry employs a significant proportion of the working population both formal and informal providing about 3.3% compensation of all formal employees (Stats SA, 2010). Furthermore, it creates many economic opportunities for enterprises, its products have an extraordinary long life span and the construction industry contributes directly to improving the quality of life of all users (Ofori, 2007).

The construction industry tends to be a very volatile sector of the economy because investment spending in construction often has a strong correlation to economic growth and future prospects. When growth is high, there would be a rise in demand for construction products and when there is a downward trend and the economy heads towards a recession, firms and the government invariably cut back on new construction projects and the industry can be hard hit by a slow down (Green, 2008).

As a result of the global economic recession, higher interest rates and tougher lending criteria, there has been a large drop in the property development industry in South Africa, as well as in the rest of the world. Currently, the sector is experiencing the worst downturn of all sectors with building activity in steady decline.
Selected building statistics of the private sector, indicated that the value of recorded building plans passed by the bigger municipalities from January to the end of May 2009 decreased by 24.4%. In the first four months of 2009, the annualized decrease was 30.4%. The largest decrease was reported for residential buildings, followed by additions and alterations and non-residential buildings. The real value of buildings as reported as completed to the bigger municipalities from the same period decreased by 3.2% compared with figures for the same period (January to May) in 2008. This was attributed to a decrease in the real value of residential buildings completed. However, increases were reported for additions and alterations along with non-residential buildings (Ndaba, 2009; Mpofu 2008).

The substantial weakening in the construction sector has had negative effects on material manufacturers, suppliers and contractors involved in the industry. Manufacturers and contractors have reported declines in sales and profit margins. As a result, the construction industry is unable to meet the socio-economic and environmental challenges and demand particularly of the lower income groups (CSIR, 2009).

The image of the construction industry differs between individuals. According to Van Wyk (2004), the industry has a low-tech image and deteriorating profitability. According to him, these two factors have been discouraging bright young people from entering the built environment professions. Also, the construction industry faces several challenges worldwide and in South Africa, these have been identified by Van Wyk (2004) and SA Construction Industry Status Report (Stats SA) (2004) to include: high rate of contracting enterprise failure/delivery capacity and performance, high interest rates, increase in the cost of building materials, external influences ~ the role of government and public sector financial and human capacity, mismatch between available skills and required skills, procurement practices/capacity for sustainable empowerment, globalization, poverty, technology levels, availability of suitable land, availability of infrastructure and insufficient mortgage markets.

According to Ofori (2007), the catalogue of problems, which face the construction industry in developing countries, is well known. However, the aim of this article is to identify the key challenges that are perceived to affect South Africa’s construction industry, particularly residential building construction, in order to proffer solutions and identify implications for construction and property studies education and research.

The importance of the construction industry in the economy of any nation, its ability to provide jobs and to consume materials (both basic and finished) and its significance as a factor of development, has made it justifiable to study the challenges facing it and proffer solutions for its viability. Moreover, since construction has a multiplier effect on the economy of any nation, a well-structured construction industry will be useful in South Africa’s drive for poverty alleviation.

The paper therefore undertakes a review of the challenges facing the South African construction industry, a survey of the perception of...
construction industry participants as to the key challenges affecting the construction industry.

2. REVIEWS OF THE CHALLENGES FACING THE SOUTH AFRICAN CONSTRUCTION INDUSTRY

This topic will discuss the following:

2.1 High rate of enterprise failure/delivery capacity and performance

According to Stats SA (2004), liquidation is one indicator of poor sustainability and the failure rate is unacceptably high. It is evident from the findings of industry performance by the Van Wyk (2004) that the high rate of failure reflects demand volatility and high levels of non-completion. According to this report there has been a long-term decline in profitability in the industry and many companies confirm profit levels as low as 1%.

StatsSA (2004) shows that there was 532 liquidations of construction companies in 2004, 554 in 2001 and 371 in 2002 and over 1400 could not remain viable over the past 2002 – 2004 period. The reasons given for some of these failures included current lack of profitability in contracting, poor management and management expertise and lack of skills at the middle management level. Van Wyk (2003) attributed the cause of enterprise failure to poor management and low productivity. According to him, compared to seven other countries, which were not disclosed, South Africa's productivity remains the lowest.

2.2 High Interest Rates

High interest rates was identified by Van Wyk (2003) as the cause of the difference between the notable increase in the number of building plans submitted and the lower levels of building completions.

2.3 Increase in the Cost of Building Materials

Materials contribute as much as 60% of total project costs. South Africa produces all its own strategic materials and relies on imported plant and equipment. Therefore, increases in material costs manifesting within the industry are a cause of concern. In 2003, it was reported by Stats SA (2004) that increases in material costs exceeded that of inflation with some increases reaching up to 20%.

According to Van Wyk (2003), significant growth in the construction industry is dependent upon price stability in material costs, which have experienced increases exceeding the inflation rate. Certain building material prices were identified as having risen way in excess of even the average building material increases, such as cement building blocks (up
20.5%), ordinary and extended cement (up 14.9%), aggregated crushed stone (up 22.1%), SA pine kiln-dried (up 19.5%), stock bricks (up 15.9%) and galvanised roofing sheet metal (up 31.9%). He stated that the result of these high increases was an average 15.7% in the BER Building Cost Index for year 2002.

2.4 External Influences ~ the Role of Government

Stats SA (2004) reports that since 1994, the South African Government has passed more than 1000 pieces of legislation, which has in turn spawned numerous regulations giving the impression of over-regulation. These laws impact on: tender procedures and procurement, employment and labour practices, Black Economic Empowerment (BEE), planning permissions and controls, skill development and training and business practices.

As a result, the development approvals and zoning processes of local authorities take too long and lead to unnecessary holding costs for developers (Stats SA, 2004).

2.5 Public Capacity both in terms of Financial and Human Capital

According to Stats SA (2004), the construction industry has been affected by the ongoing and necessary overhaul of the public service by the government and loss of knowledgeable personnel during the transition. These factors have led to a reduction in management and technical skills. Also, government’s Ten-Year Review recognises that this process has been uneven, resulting in unintended dislocation and delivery constraints that have affected a wide range of services including infrastructure. The public sector capacity was identified as a key constraint to the delivery of current volumes of infrastructure delivery and sustainable industry growth.

Van Wyk (2003) stated that the public sector capacity is evident in its inability to spend allocations received and inability to evaluate PPP schemes submitted to it for much needed infrastructure.

2.6 Mismatch between available Skills and required Skills

The report by Stats SA (2004) suggests that the skill supplied to the market through the Further Education and Training (FET) System were in many cases not appropriate to the needs of the construction industry, resulting in a skills gap and a decline in the capacity of the professional sector within the construction industry. According to Van Wyk (2003), the high number of industry participants who have no education, let alone a qualification, is a serious impediment to construction industry development.

An example of poor quality construction can be found in North West and Sweet Water in the Eastern Cape Province of South Africa. It was
reported that about 500 houses there were destroyed due to inferior workmanship (BEE News, 2009).

2.7 Procurement Practices/Capacity for Sustainable Empowerment

Stats SA (2004) reports that, the current approach to preferential procurement environment is perceived to be a challenge as it promotes historically disadvantaged professionals to establish their own firms rather than join established companies. This fragmentation according to the report has reduced the depth and breadth of expertise that can be consolidated within medium to larger companies through access and experience on specialized and diverse projects.

This method of procurement according to Van Wyk (2004) has reached a threshold in its ability to drive more meaningful empowerment because, small enterprise capability and sustainability is impeded by a continuous inflow of new entrants, resulting in unhealthy levels of competition and undermining the consolidation possible through continuous work flow and performance improvement.

It is anticipated however, that unless measures are taken to retain professional skills in the industry and fast track the growth of new capacity, South Africa may experience a lack of professional capability in the medium-term and the need to import skills.

2.8 Critical Global Issues/Globalization

The current global economic recession and its effect on the world economy are posing a challenge to the performance of the construction industry. According to Van Wyk (2004), global issues such as sustainability, global warming (level of CO₂ emissions by buildings under construction and in use), use of water and other natural resources also come with requirements which might be difficult for the construction sector participants to comply with. Lewis (2007) highlighted the impact of globalization on the construction industries in the developing countries and the areas in which global trade perpetuates economic underdevelopment, constituting a challenge to the development of the construction industries.

2.9 Poverty

At first glance, one could wonder what poverty alleviation has to do with the construction industry however, according to Van Wyk (2004), poverty alleviation has been identified as one of the Millenium Development Goals (MDG) precisely because it has the ability to destabilise the world economy and lead to global unrest. Also, poverty is a result of high unemployment levels in South Africa, which put housing on a slow growth track.
The construction industry is being (forced)/asked to resolve political and social problems, empowerment criteria, housing, local labour targets etc., which tend to have a negative impact on the construction industry..

2.10 Technology

South Africa has reasonable access to the latest technology however, the prevailing level of technology both within the country and overseas tend to limit the scope of the project that can be undertaken at any time, with the material, equipment and personnel available.

There is also a big problem with end-users perceptions about viable alternative building methods/innovative building systems especially in the low cost housing market and, there is also a juggle between technology and labour. Construction companies are encouraged by government policy to employ more labour and uplift the economy/alleviate poverty (CIDB, 2007).

2.11 Availability of Suitable Land for Construction

Builders and developers in Cape Town are limited by two major factors namely the ocean and Table Mountains and because of this, there is not a lot of land left close to its Central Business District. According to Merwe and Hendrik (1997), a large part of Cape Town encompasses the scenic mountains, delineating the eastern proximity of the Cape Town outer metropolitan area containing ecosystems which have outstanding aesthetic value and are reservoirs of biodiversity or rare species.

Also, there are lots of land claim issues in the courts, zoning issues and heritage sites all, which add up to make prices of the available land inhibitive.

2.12 Availability of Infrastructure

Human settlements require infrastructure to sustain it. An area cannot be developed without infrastructure such as electricity, pipe-borne water, roads, streetlights and sewage disposal systems. South Africa’s infrastructure is old and depreciated and the government is currently spending a lot of money on the improvement of both urban and rural infrastructure CIDB (2007). Currently, there is a huge challenge with regards to limitations on electrical capacity and water, according to reports, is also increasingly going to become a problem.

In certain cases such as high-ended housing estate development in new areas, property developers are required by government to pay for the infrastructure as an added cost on the development.
2.13 Insufficient Mortgage Markets

Since the global economic crisis started in late 2007, banks have been very stringent in their lending criteria, compared to the access to easy credit that as shown by Luus (2003) epitomised 2001 to 2003. Funds available for lending have shrunk significantly, which directly influences the number of developments.

The developers need the banks to finance the building process and the purchaser needs to access a mortgage to finance the purchase of a house/apartment. Banks due to new and more stringent lending criteria are increasingly turning down the developer and consumer. In most cases today, the banks require the developer or purchaser to put down equity of up to 50% and not less than 20% of the cost of development/house price, which very few people can afford.

According to Luus (2003), over the past decade in South Africa, nominal mortgage rates, which are linked to short-term rates, have fluctuated between 13% and 24% and have at times caused substantial problems, with households finding it difficult to afford higher interest payments. Access to affordable credit is probably the single most significant challenge facing both the construction industry and the consumer.

3. RESEARCH METHOD

The research is based on a descriptive survey of randomly selected construction industry participants in Cape Town. The construction industry participants for this research are made up of contractors, building professionals such as architects, quantity surveyors, construction managers, project managers etc, property developers, finance and leasing companies. Respondents were selected based on involvement in the construction industry.

The research was conducted by means of interviews and questionnaire survey. A total of 120 questionnaires were distributed from which 78 usable questionnaires were gathered representing a response rate of 65%. The questionnaire was grouped into two sections. The first section solicited general information about the respondent and the organization while the second section required the respondents to rate their perception of 13 challenges affecting the construction industry. The respondents were requested to rate the effect of each challenge on a 5-point Likert scale of very high effect, high, average, low and very low. These were given nominal values of 5, 4, 3, 2, and 1 respectively.

The research prepared and made use of a data analysis sheet to collect data extracted from the questionnaires filled by the respondents and the challenges were rated using the Mean Item Score (MIS) method of descriptive analysis.
MIS = 5M₅ + 4M₄ + 3M₃ + 2M₂ + 1M₁
5 x (M₅ + M₄ + M₃ + M₂ + M₁)
Where M₅, M₄, M₃, M₂ and M₁ are frequencies of the rating responses given to each challenge variable.

4. DATA PRESENTATION AND ANALYSIS

The data gathered in the field survey are presented as follows:

4.1 Sector in the Construction Industry

Table 4.1 presents the classification of the respondents according to the sector in which they are based in the construction industry.

Table 4.1 Classification of respondents according to sector in the construction industry.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Services</td>
<td>28</td>
<td>36</td>
</tr>
<tr>
<td>Contracting</td>
<td>25</td>
<td>32</td>
</tr>
<tr>
<td>Property Development &amp; Investment</td>
<td>21</td>
<td>27</td>
</tr>
<tr>
<td>Equipment Manufacturer, Supply &amp; Hire</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Not Available</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.1 shows that 35% of the respondents are in the professional services sector, 32% are in contracting, 28% are in property development and investment whilst 2.5% are in the equipment supply and hire sector of the construction industry.
4.2 Classification of the Professional Services Sector

The classification of the professional services sector is presented in Table 4.2.

<table>
<thead>
<tr>
<th>Type of Professional Service</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>Estate Agent</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>Combination of Project &amp; Construction Managers/QS</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>Architects</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Quantity Surveyor</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Engineers</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Town Planner</td>
<td>1</td>
<td>3.5</td>
</tr>
<tr>
<td>Land Surveyor</td>
<td>1</td>
<td>3.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>28</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

It can be seen from Table 4.2 that 21% of the respondents in the professional services sector were project managers, 18% were estate agents, another 18% were both project and construction managers/QS, 14% were architects, 11% were quantity surveyors, another 11% were engineers, and 3.5% were town planners and 3.5% land surveyors.
4.3 Perception of Impact of Key Challenges on the Performance of the Construction Industry

Table 4.3 shows the perception of the respondents as to the impact of the stated challenges on the performance of the construction industry.

Table 4.3 Perception of Impact of Challenges on Construction Industry Performance.

<table>
<thead>
<tr>
<th>Description of Challenge</th>
<th>Impact of Challenge</th>
<th>Very High</th>
<th>High</th>
<th>Average</th>
<th>Low</th>
<th>Very Low</th>
<th>Total Resps</th>
<th>Total Score</th>
<th>MIS Score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in the cost of building materials</td>
<td></td>
<td>32</td>
<td>29</td>
<td>10</td>
<td>3</td>
<td>0</td>
<td>74</td>
<td>312</td>
<td>0.843</td>
<td>1</td>
</tr>
<tr>
<td>Insufficient Mortgage Markets</td>
<td></td>
<td>26</td>
<td>27</td>
<td>11</td>
<td>7</td>
<td>2</td>
<td>73</td>
<td>287</td>
<td>0.786</td>
<td>2</td>
</tr>
<tr>
<td>High interest rates</td>
<td></td>
<td>21</td>
<td>38</td>
<td>12</td>
<td>6</td>
<td>1</td>
<td>78</td>
<td>306</td>
<td>0.785</td>
<td>3</td>
</tr>
<tr>
<td>High rate of enterprise failure/delivery capacity and performance</td>
<td></td>
<td>19</td>
<td>36</td>
<td>21</td>
<td>1</td>
<td>1</td>
<td>78</td>
<td>305</td>
<td>0.782</td>
<td>4</td>
</tr>
<tr>
<td>Mismatch between available skills and required skills</td>
<td></td>
<td>24</td>
<td>30</td>
<td>16</td>
<td>6</td>
<td>2</td>
<td>78</td>
<td>302</td>
<td>0.774</td>
<td>5</td>
</tr>
<tr>
<td>Availability of Infrastructure</td>
<td></td>
<td>25</td>
<td>23</td>
<td>18</td>
<td>8</td>
<td>2</td>
<td>76</td>
<td>289</td>
<td>0.760</td>
<td>6</td>
</tr>
<tr>
<td>External influences such as government legislations</td>
<td></td>
<td>20</td>
<td>28</td>
<td>19</td>
<td>7</td>
<td>3</td>
<td>77</td>
<td>286</td>
<td>0.743</td>
<td>7</td>
</tr>
<tr>
<td>Availability of suitable land</td>
<td></td>
<td>22</td>
<td>24</td>
<td>15</td>
<td>11</td>
<td>5</td>
<td>77</td>
<td>278</td>
<td>0.722</td>
<td>8</td>
</tr>
<tr>
<td>Public sector capacity in terms of financial and human capital</td>
<td></td>
<td>18</td>
<td>22</td>
<td>25</td>
<td>5</td>
<td>4</td>
<td>74</td>
<td>267</td>
<td>0.722</td>
<td>8</td>
</tr>
<tr>
<td>Poverty</td>
<td></td>
<td>12</td>
<td>25</td>
<td>20</td>
<td>14</td>
<td>6</td>
<td>77</td>
<td>254</td>
<td>0.660</td>
<td>10</td>
</tr>
<tr>
<td>Critical Global issues/Globalization</td>
<td></td>
<td>11</td>
<td>27</td>
<td>18</td>
<td>13</td>
<td>7</td>
<td>76</td>
<td>250</td>
<td>0.658</td>
<td>11</td>
</tr>
<tr>
<td>Procurement practices/capacity for sustainable empowerment</td>
<td></td>
<td>9</td>
<td>15</td>
<td>28</td>
<td>16</td>
<td>6</td>
<td>72</td>
<td>225</td>
<td>0.625</td>
<td>12</td>
</tr>
<tr>
<td>Technology</td>
<td></td>
<td>6</td>
<td>20</td>
<td>28</td>
<td>18</td>
<td>5</td>
<td>77</td>
<td>235</td>
<td>0.610</td>
<td>13</td>
</tr>
</tbody>
</table>

Table 4.3 reveals that the respondents’ perceived increase in the cost of building materials as the key construction and development challenge affecting construction industry performance in South Africa followed by insufficient mortgage markets and high interest rates. Technology, government procurement practices and critical global issues/globalization were perceived by the respondents’ to be of least importance.
### 4.4 Perception of Professional Services Sector Respondents on Key Challenges that Impact on the Performance of the Construction Industry

The study sought to find out the perception of the professional services respondents cohort on key challenges that impact on the performance of the construction industry and this is presented in Table 4.4.

**Table 4.4** Perception of Professional Services Respondents on Key Challenges that Impact on Construction industry performance.

<table>
<thead>
<tr>
<th>Description of Challenge</th>
<th>Impact of Challenge</th>
<th>Total Responses</th>
<th>MIS Score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in the cost of building materials</td>
<td>Very High</td>
<td>High</td>
<td>Average</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>12</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>High interest rates</td>
<td>7</td>
<td>17</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Availability of Infrastructure</td>
<td>9</td>
<td>10</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Public sector capacity in terms of financial and human capital</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Insufficient Mortgage Markets</td>
<td>7</td>
<td>13</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Mismatch between available skills and required skills</td>
<td>7</td>
<td>13</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>External influences such as government legislations</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>High rate of enterprise failure/delivery capacity and performance</td>
<td>4</td>
<td>12</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Availability of suitable land</td>
<td>9</td>
<td>5</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Poverty</td>
<td>4</td>
<td>12</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Procurement practices/capacity for sustainable empowerment</td>
<td>3</td>
<td>6</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Critical Global issues/Globalization</td>
<td>2</td>
<td>11</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Technology</td>
<td>0</td>
<td>10</td>
<td>11</td>
<td>7</td>
</tr>
</tbody>
</table>

It can be seen from Table 4.4 that the professional services sector respondents’ perceived increase in the cost of building materials, high interest rates and availability of infrastructure in that order as the key construction and development challenge affecting construction industry performance in South Africa. Technology, critical global issues/globalization and government procurement practices were perceived by the professional services sector respondents’ to be of least importance.
4.5 Perception of Contractors on Key Challenges that Impact on the Performance of the Construction Industry

The study sought to find out the perception of contractors on key challenges that impact on the performance of the construction industry and this is presented in Table 4.5.

<table>
<thead>
<tr>
<th>Description of Challenge</th>
<th>Impact of Challenge</th>
<th>Total Respns</th>
<th>MIS Score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mismatch between available skills and required skills</td>
<td>Very High</td>
<td>High</td>
<td>Average</td>
<td>Low</td>
</tr>
<tr>
<td>Increase in the cost of building materials</td>
<td>10</td>
<td>9</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>High rate of enterprise failure/delivery capacity and performance</td>
<td>8</td>
<td>10</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Insufficient Mortgage Markets</td>
<td>12</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>High interest rates</td>
<td>5</td>
<td>12</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>External influences such as government legislations</td>
<td>4</td>
<td>15</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Availability of suitable land</td>
<td>7</td>
<td>8</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Availability of Infrastructure</td>
<td>8</td>
<td>5</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Poverty</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Public sector capacity in terms of financial and human capital</td>
<td>5</td>
<td>8</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Procurement practices/capacity for sustainable empowerment</td>
<td>3</td>
<td>7</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Technology</td>
<td>4</td>
<td>7</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Critical Global issues/Globalization</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4.5 shows that the contractors perceived mismatch in available skills and required skills, increase in cost of building materials and high rate of enterprise failure/delivery capacity and performance in that order as the key construction and development challenge affecting construction industry performance in South Africa. Critical global issues/globalization, technology and government procurement practices were perceived by the contractors to be of least importance.
4.6 Perception of Property Development and Investment Sector Respondents on Key Challenges that Impact on the Performance of the Construction Industry

The perception of property development and investment sector respondents on key challenges that impact on the performance of the construction industry is presented in Table 4.6.

Table 4.6 Perception of Property Development and Investment Sector Respondents on Key Challenges that Impact on Construction Industry Performance.

<table>
<thead>
<tr>
<th>Description of Challenge</th>
<th>Impact of Challenge</th>
<th>Total Responses</th>
<th>MIS Score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in the cost of building materials</td>
<td>Very High: 8</td>
<td>High: 7</td>
<td>Average: 5</td>
<td>Low: 0</td>
</tr>
<tr>
<td>High rate of enterprise failure/delivery capacity and performance</td>
<td>5</td>
<td>13</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Availability of Infrastructure</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Insufficient Mortgage Markets</td>
<td>6</td>
<td>9</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>High interest rates</td>
<td>8</td>
<td>7</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>External influences such as government legislations</td>
<td>6</td>
<td>4</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Mismatch between available skills and required skills</td>
<td>7</td>
<td>5</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Critical Global Issues/Globalization</td>
<td>4</td>
<td>10</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Public sector capacity in terms of financial and human capital</td>
<td>4</td>
<td>6</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Availability of suitable land</td>
<td>5</td>
<td>8</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Poverty</td>
<td>2</td>
<td>7</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Technology</td>
<td>3</td>
<td>3</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Procurement practices/capacity for sustainable empowerment</td>
<td>2</td>
<td>1</td>
<td>9</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 4.6 shows that the property development and investor sector respondents perceived increase in the cost of building materials, high rate of enterprise failure/delivery capacity and performance and availability of infrastructure in that order as the key construction and development challenges. Government procurement practices/capacity for sustainable empowerment, Technology and Poverty were perceived by property development and investor sector respondents to be of least importance.
5. DISCUSSION OF FINDINGS

Table 4.3 reveals that the all the respondents’ perceived increase in the cost of building materials, insufficient mortgage markets and high interest rates in that order as the key construction and development challenges affecting construction industry performance in South Africa. Technology, government procurement practices and critical global issues/globalization were perceived by the respondents’ to be of least importance.

However, further analysis of the respondents in Tables 4.4, 4.5 and 4.6 according to cohorts’ reveals that each sector of the construction industry has different views about the key challenge affecting the performance of the industry. The professional services sector respondents’ perceived increase in the cost of building materials, high interest rates and availability of infrastructure in that order as the key construction and development challenge affecting construction industry performance in South Africa. The contractors perceived the key industry challenges to include mismatch in available skills and required skills, increase in cost of building materials and high rate of enterprise failure/delivery capacity and performance whilst, the property development and investor sector respondents perceived increase in the cost of building materials, high rate of enterprise failure/delivery capacity and performance and availability of infrastructure in that order as the key construction and development challenges.

6. CONCLUSIONS

The research reveals that the construction industry participants perceive that the key challenge to the performance of the industry in South Africa is primarily the increasing cost of building materials. This shows that there is either a high demand for the same type of building materials or a heavy reliance on particular materials leading to high demand with no matching supply. If materials prices are perceived as the key challenge to construction industry development and performance, there should be a concerted effort by all concerned which includes the clients – both public, private and end-users to accept other non-conventional materials when developed; the research institutions including universities and industry manufacturers should also intensify efforts into the research and development of other sustainable and affordable materials to replace those currently in use; the industry professionals should also disseminate knowledge on the existence and benefits of using new materials as substitutes to the existing ones. New materials have to be evolved if present and future needs of the products of the construction industry are to be met.
7. REFERENCES


The risks of skills shortage in Construction

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ABSTRACT AND KEYWORDS

Purpose

This paper looks at the problems and risks associated with the skills shortage in the construction industry. The various threats are identified in an attempt to evaluate and contain the nature and spread of this phenomenon.

Approach

The research investigates through literature and internet study other research on skills shortage and the risks involved in the construction industry to assess qualitatively what action has been shown to alleviate the problem elsewhere.

Findings

The salient findings indicate that the skills shortage is not confined to South Africa, but is exacerbated by some of the recruitment practices in other countries. Solutions proposed elsewhere are not always practical and are yet to be tested and found to work. Unfortunately, no concrete examples of successfully addressing skills shortages in the construction industry could be found.

Practical implications

As an industry we need to take responsibility for the plight of the construction industry and address the education and training imbalance that seem peculiar to this country.
1. INTRODUCTION

Skills shortage in construction is an international phenomenon. In South Africa the problems are compounded by the legacy of a government that ensured that more than eighty percent of the population was not educated to manage a construction economy and then handed over a decimated construction industry. Injection of massive amounts of money for reconstruction and development, and the exodus of essential skills exacerbated the situation to the point that construction could not deliver on promises of basic needs for the vast majority of the population.

Management of the construction sector largely remains a ‘pale male’ domain. The few historically disadvantaged who have managed to break through the concrete ceiling continue to be under-represented through middle and senior management up to board level. The born free generation has been failed by a dysfunctional education system that should have itself been born free but has struggled with academic issues of teaching and transformation.

South Africa is said to have achieved intentional social transformations in 1994 when it embraced democracy. This was not transformation, however, but a transition from the known system of apartheid to a defined democracy. Similarly, there was no transformation to the new Constitution – it happened overnight after a period of definition. What is significant here is that we knew where we were coming from and we defined and achieved our goal.

Construction in South Africa is at risk from lack of transformation and lack of skills. We need to look at the risks involved and identify ways to cope with lack of progress.

1.1 What is construction project risk?

Construction projects are characterized as being very complex with uncertainty from various sources. The word ‘uncertainty’ is often preferred instead of ‘risk’, to emphasize that a risk has two sides, both negative and positive (Miller and Lessard, 2001). When dealing with risks, the potential for improvement should also be taken into account, for example to undertake a project with fewer resources or to take advantage of an unexpected window or opportunity.

Risks are central to business and linked with opportunities. Since opportunities and threats are seldom independent, there are no opportunities without risks related to them. Understanding each participant’s risks gives better risk allocation (Klemetti, 2006). Construction projects gather together a large variety of stakeholders making it difficult to study a network as a whole. As more and more companies concentrate on their core business, the expansion of subcontracting results in more complex networks and greater numbers of project participants. Hence
projects are becoming shared efforts of multiple parties, where the project is delivered in an extremely complex skills network.

Risk management is directly related to successful project completion. Statistically significant relationships have been shown between management support for risk management processes and reported project success (Voetsch, Cioffi and Anbari, 2004). Project risk management has received a lot of attention recently, and is widely seen as one of the most critical procedures and capability areas in the field of project management.

Construction projects are recognized as risky projects associated with inflexible risk management by contracts. There is a gap, however, between risk management techniques and their practical application by construction contractors. The literature on project risk management is extensive, but lacking from the network viewpoint in managing project risk (Baccarini and Archer, 2001).

Losing projects are those that are behind schedule, over budget, where start-up and operational problems are common, and where contractors fail to realize a profit. Based on the assumption that by better understanding both the relationships in a project and risks related to the network structure, project risk management can become more effective (Klemetti, 2006).

1.2 What is skills shortage?

Skills are the necessary competencies that can be expertly applied in a particular context for a particular purpose (NACI 2003), and skills shortage occurs where employers are unable to fill vacancies or have difficulty in filling vacancies for a particular occupation, or specialized skill needs within that occupation, under current levels of remuneration and conditions of employment, and location. Shortages are typically for specialized and experienced workers in an occupation, and also relatively overall unemployment. An occupation may be recognized with shortages even where there is not a shortage in all specializations, and may be in shortage in some geographical areas only (Coulter, 2004).

Technology changes which result in new methods and skills requirements often lag behind retraining. Degree of difficulty may require higher basic education levels, such as Grade 12 mathematics, particularly in the technology trades. The shortage may be identified as resulting from deficiencies in the education system at school levels.

Recruitment difficulties also occur when there may be an adequate supply of skilled workers, but employers are still unable to attract and recruit sufficient suitable employees, due to characteristics of industry, occupation or employer, including relatively low remuneration, poor working conditions, unsatisfactory working hours, poor image of the industry, undesirable location, ineffective recruitment, inappropriate advertising and so on. Skill shortage lists typically exclude skills with only a limited period of training or experience to acquire.
Over the last twenty years or so, the labour market and industry skills needs have undergone significant change. Skill shortage includes managers, professionals and artisans, and the biggest gap in construction appears to be skilled artisans and supervisors (NCE, 2001). This is not peculiar to South Africa but is a worldwide phenomenon. Although it may reflect a buoyant construction economy, it is causing real project delivery challenges for consultants and contractors alike.

1.3 What causes skills shortage?

The construction industry boom means worsening skills crisis. Retirement of skilled managers, professionals and artisans coupled with a deficient education and training system means a dwindling pool of human resources (Greenblat, 2008). The attraction of UK, Australasia and the Middle East will be a continuing draw for talent.

Attracting new staff often means we are competing with lifestyle choices – it is a hearts and minds issue. Mobility in career choices means companies face problems recruiting and retaining experienced staff, competing with more attractive packages resulting in higher staff turnover. In civil engineering during the 1990s, for example, the number of graduates declined by over 40% in spite of an overall increase in university graduates. Many of these do not remain in the industry, and many are attracted overseas (NACI 2003).

The poor public image of the construction industry as a career and the ambiguity of functions in construction, coupled with the perception that a career in construction means working 50% more for 50% less, forever being shipped from one site to another, is a major factor. The lowly professional status means that there is an increasing reluctance of younger employees to commit the necessary effort to achieve professional status.

Construction is notorious for its low profit margins, which explains why there is a reluctance to increase salaries (Mylius, 2001). When margins are at historical low levels, we have a skills shortage which could lead to a reversal in roles – employees may be interviewing prospective employers.

Changes in on the job training and the demise of apprenticeships have a long-term impact on the skills base. The low national interest in physical sciences, mathematics and the massive inequality in education reduces the potential pool of required skills. Where the construction industry does not interact with people at school or a university, it results in poor career information and further reduces the choices (Pieterse, 2007).

The skills profile in construction is skewed towards retirement age. As skilled managers and artisans retire and insufficient recruits are capable of replacing them, the skills shortage is set to grow and construction prices will increase, posing an unnecessary burden on the construction economy. We cannot continue to blame the government (or apartheid) for the problem, or even look to the government for a solution. Yet that is precisely what we have been doing.
1.4 How is construction industry affected?

Skills shortage poses the greatest threat to the future of construction, and will continue as demand for construction work increases. The boom in demand puts pressure on the construction industry which is struggling to meet increasing demand for its services (Creamer, 2007). There will be an increase in construction demand together with a worsening supply of middle and senior management.

The construction sector is struggling to meet the increasing demand for its services because of an increasing industry-wide skill shortage. The skill shortage will continue as the demand for construction work increases, and is most acute in the public sector where the most sought after skills are for engineers, natural scientists and artisans.

The shortage of professionals and managers within the industry is reflected in many parts of the world, and the construction industry is becoming more global. The risks for both contractors and their clients as human, material, logistical and financial resources are being leveraged to unsustainable levels. Companies are expected to develop more of these resources internally as the projects evolve, exacting a toll on the efficiency of the company and the ability to meet deadlines (Essa, 2008). For how much longer can this continue?

1.5 What are the risks of skills shortage?

The risks that are caused by the skills shortage need to be identified and the ways to manage risks in co-operation with the whole construction industry found. Risks facing construction include (Leitch, 2008):

- the skills shortage in the construction industry;
- the level of health care and education spending by government;
- capacity constraints in the industry; and
- tight delivery deadlines imposed by clients.

The quality of output is at risk with a greater proportion of unskilled workers, and skills shortage is a growth risk making the industry less attractive as a career. Future competitiveness is at risk as we fight for the talent remaining after the brain drain.

Skills shortage will see a decline in SMMEs – with more bankruptcies. A greater proportion of unskilled workers restricts innovation and growth, where we have 80% of the workforce without qualifications and only 20% of jobs have no need for qualifications. The education system will be unable to cope with the demand.

Industry will be crippled by skills shortage – globally. Sustainable construction is at risk, and it is hurting the economy. As it becomes more difficult to recruit skills, the smaller firms look within the company while the larger companies look outside. Risk management at project levels is
improving, but skills shortage risk management is absorbed into company culture.

1.6 What are risks to construction economy?

The construction economy is a well defined element of every national economic framework and is identified as a component of gross fixed capital formation within the gross domestic product. It is represented by all expenditure associated with fixed investment into physical infrastructure, production and commercial facilities and accommodation, as performed by general and specialist contractors, engineers, materials suppliers and service providers. It generally excludes the supply of process machinery and equipment.

South Africa’s construction boom is expected for at least the next 10 years thanks to government investment in the private sector spend, creating a catalyst for further earnings growth and keeping the industry alive beyond the 2010 World Cup.

Given the definition of skills, skills shortages are likely at all levels of the economy, as a result of relatively low levels of education in the workforce and static growth in higher education outputs (NACI 2003). Skills shortage is one of the greatest risks to economic prosperity. It is inflationary when demand outstrips supply forcing wages higher that are not based on productivity. Higher unemployment results in greater inequality – the rich get richer while poor get poorer. Lack of skills puts market growth at risk, with the further risk of capital flight and the mothballing of future major projects.

1.7 What does this mean for projects in SA?

Skills shortage puts more pressure on existing systems and processes. More projects not completed on time or within budget, some organizations attempt to take short cuts and safety slips. More pressure is placed on existing systems and processes. Skills shortage gets blamed for everything – project delays, power shortage, oil crisis, etc.

Scarce workers have unrealistic salary expectations, resulting in demands for higher salaries, wages and organizational costs. Rapid promotion means some are running before they can walk, and retention issues can affect performance and culture, with more project pressure, and less executive management support.

Initially, the industry has responded by recruiting from overseas, with Australia and New Zealand being the favoured sources as English is the common language. But with the construction boom in those countries, some companies are recruiting from the UK resulting in a two-way flow of skills (Gabriel, 2007). More subcontracting moves the focus onto smaller firms. Many organizations, however, become more focused on skills
development, putting safety down as a real value and not merely paying it lip service.

The South African construction industry recognises the importance of outcomes-based training, overseen by long-term training and skills development plans, and acknowledges that the SETAs are the logical implementation bodies (NACI 2003).

1.8 What are organizations doing to cope?

Many organizations are adopting a new strategy: they accept the new reality that the market, not the company will determine the movement of their employees. Managing retention becomes controlling both the direction and speed of the flow, rather than trying to dam it.

While the increase in skills from abroad helps to ease the pressure, obtaining work permits to bring in skilled foreign nationals is often a lengthy process fraught with unnecessary delays. Migrant workers on temporary work permits are mainly filling manual occupations.

Visible support from the management is crucial, convincing teams that they are serious about career programmes and not just performance management. Graduate programmes and mentoring is becoming more common, and many contractors are providing construction skills training centres. Some contractors, however, are transferring all the risks to project owners, which will ultimately be forced to cancel projects that are no longer feasible on a reassessment of risks, rewards.

1.9 What is government doing to cope?

The South African Government has introduced policy around the Joint Initiative for Priority Skills Acquisition, the Accelerated and Shared Growth Initiative of South Africa, the Construction Transformation Charter Group and the 2014 goal to halve unemployment (Mlambo-Ngcuka, 2006). These are expected to sustain and transform the industry.

Government promises on spending levels are the main driver of growth aimed at propping up the construction industry as the current major projects come to a close and house building is slowing down. Private infrastructure spending, however, is still rising reflecting the important balance between public and private spending.

The Department of Higher Education and Training has been separated from the Department of Basic Education to focus on skills training and education. The participation rate in higher education for 18 to 24 year olds has increased from about 14% to 18% since 1994 (HESA, 2008). The Government has, however, set a steady state target of 20% from this year onwards. Alarm bells ring when this is compared with an average percentage for North America, Western Europe and Australasia of about 70%. Some Asian countries have an even higher participation rate.
What may be of even greater concern is where the post-school education and training is positioned. In 2006, the bulk of growth is in the more expensive university system with about 800,000 students. The remainder of about 380,000 students are found in the further education and training system, resulting in an absurd inverted pyramid. This is on top of an under-performing school system. Most developed countries generally accept a ratio of five sub-professionals to support each graduate.

Both the construction sector and the education sector are facing similar problems of transformation and sustainable growth. The two are closely related.

1.10 Economic progress over time

Consider the economic implications of the different technologies shown. Relative to a constant rand, the cost per unit of construction – be it a kilometre of highway, a hundred square metres of house, or a megawatt of power plant – has generally gone up since the mid-twentieth century, in spite of more mechanization, prefabrication, and so on. Certainly, in some absolute sense, things have probably improved; but relative to the economy as a whole, which has improved even more rapidly, construction has become more expensive.

Things have been somewhat better for automobiles – today’s cars are better engineered and more fuel efficient, yet are still within the purchasing power of most workers in industrialized countries (unlike new homes!) – but the gains have still been modest on a relative scale.

Progress has been greater in commercial aircraft. Around 1950 air travel was mostly for wealthier people, and by today’s standards the aircraft were slow and expensive to run. Today’s efficient commercial jets fly on less than half the cleaner fuel of earlier models, and international as well as domestic air travel has become accessible to people of average means.

But compared with computers, even these gains have been modest. It has been said that if the economics and productivity of aircraft had evolved as rapidly as those of computers, one could travel from Johannesburg to Cape Town for just a few cents and arrive within seconds of taking off.

What if we extend this analogy to construction? You should then be able to buy a single-family house for under a rand, and have it constructed while reaching for your wallet.

It is pertinent to note that both construction and education exhibit similar characteristics. The cost of education continues to climb with no
significant improvement in the quality of the graduates. If we extend the computer analogy to education, you could educate a learner to graduate level for under a rand!

1.11 Incremental earnings per rand invested

An important feature of the construction economy is its multiplier effect. It is estimated that for every rand invested in construction, about 80 cents incremental earnings are generated to the Gross National Product (GNP). The corresponding figures are for agriculture about 20 cents and for manufacturing about 14 cents (ISRDS, 2000). From the fiscal point of view, investment in construction is more desirable to boost the economy. In more developed economies, the fiscal policy makers routinely create favourable or unfavourable situations to guide the real estate market which in turn affects the construction and the short term economic environment. Fiscal control of construction is one of the easiest tools to apply, but unfortunately it often takes the construction industry a long time to recover, especially following harsh conditions where firms have sold plant and down-sized skilled labour, such as occurred in South Africa in the dying years of apartheid.

Construction creates large scale employment which by itself is a significant contribution to the national economy. It is also a good vehicle for the distribution of wealth which means that a significant proportion of the money spent in construction moves directly from the rich to poor people, especially in rural areas.

1.12 Graduating engineers per million population

We often take comfort in comparing ourselves with the rest of Africa. After all, South Africa has 10 per cent of the total population of Sub-Saharan Africa. Our gross national product is 71 per cent the magnitude, and electricity generation 2.3 times as large as the rest of the sub-continent. Indeed, the South African government actually spends a greater portion of its budget allocation on education than any other country, not only in Africa but in the world. But how do we compare with major industrial nations in technically trained people? At present only about 35 engineers per 1 million
population graduate annually in South Africa. The sorry state of engineering education in South Africa is shown (Utting, 2008).

1.13 Science and engineering doctoral degrees

Other comparisons are equally dismal. For example:

- South Africa only has twice the number of engineers and technicians as New Zealand to serve a population that is over 10 times as large.
- South Africa has proportionately only 10 per cent of the number of scientists and engineers as North America. The United States has 13 doctoral degrees in science and engineering per 10 000 population, Germany 22 and Britain 11. South Africa has only 0.18 (Utting, 2008).

1.14 How do they cope internationally?

In the past, school leavers could be trained to fill the skills shortages. In the UK the government has launched a £200 million training project to try and tackle the skills shortage and lessen the reliance on migrant workers to fill the gaps (Denham, 2008). Eastern European migrants have filled shortages but in the longer term this is not something to be relied upon. Supplementing the shortfalls in local recruitment can only be considered a short-term solution, and as soon as the global demand for these workers increases, then the supply will dry up. There are also questions being asked about whether one country should be taking valuable skilled workers away from their own countries where they are needed.

The civil engineering skill shortage cannot be solved by importing more engineers from Australia, South Africa, New Zealand, Poland, China and India. Importing foreign workers fails to address the widening skills gap that is driving construction inflation, limiting capacity and adversely affecting project time scales and budgets.

The Construction Industry Training Board predicts that Britain needs to attract 370 000 new recruits over a five year period just to keep up with demand. Of these 74 000 each year, 64 000 are required simply to replace existing workers leaving the industry (NCE, 2001). Some of the proposals for solving the problem include:

- Flexible working hours is the key to resolving the skills crisis.
- Training projects provided by specialist training colleges focusing on the construction industry.
• Respect and retain the engineers already on board. Lack of respect is the second biggest reason given by graduates for leaving the industry and for undergraduates not joining.
• Employers should reward good staff properly and provide them with good opportunities to develop and progress.
• Improve the standard of training mentoring and provide training agreements that are not considered incidental in the early years of the professional’s career.
• The clients, especially Government, should award more contracts on quality not price.
• Engineers should be used as engineers, not project managers.
• Retain the best staff and help them reach the top of the profession.
• Consider ethical recruitment, especially when bypassing social legislation to recruit abroad. When work can be done for a quarter of the price in India it may make sound business sense, but it maintains the differences between the developed and developing countries and does nothing to resolve the long term problems of the profession.
• Recruit school leavers rather than graduates and help them to gain their technical experience from vocational qualifications.
• Offer golden hellos to graduates.
• Head hunt from rival organizations is an extension of the problems associated with recruiting abroad.
• Treat staff equally. The construction industry’s macho, bullish, sexist and racist image is a major deterrent. Redress the gender and racial imbalance in the industry.
• Work with the universities so that they educate and train the right people for the right work.
• Use the over fifties to solve the construction skills shortage.
• Retrain skilled workers at retirement age so that they can impart their skills and knowledge to the younger generation.
• Adapt to new technologies and keep abreast with the latest methods.
• Scream at Government!

1.15 How are we coping long term?

In a recent report (CIDB 2007), the Construction Industries Development Board considered that the construction and engineering industries can overcome the immediate challenges by re-organization and targeted interventions, as well as by importing scarce skills. However, the industry’s ability to cope will decline over the next five to ten years unless new capacity skills are developed in the interim.

The construction industry in South Africa has been fortunate to be bolstered by the 2010 FIFA World Cup. We have passed through the worst of the economic downturn and need to assume that the booming infrastructure future will continue. The five-year forecast continues to look healthy thanks to the Government recognition of the value of the industry.
During the next five-year period we must rethink the way we sell the industry to children and make a concerted effort to provide the construction toys that allow children to develop spatial perceptions, building concepts that they can relate to the real world. By the time that they reach high school they should be conversant with the basic technical tools of the industry.

The industry needs to stand up and collectively be counted, starting with the client and then down through the supply chain with consultants, contractors suppliers and institutions. The mystery needs to be taken out of the industry and we need to teach that which is relevant to knowledge and understanding of how construction works and the facilities function. A radical approach rather than a magic wand is required:

- the post-school pyramid must be inverted to restore proper education balance;
- skills development should be a core business value and not considered a cost to the business;
- skills development must be rationalized and standardized and made easily available;
- training provision must be increased to attract and retain good staff;
- construction professionals must commit to continuing professional development if they want employers to invest in their education and training;
- think about long-term rather than short-term benefits;
- think about the next generation of builders and take on more apprentices;
- invest in education and training.

As an industry we need to take responsibility for our skills problems and collectively develop appropriate solutions. We need to avoid the triple threat of spiraling costs, eroding quality and increased accidents on site. Skills shortage should not be seen as a problem, but in a solution oriented industry we are about finding solutions. We must continue to tackle the challenge and not leave it until it is too late.
2. REFERENCES


Gabriel, Keith, Keith’s point: the skills shortage - can the industry delier? *NCE online*, 27 November 2007, [http://www.nce.co.uk/opinion/keiths_point_the_skills_shortage_can_the_industry_deliver.html](http://www.nce.co.uk/opinion/keiths_point_the_skills_shortage_can_the_industry_deliver.html)


Pieterse, Ilva, Skills shortage remains a concern, *ITWEB Contributor*, 12sep07, http://www.itweb.co.za


Purpose of the paper
The object of this paper is to investigate possible gender mainstreaming activities that might be applied to mitigate the situation and to encourage more women into the industry.

The paper further intends to trigger a reaction amongst stakeholders in the South African Commercial Property, and to cause these decision-makers to attempt to address the situation, so that a better balanced industry is sustained in the long term.

Design/methodology/approach
The purposive sampling method has been used to select well known commercial property owning and servicing companies in South Africa. In each purposefully chosen company a group of ten representatives were selected to represent members of the Executive Committee, Senior Management, Middle Management, First-line management and all those below first line management level.

A questionnaire based survey was conducted. Collected data was codified and analysed qualitatively and quantitatively.

Findings
The survey revealed that there are certain mainstreaming activities that the commercial property industry may embark upon in order to address the scarcity of women while mitigating the lack of gender balance in the commercial property industry.

In addition the current gender related data in South African commercial property is being exposed.
Value
This paper may be viewed as a pioneering step towards the treatment of the imbalance as well as an acknowledgement of the truth that “Technical professions (like commercial property) offer attractive career and earning opportunities - for members of both sexes. However, these professions of the future remain a male bastion” (Federal Ministry of Education & Research: n.d),(pp1)

The paper is an exploration of current reality in the South African commercial property industry. It highlights that against the backdrop of social culture, gender-stereotypes and historical government roles "there is no such thing as gender-neutral policies", (European Commission: 2007), (pp1); and only with deliberate strategies may the commercial property landscape be brought to a balance.

Research limitations
The limited number of questions, as well as the close-ended type of questions to respondents may be considered a research limitation.

Practical implications

Keywords
Gender mainstreaming, women empowerment, women in leadership positions.

1. INTRODUCTION

It is believed that the commercial property environment in South Africa (and probably in many other countries) is characterised by gender imbalances. Members of the female species remain underrepresented, more especially at the decision-making levels of the profession. This is still the case “despite the dramatic reduction in the gender income gap in recent decades” (Green, Jegadeesh, and Tang: 2007).

Gender mainstreaming of women refers to a set of policies, procedures and rules that ensure that women are deliberately included in the decision-making roles and key leadership positions of specific organisations. The Federal Ministry of Education & Research (n.d), (pp1) defines ‘Gender mainstreaming’ as “a strategy for achieving the equality of women and men and stands for a policy of equality in all fields.” And further describes this policy as common where in “particularly male-dominated organisations” a radical change (is effected) by opening doors to women and by restructuring."
International labour Organisation (2002), (pp1) defines gender mainstreaming as “The process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in any area and at all levels. It is a strategy for making the concerns and experiences of women as well as of men an integral part of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres, so that women and men benefit equally, and inequality is not perpetuated. The ultimate goal of mainstreaming is to achieve gender equality.”

This paper is based on the definitions of gender mainstreaming indicated above.

2. LITERATURE REVIEW

Literature associated with this topic is widely available internationally. However, locally there is a gap in terms of written text on the topic. Based on time limitations a few authors are noted below and these afforded the project the requisite impetus it warranted.

Green, Jegadeesh, and Tang (2007) observe that “Despite the dramatic reduction in the gender income gap in recent decades, women remain underrepresented in many high-profile careers.

Other researchers such as Neumark, (1996), Goldin (2000) and Rouse (2009), focus on discrimination in the workplace as a result, “evidence of gender-based discrimination has been documented in certain, yet employers’ attempts to offset bias through focused hiring strategies also raise concerns of reverse discrimination, [http://hightech-strategy.info/en/508.php].

Williams (2003) notes that “Globalisation and trade liberalisation are often assumed to be universally beneficial and gender, class and race neutral... Yet trade liberalisation has different effects on women and men because of their different access to and control of economic and social resources, decision-making and participation.”

Reeves (2001), (pp1) declares that “More women will lead to ‘more humane forms of management and thus greater productivity and less of a confrontational, conflict-ridden ‘macho-pack culture’. It has been argued that in a gender equal parliament, women’s less confrontational and more consensual approach will transform decision-making.”

Many authors on similar projects agree that everyday policies in most industries are not gender neutral. These policies are either by design or default evidently discriminatory to women.

Having read extensively on the topic, while also noting previous research, it is my view that by leaving equitable contribution of both gender types to chance, the full economic actualisation of many specialised fields may
never be realised. Gender diversification in professions is a strength that deserves active pursuit by all stakeholders.

3. METHODOLOGY

Data on five prominent property companies was accessed to determine the actual ratio of females on their boards.

A questionnaire based survey was undertaken to investigate on the following questions

A purposive sampling was used to select the property companies. The sample was stratified to cover 10 companies; 5 of these are conventionally white property companies and 5 of these are black owned property companies. 50% of the questionnaires were given to female members while 50% of the questionnaires were given to male members to complete.

To avoid bias, the questionnaire asked respondents about activities that people believed needed to be undertaken to gender mainstream women, as well as activities that had to be undertaken to gender mainstream men.

The same selection alternatives, fourteen in number (‘a’ – ‘n’) were presented for both male and female mainstreaming. Each participant had to select the best 5 options for gender mainstreaming of men, and the 5 best options for gender mainstreaming of women.

Men had only 3 questions to answer while women had 5 questions to answer.

The two additional questions to women were asked to investigate what personal work experiences (positive/negative) were women exposed to, from their male colleagues, in their work environment.

Questions to both male and female
a) What job position do you hold in your organisation?
b) What activities do you believe need to be undertaken in order to mainstream women in the South African commercial Property?
c) What activities do you believe need to be undertaken in order to mainstream men in the South African commercial Property?

Questions to female only
(d) In what ways have your male colleagues supported you at your work place.
(e) In what ways have your male colleagues discouraged you at your work place.

The target sample size was 100 respondents from 10 property companies operating in the industry.
4. FINDINGS

4.1 General industry findings

Analysis of data from five prominent property companies in the commercial property industry revealed underrepresentation of women on their boards of directors:

Company A: 4 women out of 13 people are part of the board of directors.
Company B: 2 women out of 12 people are part of the board of directors.
Company C: 0 women out of 10 people are part of the board of directors.
Company D: 1 woman out of 11 people are part of the board of directors.
Company E: 0 women out of 9 people are part of the board of directors.

In total, 7 out of 55 company boards of directors are women. This equates to 12.7% of the sample of companies participating in this section of the research.

4.2 Findings based on survey

4.2.1 Seniority of males vs. female

1. MEN’S RESPONSES
   More than 60%: 18 out 29 men have jobs in the middle and senior management positions, while
   38%: 11 out of 29 men have jobs in the 1st line management positions and below

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<table>
<thead>
<tr>
<th>Position</th>
<th>Men's Responses</th>
</tr>
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<tbody>
<tr>
<td>Middle and Senior</td>
<td>More than 60%</td>
</tr>
<tr>
<td>Management</td>
<td>18 out of 29</td>
</tr>
<tr>
<td>1st Line Management</td>
<td>38%</td>
</tr>
<tr>
<td>Management</td>
<td>11 out of 29</td>
</tr>
</tbody>
</table>
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In contrast,

65%: 26 out of 40 women have jobs in the 1st line management positions and below.
35%: 14 out 40 women have jobs in the middle and senior management positions.

4.2.2 The 5 most important actions regarded as necessary for gender mainstreaming of women (answered by both males and females).

<table>
<thead>
<tr>
<th>Options to choose from</th>
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</thead>
<tbody>
<tr>
<td>After-work drinking sessions</td>
<td>a</td>
</tr>
<tr>
<td>Career building for young male/female leaders in commercial property</td>
<td>b</td>
</tr>
<tr>
<td>Career building for young male leaders in commercial property</td>
<td>c</td>
</tr>
<tr>
<td>Create a gender-focused centre for excellence in Commercial Property</td>
<td>d</td>
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<tr>
<td>Focus on gender empowerment and encourage entrepreneurship in Commercial Property</td>
<td>e</td>
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<tr>
<td>Provide onsite child-care facilities</td>
<td>f</td>
</tr>
<tr>
<td>Provide a private on-site cigar lounge &amp; bar</td>
<td>g</td>
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<tr>
<td>On site gym facilities</td>
<td>h</td>
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<tr>
<td>TV Sport channels during lunch break</td>
<td>i</td>
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<tr>
<td>Playing golf where the company pays membership fees</td>
<td>j</td>
</tr>
<tr>
<td>Take a girl child to work and share interesting, child-friendly commercial property</td>
<td>k</td>
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<tr>
<td>orientation programs, more than once a year.</td>
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<tr>
<td>Take a boy child to work and share interesting, child-friendly commercial property</td>
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<tr>
<td>orientation programs, more than once a year.</td>
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<tr>
<td>Expand a gender-focused career spectrum in commercial property education &amp; training</td>
<td>m</td>
</tr>
<tr>
<td>Peer mentoring &amp; coaching by fellow men/women professionals</td>
<td>n</td>
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</tbody>
</table>
The responses are summarised in Figure 2.

![Figure 2: Responses on the most important actions required for gender mainstreaming of women.](image)

Female respondents believed that the most important actions required to gender mainstream women in the South African commercial property industry are b, e, n, and m/d.

Male respondents on the other hand believed that the most important actions required to gender mainstream women in the South African commercial property industry are b, n, e, d, and k in that order.

4.2.3 The 5 most important actions regarded as necessary for gender mainstreaming of men (answered by both males and females).

<table>
<thead>
<tr>
<th>Options to choose from</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>After-work drinking sessions</td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>Career building for young female leaders is commercial property</td>
<td>b</td>
<td></td>
</tr>
<tr>
<td>Career building for young male leaders in commercial property</td>
<td>c</td>
<td></td>
</tr>
<tr>
<td>Create a gender-focused centre for excellence in Commercial Property</td>
<td>d</td>
<td></td>
</tr>
<tr>
<td>Focus on gender empowerment and encourage entrepreneurship in Commercial Property</td>
<td>e</td>
<td></td>
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<tr>
<td>Provide onsite child-care facilities</td>
<td>f</td>
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</tr>
<tr>
<td>Provide a private on-site cigar lounge &amp; bar</td>
<td>g</td>
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<tr>
<td>On site gym facilities</td>
<td>h</td>
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<tr>
<td>TV Sport channels during lunch break</td>
<td>i</td>
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</tr>
</tbody>
</table>
Playing golf where the company for membership fees
Take a girl child to work and share interesting, child-friendly commercial property orientation programs, more than once a year.
Take a boy child to work and share interesting, child-friendly commercial property orientation programs, more than once a year.
Expand a gender-focused career spectrum in commercial property education & training
Peer mentoring & coaching by fellow men/women professionals

The responses are summarised in figure 3

Figure 3. Responses on the most important actions required for gender mainstreaming of women.

Female respondents believed that the most important actions required to gender mainstream women in the South African commercial property industry are c, n, d, e, and m.
Male respondents on the other hand believed that the most important actions required to gender mainstream women in the south African commercial property industry are c, n, i, e, and d in that order.

4.2.4 Treatment by male colleagues

Female respondents were asked to rate their treatment by male colleagues by responding to the following questions:
How do some male colleagues in your immediate work environment support you (show with a tick)?
They teach/coach me with work
They are friendly though they do not necessarily refer to work
They send me to training or advise me about training courses
They do part of my work for me
They make sure I am paid well for what I do
Other ways of encouragement, please explain

How do some male colleagues in your immediate environment discourage you (show with a tick)?

They show lack of interest with what I do at work
They are unfriendly although they DO NOT refer to my work
They avoid sending me to and make excuses when they have to send me to training/ hide information about training courses.
They give me the wrong information.
They are impatient with me.
They make excuses when I have to get a salary increase.
Other ways of discouragement-please explain.
The responses are summarised in figure 4

![Figure 4. Women’s perceptions of their treatment by males](image)

**4.2.5 FEMALE PERCEPTION: Open ended responses.**

4.2.5.1 In general what attraction does commercial property have for women?

- There are opportunities in property & Facilities Management, leasing and valuations.
- Gives an opportunity for women to exercise their leadership ability.
- Relatively good salaries
- Challenges are exciting
- Growth
- Experience
- Women are more multi-skilled than men
- The industry is challenged by shortage of skills; therefore this puts women in a better position to join the industry.
- There is a potential to make lots of money, that is empowering to women.
- Fairly straightforward business, easy to understand.
- Growth and opportunities by being a woman.
- To achieve exposure.
- I believe there is a gap in the market to empower women.
- Career growth, money better earnings
- It is largely administrative therefore women often think they can grow in the industry.
- It is diverse; one doesn’t have to be stuck in one position.
In summary, women believe that there are good opportunities in the SA commercial property environment, and these include good income, career advancement, prestige and personal empowerment.

4.2.5.2 Perceptions by women about things that happen in the industry and which men do to discourage women.

· Lack of awareness about opportunities available in the industry.
· The unwillingness by most establishments to promote black women professionals to meaningful positions.
· “Not being involved in top management while making decisions in their operational areas.”
· “Very aggressive environment”.
· Fear that they will not manage the workload.
· Fear of being discriminated against as women especially in leadership.
· The long hours, the travelling
· They respect women less than men.
· The industry is male dominated and women feel threatened.
· Commission only earning structure
· Very male dominated.
· Men don’t take women in lesser positions than them seriously, even if those women are in management level.
· The networking forums are too elite and inaccessible.
· Lack of respect from men.
· Male dominance
· Currently very male dominated.
· Not the correct information on career opportunities in the property industry.
· Male domination
· Too much expectation from women regarding experience (qualification sometimes) when for men these requirements seem to be relaxed.
· It is a male dominated industry.
· The belief the men can do a better job than women, coupled with the myth that men are better equipped to deal with the pressure is discouraging.
· Women have to work twice as hard as men to prove that they are half as good.
· There’s a perception that the profession can be too technical.
There's a stereotype that the industry is for males.
Some women may feel overwhelmed by too many male executives and may feel that there is no place for them.
Most women are discouraged because of gender inequality when it comes to the industry.

In summary, women believe that the SA commercial property industry is male dominated, intimidating, disrespectful and reluctant to place women in positions of authority.

5. CONCLUSIONS

It is evident that the commercial property industry in South Africa is male dominated. There are currently no signs or efforts made to balance gender within this industry. Strong suggestions from both male and female respondents indicate that the list of gender mainstreaming activities for women should include (but not be limited to) the following:

- Career building for young female leaders in commercial property.
- Focus on gender empowerment and encourage entrepreneurship in commercial property.
- Peer mentoring & coaching by fellow women professionals.
- Create a gender focused centre for excellence in commercial property, and
- Education & training—expand a gender focused career spectrum in commercial property.

Through this paper, certain individual male attitudes were noticed. Some men refused to respond to the questionnaire because they believed that the current SA laws viewed all persons as equal, therefore gender imbalances cannot be seen as a valid challenge to business in South Africa. Another verbal reaction to this paper was that if women were good enough, they would have managed to compete and to get themselves into the top positions of the industry.

Other relevant reactions included (unrecorded) comments by certain women that the obstruction of women’s progress in certain professions was being perpetuated by members of the very species.

It is accepted that questionnaire-based research is vital to support perceptions and beliefs; however, there are other indicators that are also capable of bringing out the truth in particular environments. One of such indicators in the SA commercial property sector are board room meetings, and professional conferences such as SAPOA and ASOCSA. If one had to conduct a quick head count, one would realise that the fraction of women to
men is such places is negligible compared to the fraction of male representation.

While it is understood that Rome was never built in a day, a starting point at this stage is critical. The shift in mindsets needs to be led by industry champions. These individuals or groups would need to advocate persistently until gender mainstreaming, becomes one of the sought after strategies in the South African commercial property sector. After all, the South African government ministries have paved the way and demonstrated that women are capable of leading as well.

6. REFERENCES


ABSTRACT AND KEYWORDS

Purpose
In our case, the desire was to determine whether there was any relationship between contract strategies used on infrastructure maintenance projects in developing countries and their performance in terms of value for money on projects of this nature.

Methodology
The research was carried out through interviews, questionnaire survey and literature review. A literature review focused on determining whether there was any relationship between various contract strategies and their performance regarding value for money or consequential cost overruns. Questionnaires were sent out to built environment professionals working in government departments, built environment practitioners in the private sector and contractors. Interviews were arranged with respondents whenever there were issues in the questionnaire that needed clarification or
whenever the information on specific questions contradicted the opinion survey in a material way. The questionnaire was structured in such a way that it dealt with more specific questions inclined to statistical analysis as well as general questions of opinion more prone to qualitative analysis. The questions susceptible to statistical analysis were analysed using statistical methods. The general survey was structured in such a manner that respondents gave their opinions on the question at hand and suggested suitable alternatives where applicable.

**Findings**

It is affirmed that various types of contract strategies have an effect on the performance of the contract with regard to the attainment of good value for money.

It is further acknowledged that, although governments advocate for the attainment of good value for money on infrastructure maintenance projects, the governments’ emphasis on the involvement of contracting companies with a majority shareholding owned by “Citizens”, compromises the use of innovative and cost effective contract strategies and ultimately entertains the lack of good value for money on infrastructure projects.

**Research limitations:**

The survey was exclusive to contract strategies employed by governments in developing countries and not parastatals or other affiliated organisations. The study also excludes international focus or specialised contracts for which the governments are implored to source international contractors. Stratified sample including other organisations affiliated to the government, specialised contracts and international focus would have generated more insight on the subject matter.

**Practical implications**

The element of the study is to highlight the most efficient contract strategy that will attain the greatest value for money when applied on infrastructure maintenance projects by governments of developing countries.

**Originality**

The study explores the various contract strategies used in the construction industry which if appropriately selected on a particular infrastructure maintenance project will attain greater value for money.

**Keywords**

Contract strategy, developing countries, infrastructure, value-for-money
1. INTRODUCTION

Significant and lasting strides by the United Nations to revamp economies in developing countries resonate well with the development ideals of most of these countries. Infrastructure development is one of the major areas of concern highlighted which if properly developed and maintained in a good state is perceived to be a major factor for enhanced economic development which is necessary to meet the development ideals of these countries.

It is worth mentioning that most of the developing countries do not only have insufficient infrastructure to create an enabling environment for economic development, but the meager infrastructure that is there is in most cases in a state of disrepair.

Given the financial constraints governments in developing countries are in, it is worthwhile to prioritize the maintenance of existing infrastructure before embarking on multibillion new infrastructure projects.

1.1 Statement of the Problem

Infrastructure rehabilitation projects in most developing countries are to a large extent funded by donor governments from developed countries. Sovereign governments in recipient countries sometimes jointly fund these projects with donor countries. The two are concerned with the lack of good value for money that is spent on infrastructure maintenance projects. Lack of good value for money may amongst others be attributable to the contract strategy that is used on maintenance of physical infrastructure projects.

1.2 The concept of infrastructure maintenance

Seeley (1987, p.1) defines ‘maintenance’ as: the combination of all technical and associated administrative actions intended to retain in, or restore it to a state in which it can perform its required function. The prime aim of maintenance is to preserve a … [facility] to its initial state, as far as practicable, so that it effectively serves its purpose which includes the following (Seeley 1987, p.10):

- Retaining value of investment;
- Maintaining the … [facility] in a condition in which it continues to fulfill its function; and,
- Presenting a good appearance.

Seeley (1987, p.1) affirms that it is highly desirable but hardly feasible to produce … [infrastructure] that is maintenance free, although much can be done at the design stage to reduce the amount of subsequent maintenance work.
1.3 Nature of Maintenance

Seeley (1987, p.2) subdivides maintenance into ‘planned’ and ‘unplanned’ maintenance. This discussion categorises maintenance in accordance with Speight’s classification in Seeley (1987, p.3) which summarises this topic into three broad categories as listed below:

- Major repair or restoration: such as re-roofing or rebuilding defective walls and often incorporating an element of improvement.
- Periodic maintenance: a typical example being annual contracts for decorations and similar work.
- Routine or day-to-day maintenance: This is largely of the preventive type, such as checking rainwater gutters and servicing mechanical and electrical installations.

As stated above, Seeley (1987, p.13) further, asserts that maintenance comprises three separate main components – servicing, rectification and replacement.

Servicing: is essentially a cleaning operation undertaken at regular intervals of varying frequency and is sometimes termed day-to-day maintenance.

Rectification: work usually occurs fairly early in the life of the building and arises from shortcomings in design, inherent faults in or unsuitability of components, damage of goods in transit or installation and incorrect assembly.

Replacement: is inevitable because service conditions cause materials to decay at different rates. Much replacement work stems not so much from physical breakdown of the materials or elements as from deterioration of appearance.

Seeley (1987, p.14) also states that maintenance can also embrace renovations which consists of work done to restore a structure, service and equipment by a major overhaul to the original design and specification, or to improve on the original design. This may include limited additions and extensions to the original … [facility].

Periodic and routine or day to day maintenance highlighted in the foregoing definition of maintenance including servicing and rectification, falls outside the ambit of this discussion and will not be discussed any further. The undergoing argument will therefore be centered on major repair and restoration or replacement.

2. CONTRACT STRATEGY AND PROJECT MANAGEMENT

Infrastructure maintenance projects like any other project requires effective application of project management principles as laid down by the PMBOK (2006). This is in order to attain project objectives and meet the stakeholders’ expectations. Stakeholder needs and expectations in the discussion at hand include the attainment of good value for money.
PMBOK Guide (1996, p.6), defines Project management as the application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project. Contract strategy is one of the tools within project management that is used to accomplish stakeholder needs and expectations on a project.

PMBOK Guide (1996, p.277) states that different types of contract strategies are more or less appropriate for different types of projects and the type of contract strategy to be used including the specific terms and conditions sets the degree of risk for meeting or not meeting stakeholder needs or expectations.

PMBOK Guide (1996, p.277) further points out that, contract strategies generally fall into one of the three broad categories namely; fixed-price or lump-sum contracts, cost-reimbursable contracts and, time and material (T&M) contracts. For the purpose of this discussion T & M Contracts will not be discussed any further as they are suitable for research and development projects and not infrastructure rehabilitation projects.

It can therefore be concluded that the clients’ requirements [needs] or expectations... along with other planning considerations such as the degree of market competition and degree of risk determines the type of contract strategy to be used, (PMBOK Guide 1996, p.277).

The chapter that follows analyses the different types of contract strategies that are frequently used on the execution of infrastructure rehabilitation works, with special focus on works of alteration and repair and a strong emphasis on attaining good value for money.

2.1 Fixed Price or Lump Sum

Fixed price contracts include those based on schedules of rates, approximate quantities and bills of quantities (Seeley 1987, p.297). Their great merit lies in the predetermined nature of the mechanism for financial control provided by the pre-determined agreed rates, and the risk of making a profit or loss rests with the contractor (Seeley 1987, p.297).

Under this contractual arrangement the contractor must carefully estimate the target cost because he is required to perform the work at the negotiated contract value. If the estimated target cost was low, the total profit is reduced and may even vanish. However, the contractor may not be able to underbid the competitors if the expected profit is overestimated and therefore he assumes a large risk (Kerzner 2003, p.819).

A fixed price contract provides maximum protection to the client for the ultimate cost of the project, but has the disadvantage of requiring a long period for preparation and adjudication of bids. There is also a possibility arising out of the unpredictability nature of building maintenance works where contractors may include an excessive amount of contingency to cater for the unknown.
This form of contract should not be considered by the client unless, at the
time bid invitations are issued, the building requirements are known exactly
because any changes requested by the client after award of a contract on a
lump sum basis lead to troublesome and sometimes costly extras (Kerzner
2003, p.819). PMBOK Guide (1996, p.277) also share the same opinion
that this type of contract is suitable for a well-defined product. Because
maintenance works involve a lot of changes requested by the client, using
this contract may defeat the purpose of attaining good value for money.

Seeley (1987, p.297) further examines and compares the most
commonly used variations of the fixed price contracts as follows:

### 2.2 Bills of Quantities Contracts

A bill of quantities (BOQ) is a document used in tendering in the
construction industry in which materials, parts, and labour (and their costs)
are itemised. It also (ideally) details the terms and conditions of the
construction or repair contract and itemises all work to enable a contractor
to price the work for which he or she is bidding.

This type of contract is a commonly used contractual arrangement
where the quantities of the bulk of the work can be ascertained with
reasonable accuracy before the work is commenced. A bill of quantities
gives as accurately as possible the quantities of work to be executed and
the contractor enters a unit rate against each item of work. The extended
total are added together to give the total cost of the project. This is also the
most frequently used contract strategy in developing countries.

Al-Sedairy in Tsheboeng (2002, p. 27), in his studies of project
management in developing countries states that, as a country moves
through its development continuum, the role of the large international…
[Contractor] diminishes and the importance of the small contractor grows.
Cost reimbursable contracts including the associated variations receive
very little application in developing countries. This is as a result of the low
literacy levels of most citizen contractors who have no professional
expertise in administering other contract strategies. However, they are
“targeted” by their governments to participate in the development of their
countries’ with a view of creating employment and alleviating mass poverty.
The situation is worsened by citizen contractors’ general reluctance to
employing professional and skilled staff who would provide the needed
expertise for successful contract administration.

Despite governments’ emphasis on attaining greater value for
money when investing in infrastructure projects, other factors may play a
role and to a large extent and outweigh the priority of attaining good value
for money. One critical area worth mentioning is the [social, economic and
political] environment in which procurement takes place (Kerzner 2003,
p.812). In our case “targeting” citizen contractors when awarding jobs and
the application of contract strategies which citizens’ contractors would find easy to use, in view of employment creation and poverty alleviation.

2.3 Approximate Quantities Contracts

Bills of Approximate Quantities are an alternative form of Bills of Quantities and are prepared early in the design process before a firm design is available. The contractor is selected, normally by competition from a pre-selected list of contractors. Contractors prepare a tender bid based on pricing a Bill of Approximate Quantities. This is essentially a traditional Bill of Quantities but with the quantities assessed from professional experience by the Quantity Surveyor rather than firmly measured, as would be the case with “Bills of Quantities”.

The disadvantage of approximate Bills of Quantities is the lack of a firm cost for the work at the time the contractor is appointed, thus there is less price certainty. This is because the actual cost of the works is calculated only when the design is available and detailed re-measurements have been made. This entails that the client proceeds to the construction stage at greater risk, despite a check being made at the tender stage by means of bids being submitted by the tendering contractors.

This type of contract strategy is appropriate for projects for which an early start on site is required or where the design is reasonably well defined or alternatively where the work is of a repetitive nature following on from other similar projects (allowing assessments to be made of the quantity of works from previous experience), but where time is not available for full Bills of Quantities to be prepared.

Because of the fact that the client proceeds to construction stage at great risk regarding the final cost, this type of contract is not suitable where there is a lot of emphasis on attaining the greatest value for money.

2.4 Schedule of Rates Contracts

The employer may supply a schedule of unit rates covering each item of work and ask the contractors, when tendering, to state a percentage above or below the given rates for which they would be prepared to execute the work. Alternatively and in many cases, the contractors may be requested to insert prices against each item of work, and a comparison of the rates so entered will enable the most favourable offer to be ascertained.

Approximate quantities are sometimes included to assist the contractors in pricing the schedules and the subsequent comparison of the tendered figures. This type of contract is very suitable for maintenance and repair contracts, where it is impossible to give realistic and accurate quantities of the work to be undertaken.
Although this type of contract is suitable for maintenance and repair contracts, they are unsuitable for application on maintenance and repair contracts where value for money is the first priority. This is due to cost overruns which in most cases outweigh the return on investment (ROI). It is further, extremely difficult to make a fair comparison between the figures submitted by various contractors, unless approximate quantities are inserted in the schedules. This is because there is no total figure available for comparison purposes and the unit rates may fluctuate extensively between the various tenders.

The foregoing notion affirms Kerzner’s (2003, p.819) statement that a lump sum contract should not be considered by the client unless, at the time bid invitations are issued, the project requirements are known exactly, because any changes requested by the client after award of a contract leads to troublesome and in most cases costly extras. Although this type of contract is suitable for maintenance and repair contracts, PMBOK Guide (1996, p.277) disagree with this thought and further states that this type of contract is suitable for a well-defined product, a fact that is not common with the nature of maintenance works.

Although the easy to use fixed price contract helps create employment and poverty alleviation by involving citizen contractors, most governments in developing countries appear dissatisfied with this contract as far as the attainment of value for money is concerned. This is the predicament that most governments in developing countries find themselves in. a situation where in trying to improve the physical infrastructure of the country at optimum cost other factors such as political, social, economic and so on, within the environment in which procurement takes place affects this goal.

In view of the foregoing it is worthwhile to further discuss the use of other types of contract strategies like the cost plus contracts.

### 2.5 Cost plus Contracts

Baker (1974) in Tsheboeng (2002, p.11), states that the fixed price incentive contracts would be suitable where the attainment of good value for money is of utmost importance. In justifying this thought, he pointed out two studies that were undertaken where incentive contracts were used. The studies showed a move of the actual program cost closer to the cost estimates. Robert Perry et al (1985) in Tsheboeng (2002, p.11) also reported in his study that on average, cost estimates for the 1960s were about 25% less than those for programmes for the 1950s. Similarly the Rand studies of the 1970s showed less cost and schedule overrun than in the 1960s, and studies of the 1980s conducted to-date show an improvement over the 1970s (Robert Perry et al (1985) in Tsheboeng (2002, p.11)). Therefore, the picture created by the cost plus fee contract, shows that scales are tipped towards the incentive fee contract. In practice
cost plus contracts can take any one of the three different forms discussed below, (Seeley 1987, p.296):

2.5.1 Cost plus Percentage Fee

Seeley (1987, p.296) states that in a cost plus percentage contract the contractor is paid the actual cost of work done plus an agreed percentage of the actual or allowable cost to cover overheads and profit. This type of contract is useful on maintenance works of an emergency nature when there is insufficient time available to prepare detailed schemes prior to commencement of the work, but an unscrupulous contractor could increase his profit by delaying the completion of the works because no incentive exists for the contractor to complete the works as quickly as possible or to endeavor to reduce costs.

2.5.2 Cost plus Fixed Fee

With this form of contract the contractor bids a fixed amount of fee or profit for the services to be supplied; with engineering, materials, and field labour costs to be reimbursed at actual cost, (Kerzner 2003, p.820). No incentive exists for the contractors to secure efficient working, although it is the contractors’ advantage to complete the works as soon as possible so that they earn the fixed fee as quickly as possible and release their resources for other works (Seeley 1987, p.297).

2.5.3 Cost plus Fluctuating Fee or Fixed Price Incentive Fee

Fixed-price-incentive-fee (FPIF) contract is the same as fixed-price contracts except that they have a provision for adjustment of the total profit by a formula that depends on the final cost at completion of the project which is agreed in advance by both the client and the contractor (Kerzner 2003, p.823). This contract is suitable for use on a project where contractual requirements are firmly established. This contract provides an incentive to the contractor to reduce costs and therefore increase profit and both the client and contractor share the risk and savings (Kerzner 2003, p.823).

The essence of the incentive contract is that it offers the contractor more profit if costs are reduced or performance is improved and less profit if costs are raised or if performance goals are not met. The sharing formula is generally expressed as a ratio. For instance, if a 90/10 formula is negotiated, the client would pay for 90 cents and the contractor 10 cents for every Rand above the target cost. Thus it benefits both the contractor and the client to reduce costs; because the contractor must consider that 10 percent of every Rand must be spent by the
company should costs escalate. Expected profits are therefore increased by making maximum use of the contractor’s managerial skills (Kerzner 2003, p.823). In addition Kerzner (2003, p.823) states that in the FPIF contract, the contractor agrees to perform a service at a given fixed cost. If the total cost is less than the target cost, then the contractor makes a profit according to the incentive-fee formula. If the total cost exceeds the target cost, then the contractor makes a loss.

When the works are completed, the contractor submits a statement of costs incurred in the performance of the contract. The costs are audited to determine allowability and questionable charges are removed. This determines the negotiated cost. The negotiated cost is then subtracted from the target cost. The result is then multiplied by the sharing ratio. If the number is positive, it is added to the target profit. If it is negative, it is subtracted. The result is the final profit, which is then added to the negotiated cost to determine the final price. The final price never exceeds the ceiling price.

The foregoing comparison of the most commonly used contract strategies on infrastructure maintenance works is an attempt at finding the most appropriate contract strategy that would yield greater value for money on infrastructure rehabilitation works.

3. CONCLUSION

The discussion affirms that most maintenance works carried out by governments of developing countries utilise the lump sum contract with bills of quantities. Their great merit lies in the predetermined nature of the mechanism for financial control where the contractor must carefully estimate the target cost because he is required to perform the work at the negotiated contract value. However, it lacks the ability to give an incentive to the contractor to reduce costs while the works are in progress. This is one reason that renders this contract strategy vulnerable to the lack of good value for money.

The fixed price contract is unlike the FPIF contract which provides an incentive to the contractor to reduce costs and its fundamental nature to offer the contractor more profit if costs are reduced or if performance is improved and less profit if costs are raised or if performance goals are not met. This unique feature about FPIF contracts boosts greater value for money.

On the other hand the two contracts share one thing in common, in the sense that the determination of a target cost in both cases may be done using the bill of quantities.

In conclusion, the FPIF contract would yield the greatest value for money compared to the lump sum contract when properly applied on maintenance works by governments in developing countries.
4. SUMMARY RECOMMENDATIONS

1. The governments in developing countries should align technical and socio economic goals to be achieved on a project with the need to attain the best value for money.
2. The fixed price incentive fee contract is recommended for use on maintenance works as it does not only address the inadequacies of other contract strategies but has the capability to attain the greatest values for money.
3. The use of a fixed price incentive fee contract and other standard forms of contracts like the NEC, FIDIC, and so on, would be too complex for small and emerging contractors, hence the following is recommended:
   - Media publications and contractors’ booklets or periodicals should be used to communicate, educate and interact with citizen contractors.
   - Citizen contractors should enter into joint ventures with international and experienced larger contractors.
   - Citizen contractors should be encouraged to employing qualified staff knowledgeable to manage these contracts strategies.
   - Skills transfer can further be enhanced by providing third party management support to small and emerging contractors.
5. REFERENCES


The Application of Facilities Maintenance within the public sector: An exploratory study

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ABSTRACT AND KEYWORDS

Purpose

The exploratory study investigates the implementation of maintenance practices with regard to the need, classification, planning, implementation, impact and cost estimating by property practitioners.

Design/methodology/approach

A literature review identified key concepts to be defined in terms of maintenance. Data was gathered through visual inspections and structured interviews with a sample of property practitioners regarding current maintenance practices adopted for their facilities. Outputs were subsequently analysed and interpreted.

Findings

The key finding revealed that maintenance is implemented predominately on a corrective/emergency basis. This in turn has led to inaccurate maintenance estimates being projected by property practitioners resulting in the overrunning of maintenance budgets and premature replacement of building components.
Research limitations/implications

The study was limited to two public sector organisations in the Eastern Cape province, managing facilities covering in excess of 100 000m² of office accommodation, warehousing, clinics, museums, libraries, houses and community halls.

Practical implication

The findings provide a holistic overview of the status of maintenance and the impact of unstructured maintenance on facilities within the public sector.

Originality/Value

The data retrieved from respondents can be compared against best practice as defined in the various literature sources on maintenance. This can inform the shortcomings of current maintenance practices and the requirements to develop a cost effective maintenance strategy. Hence collation of the data analysed can be further developed into a structured Maintenance Management Framework for the public sector.

Key words


1. INTRODUCTION

Infrastructure is a means to an end (The Department of Public Works, 2006: 9). Maintaining this infrastructure is therefore an essential imperative for the country. Maintenance is thus an essential priority. Chanter and Swallow (2007:128) state that maintenance work will be inevitable, as it is in its nature for material to deteriorate over time with usage and exposure to the elements of climate. Moubray (1997:6-7) views maintenance as preserving something which stems from the word ‘maintain’ which is defined as a cause to continue or keep in an existing state. Best, Valence, Langston (2003:177) state clearly that maintenance is a significant activity. Best et al., (2003:177) continue by stating that an important competency that provides value adding to built facilities is the coordination of operations and maintenance management. Cloete (2002: 40) goes as far as stating that maintenance management guarantees that capital investments are protected and ensures acceptable working environment for users.

Cloete (2001: 14) also adds that it is unfortunate that at times maintenance is accorded little or no merit in addition to this Martin (2006:...
adds that failure to maintain property often results in large and unbudgeted expenditure occurring. It is therefore imperative for the property practitioner to embrace maintenance as a global concept and to apply it as efficiently and effectively within their working environment. In order to implement good maintenance, the property practitioner will need to understand the various components of a building structure, its functionality and with regard to maintenance the need, classification, planning, implementation, impact and cost estimating. Maintenance can therefore be seen as an important management component to any property practitioner as it forms the cornerstone of the life span of any property.

This exploratory study will investigate the implementation of maintenance practices with regard to the need, classification, planning, implementation, impact and cost estimating by property practitioners.

2. FACILITIES MAINTENANCE

2.1 The Need for Building Maintenance

Various authors have presented cases for the need for structured maintenance among these are Martin (2006:199) who states that if routine maintenance is neglected or deferred, defects are aggravated and items that could have been dealt with at a relative low cost can deteriorate and create more costly and serious repairs. In line with this the Department of Public Works (2006: 9) states that the cost of not maintaining infrastructure is no longer affordable to South Africa. They continue by stating that in some sectors it is negating the impact of the infrastructure development undertaken to date and planned for the future. The above statement clearly indicates the importance of maintenance of infrastructure and built facilities, as described by the Department of Public Works (2006: 9) maintenance of infrastructure lends itself towards ensuring an adequate quality of life and supports the economy of the country.

2.2 Classification of Maintenance

Chanter and Swallow (2007: 134) and Cloete (2001: 10-12) state that maintenance can be classified as routine or remedial, or planned and unplanned. Chanter and Swallow (2007: 134) and Cloete (2001: 10-12) refer to the British Standards Institute’s definition of planned maintenance which is described as maintenance organised and carried out with forethought, control and the use of records, to a predetermined plan.

Cloete (2001:10-12) further subdivides planned maintenance into two main sub categories being planned preventative maintenance which is work directed to the prevention of failure of a facility in order to ensure continued operation and planned corrective maintenance which is work undertaken after failure has occurred. Cloete (2001: 12) makes
reference to Seely (1987: 2) who further sub divides planned preventative maintenance into scheduled and condition based maintenance. The more common practice which is scheduled maintenance is defined in Chanter and Swallow (2007: 134) as preventative maintenance carried out to a predetermined interval of time, number of operations, mileage, etc. Chanter and Swallow (2007: 134) make reference to the British Standards Institutes definition of unplanned maintenance which is described as ad-hoc maintenance carried out to no predetermined plan. Cloete (2001: 10-12) refers to unplanned maintenance as work necessitated by unforeseen breakdowns or damage due to external forces. Suttel (2006) states that ideally, the ratio should be 70% planned preventive maintenance and 30% planned corrective maintenance.

Another classification of maintenance as used in practice by property practitioners is deferred maintenance. Deferred maintenance is the practice of postponing maintenance activities such as repairs on a facility in order to save costs, meet budget funding levels, or realign available budget monies. The failure to perform needed repairs could lead to asset deterioration and ultimately asset impairment. Generally, a policy of continued deferred maintenance may result in higher costs, asset failure, and in some cases, health and safety implications. Table 1 below provides an overview of the classification of maintenance as defined by the (Department of Public Works, 2007).
### MAINTENANCE WORK CLASSIFICATION

**And Sub-Categories**

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned</td>
<td>Preventive Service</td>
<td>The actions performed to prevent failure by providing systematic inspection and monitoring to detect and prevent incipient deterioration or failure and includes testing to confirm correct operation.</td>
</tr>
<tr>
<td></td>
<td>Condition-based</td>
<td>Corrective maintenance work performed, as a result of significant deterioration or failure, to restore an asset to its required condition standard. The work may be programmed as a result of Condition Assessments or as random additions to the program based on priority.</td>
</tr>
<tr>
<td></td>
<td>Statutory Maintenance</td>
<td>Both Preventative Service Maintenance and Condition-based Maintenance may contain elements of Statutory Maintenance which is defined as actions performed to provide the minimum level of maintenance to meet legal and other mandatory requirements contained in Commonwealth and State Regulations, Australian Standards and Codes of Practice.</td>
</tr>
<tr>
<td>Unplanned</td>
<td>Routine &amp; Breakdown</td>
<td>Unplanned and reactive maintenance actions performed to restore an asset to operational condition, as a result of an unforeseen failure. Unplanned maintenance actions to restore an asset to an operational or safe condition as a result of property damage resulting from storms, fire, forced entry and vandal damage.</td>
</tr>
<tr>
<td></td>
<td>Incident Maintenance</td>
<td>Unplanned maintenance actions to restore an asset to an operational or safe condition as a result of property damage resulting from storms, fire, forced entry and vandal damage.</td>
</tr>
</tbody>
</table>

**Table 1: Maintenance classification**

Source: Maintenance Management Framework, Department of Public Works, Queensland, Australia.

#### 2.3 The Execution of Maintenance

In executing maintenance Cloete (2001: 30) states that inspection cycles are a basic necessity for planned maintenance. Mc Dulling (2008) underlines the importance of condition based assessments which is defined as predetermined inspections to analyse asset performance and maintenance requirements aligned with this is maintenance cost estimating, maintenance budgeting, managing of maintenance data and building up historical information as presented in Means (1997). Mc Dulling (2008) alludes to an important point of consideration for property practitioners which is prioritising maintenance work. From the above it is apparent that planning is key in executing maintenance. With regard to maintenance planning Buys (1997: 6) describes the planning as a process which sets out realistic action plans to anticipate, regular repair and sustained enhancement in order to prolong economically useful lives of buildings and to ensure the desirability in terms of market value.
Chanter and Swallow (2007: 255) state that of all the consideration relating to the execution of building maintenance the most important strategic issue is that of who actually does the work. Chanter and Swallow (2007: 255-283) explain the process behind the execution of building maintenance, although based on British conditions, they identify generic concepts to consider; these are the decision whether to employ direct labour or outsourced method of performing maintenance, secondly the agreements between client and service providers must be sound and clear, thirdly performance criteria must be established and agreed upon. In executing maintenance the property practitioners needs to understand the basic need of maintenance which is to re-instate physical condition of an asset to a specified standard, and to prevent further deterioration or failure. Means (1997: 402) states that much of the maintenance and repair work with regard to office buildings is predictable and that landlords use a combination of in house staff and outsourced vendors to execute maintenance.

2.4 Maintenance Estimating

Means (1997: 231-232) state that maintenance estimating is the most common type of estimate performed for a property and in addition cost estimates play an important role in evaluating the feasibility or desirability of major modifications or improvements to a property. The process of conducting maintenance estimates begins with understanding all the costs incurred, these must be categorised as direct and indirect cost. The property practitioner must create their own data base of cost, this includes understanding the various cost involved in maintenance such as material cost, labour cost, market related profit percentages charged by contractors. Added to this must be the understanding of productivity, the property practitioner must understand how long maintenance of the various components will take and how often maintenance or repair will be required.

Mc Dulling (2008) has identified key contributors to high maintenance cost, among these are the lack of accurate and reliable information on the current condition and maintenance requirements of an element and inaccurate budgeting or under funding for maintenance work. The Department of Public Works (2007: 3) states that when developing a maintenance budget due consideration must be given to existing assets to be maintained, new assets coming in to the facility, existing assets to be upgraded, refurbished, quality of material and components in a facility and the required level of planned maintenance. In the process of estimating maintenance cost the property practitioner needs to understand the concepts of value engineering versus capital improvement and reserve funds Means (1997: 288) defines value engineering as being a rational method of making cost-efficient choices between alternatives when upgrading, maintaining, and making system replacements. A capital improvement is normally a short-range plan, usually four to six years, which
identifies capital projects and equipment that need to be purchased, in line with this will be a schedule that identifies options for financing the improvements. According to Means (1997: 309) all facilities require some type of capital plan or reserve fund. Components of the facility that are exposed to weather, climate and general wear and tear have a higher degree of need for maintenance and repair than structural elements. Means (1997: 209) continues to add that the perfect reserves set aside funds equal to the rate of attrition of the components and schedule component replacement just prior to the onset of either functional or economic obsolescence.

2.5 Benchmarking and Maintenance Outsourcing

Benchmarking in maintenance is the identification of industry best practices that lead to superior performance, where data from individual facilities are measured against those from other comparable ones. Reichelt (2005: 179) defines benchmarking as the continuous process to measure products, services and practices against the strongest competitor or the company which is considered an industry leader. Dunn (1999:online) adds that benchmarking has become a common practice in all kinds of businesses. Best et al. (2003: 378) states that there is a world trend towards outsourcing specialist non-core services. Outsourcing is changing the way in which organisations restructure and procure services. Means (1997: 39) state that it is important to use a structured approach when evaluating the potential outsourcing of some or all of the facility management and maintenance functions. Atkin and Brooks (2009: 52) state that the decision to outsource has to be made both rationally and objectively. Maintenance outsourcing is an aspect that all property practitioners will be faced with; it plays a key role in ensuring the efficient operation of a facility as non-core functions that do not impact on the organisations competitive advantage can be outsourced. Maintenance outsourcing can be best utilised within facilities management by the property practitioner identifying maintenance activities that can be outsourced.

3. EMPIRICAL STUDY

3.1 Sample overview and survey methodology

The primary source of conducting the research was through the use of structures interviews with property practitioners. This included visual inspections of the facilities and access to maintenance records. The study was limited to two public sector organisations in the Eastern Cape province managing facilities covering in excess of 100 000m² of office accommodation, warehousing, clinics, museums, libraries, houses and community halls. The reason for only selecting public sector organisations
is that they are the largest property owners in South Africa and hence play a major role in the preservation and utilisation of infrastructure.

**Organisation one:**

- **Organisation:** South African Revenue Services (SARS), (Eastern Cape Province)
- **Practitioner:** Mr Jude Sam
- **Position:** Regional Facilities Manager
- **No of facilities:** 11 (38 000 m²)
- **Type of facilities:** Office accommodation and warehousing

**Organisation two:**

- **Organisation:** Nelson Mandela Metropolitan Municipality (NMMM), (Eastern Cape Province)
- **Practitioner:** Mr Patrick Keble
- **Position:** Director of Facilities Management
- **No of facilities:** 289 (65 000 m²)
- **Type of facilities:** Office accommodation, libraries, clinics, museums, houses and community halls.

**a. Classification of maintenance**

<table>
<thead>
<tr>
<th>Question one</th>
<th>Does your organisation have a structured maintenance management framework covering all aspects of your maintenance requirements and implementation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question two</td>
<td>How would you categorise the type of maintenance implemented by your organisation, both in terms of classification and percentage allocation.</td>
</tr>
</tbody>
</table>

*Table 2: Interview questions for classification of maintenance*
b. Executing maintenance

Table 3: Interview questions for the execution of maintenance

<table>
<thead>
<tr>
<th>Question one</th>
<th>How often do you conduct inspections/condition monitoring of your facilities to assess the impact of climate, general wear and tear from usage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question two</td>
<td>How often is your maintenance planning/policy or procedures reviewed and how do you prioritise maintenance activities.</td>
</tr>
<tr>
<td>Question three</td>
<td>Is your maintenance work outsourced or conducted internally and what is the percentage allocation.</td>
</tr>
<tr>
<td>Question five</td>
<td>Do you make use of Building Management Software such as Archibus, Genesis etc.</td>
</tr>
<tr>
<td>Question five</td>
<td>Is your maintenance activities categorised per building component and which components require more attention and utilise most of the budget. Do you prioritise your buildings according to service provide and the rate of usage.</td>
</tr>
<tr>
<td>Question six</td>
<td>How are you addressing any shortcomings in your maintenance strategy based on the maintenance literature provided.</td>
</tr>
<tr>
<td>Question seven</td>
<td>How much of the required maintenance is deferred to the next financial year (%)</td>
</tr>
</tbody>
</table>

c. Maintenance Estimating

Table 4: Interview questions for maintenance estimating

<table>
<thead>
<tr>
<th>Question one</th>
<th>Does maintenance budgets receive the necessary attention by top management structures, and are they based on condition assessments of all facilities.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question two</td>
<td>Do you meet or over exceed your annual maintenance budgets as approved by top management and by what percentage</td>
</tr>
<tr>
<td>Question three</td>
<td>Have you created a database or information system to record all maintenance work, their cost in order to build up historical data.</td>
</tr>
<tr>
<td>Question four</td>
<td>How often do you conduct value engineering exercises in order to determine repair and replacement cost of the various building components.</td>
</tr>
<tr>
<td>Question five</td>
<td>Does your organisation set aside reserve funds for maintenance activities and future replacement cost of the building components.</td>
</tr>
</tbody>
</table>
d. Benchmarking and Maintenance Outsourcing

<table>
<thead>
<tr>
<th>Question one</th>
<th>Does your organisation institute benchmarking practices by comparing the maintenance requirements of the various facilities you manage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question two</td>
<td>Do you have standing Service Level Agreements (SLA) with service providers for your maintenance needs both scheduled and planned</td>
</tr>
<tr>
<td>Question three</td>
<td>Are or will your SLA’s be incentivised or performance based</td>
</tr>
</tbody>
</table>

3. FINDINGS

The study revealed that the following findings regarding maintenance as practiced by the two public sector organisations:

a. Classification of maintenance

- No structured Maintenance Management Framework or plan is in place despite both entities having dedicated maintenance departments.
- Maintenance is carried out predominately on a corrective basis. The percentage allocations for both entities are 65% corrective and 35% preventative.
- There are no planned preventative maintenance plans in place.
- Only certain building components such as HVAC and lifts were on a scheduled maintenance programme. These are also components which receive the most priority regarding maintenance budgets and implementation.

b. Executing maintenance

- Both organisations have recently implemented annual condition based assessments in order to determine the specific maintenance requirements. However no record exists to suggest that the maintenance requirements identified are implemented.
- Only SARS have implemented a general weekly inspection to determine any minor maintenance requirements. This is an area neglected by the NMMM.
- Maintenance strategies are reviewed annually by both organisations.
- On average 70% of maintenance work implemented is outsourced.
- Both organisations make use of Building Management Software.
• SARS have implemented a system that is rarely used and the NMMM have implemented a system that does not provide all the functionality required to manage their daily maintenance.
• Most maintenance is related to HVAC components.
• Shortcoming identified in their maintenance strategies are not corrected immediately due to the bureaucratic management systems in place.
• Up to 15% of all identified maintenance is deferred to the next financial year.

c. Maintenance estimating

• The property practitioners due to various reasons fail to estimate maintenance related cost accurately resulting in the overrunning of maintenance budgets and premature replacement of building components.
• A further deterrent for both organisations is that maintenance budgets requested annually are on average cut by 35% by senior management.
• No maintenance history is built up for assets resulting in previous maintenance cost not being recorded and used as reference to prepare for maintenance budgets.
• Value engineering exercises are implemented every 3 years.
• No reserve funds are set aside to cater for future replacement costs of building components.

d. Benchmarking and maintenance outsourcing

• Benchmarking is new to both organisations will implementation only scheduled for 2010 and onwards.
• The NMMM makes use SLA’s to procure the service of service providers, however with these are not target of performance driven, nor are they incentivised. SARS do not make use of SLA’s, opting for conventional open tenders thus delaying any emergency maintenance requirements.

4. RECOMMENDATIONS

It is recommended that public sector entities;

• Revisit their current maintenance practices and evaluate the merits thereof. The literature on maintenance3 as indicated in the study can be utilised as a basis for developing a revised maintenance management framework.
Key areas to be reviewed are implementing preventative maintenance strategies, improving their maintenance cost estimating and budgeting process and building up details records of maintenance history on their facilities. The NMMM makes use SLA’s to procure the service of service

5. CONCLUSION

It can be concluded that although the practitioners interviewed and there organisations do not fully implement maintenance practices as prescribed in the literature, there is an attempt by them to move from the predominately reactive approach to a proactive approach and align themselves in accordance with the literature presented.

Both interviewees demonstrate that they understand the need, classification, planning, implementation, impact and cost estimating with regard to maintenance.

Although key factors detracting from this are:

- The failure to classify maintenance requirements accordingly.
- Key errors in areas such as estimating maintenance cost and not creating an asset history regarding performance and cost are evident.
- Senior management structures who are seen as hampering progress towards generating a fully fledged maintenance programme as in both studies they influence the budgets in a negative manner affecting both back log and planned maintenance.

The findings above support the need for public sector entities to implement a more structured Maintenance Management Framework both from a cost perspective and the preservation of state assets.
6. REFERENCE

A Comparative Overview of Facilities Management Namibia and South Africa Regarding Building Maintenance

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ABSTRACT AND KEYWORDS

Purpose of this paper

The study examines the building maintenance process for institutional facilities in Namibia in comparison with South Africa and other developed countries.

Design methodology

A review of historical and current building maintenance practices. Data was gathered by means of a questionnaire survey with the Department of Works in Namibia, the only feasible department in which such a survey could be conducted, as well as interviews and review of electronic and written literature.

Findings

The need for condition-based maintenance budgets in building maintenance is reliant on an integrated budgeting approach for both new and existing facilities. The increasing awareness of constraints in terms of
human resources, finance and transport forces the establishment of a
proactive maintenance culture.

Research limitations

The study only focussed on the management of institutional buildings of the
countries in question. The building preservation process is a critical
outcome of condition-based maintenance activities, however not discussed
herein due to space constraints.

Practical implications

The findings provide a picture of the budget process and the benefits of
maintaining state-owned facilities, while eradicating backlog maintenance
through condition-based maintenance budgets.

What is the value of paper?

The study can be further developed into a structured Maintenance
Management Framework for effective management of government assets.

Key words

Building maintenance, condition assessments, condition-based
maintenance budgets, facilities maintenance management

1. INTRODUCTION

This research paper focuses on the rational of condition-based
maintenance budgets for institutional buildings within the context of
facilities maintenance management.

The link between new facilities i.e. capital projects and existing
facilities i.e. maintenance management of institutional facilities are
investigated. A questionnaire (available on request) was developed by the
authors to assess the development, implementation and monitoring in eight
areas, concluding with general remarks. The survey conducted at the
Department of Works included areas of investigation in/of: immovable asset
registers; identification of maintenance needs and support functions of the
custodian; policies and procedures; key maintenance activities; use and
maintaining of cost data; procurement and budgeted allowances;
maintenance planning and execution; integrated budget process – new and
existing facilities; general opinion on building maintenance execution. More
rigorous results may have been obtained through sampling of buildings, but
such research evidently requires more time and direct stakeholder(s)
involvement, from an informed client on the subject.

Where applicable, examples from the health sectors of Namibia and
South Africa are used to illustrate the outcome of previous research results.
In 2001, the Ministry of Health and Social Services in Namibia (MOHSS), requested the assistance of the Council for Scientific and Industrial Research (CSIR) in South Africa, in order to establish the shortcomings of the ministry in terms of maintenance issues. Findings of the research revealed four common maintenance problems (McDuling, 2001):

- Problem No. 1: Lack of accurate and reliable information on the current condition and maintenance requirements of building fabric and elements;
- Problem No. 2: Inaccurate budgeting for and under-funding of maintenance work;
- Problem No. 3: Technical and financial considerations are often neglected in the prioritising of maintenance work;
- Problem No. 4: Communication

Almost a decade after identifying and analyzing the problem areas, the maintenance management of health facilities remains under severe pressure in Namibia. While the same negative results are visible from South African reports in the health sector, South Africa do have records of significant success stories in the sectors of health, education and the defense force. It is for this reason that the implementation, monitoring and control of condition-based maintenance budgets are reviewed in this paper.

The objective is to contribute to the effective and efficient maintenance management of buildings through the application of condition-based maintenance budgets, by both custodian and user, as in the case of building management for institutional buildings.

2. THE RATIONALE BEHIND CONDITION-BASED MAINTENANCE BUDGETS

2.1. The Relationship of an Immovable Asset Registers (AIM) with the Condition Assessments and Ultimately Condition-based Maintenance Budgets

The condition of something has a direct relationship with the need to keep, maintain, or reinstate it to its original state. Therefore, in the context of facilities maintenance management "Maintenance budgets depend on the condition" in turn "Maintenance budgets should be condition-based and thus reliant on the execution of condition assessment of the fabric, element, installation or building" (McDuling, 2007).

"The period after installation during which a building or component meets or exceeds its performance requirements" (Agenda 21, 1992) so defines, service life, and thus connects to age and condition.

The latter two elements of an asset are a reasonably safe measure of determining the remaining service life, subject to knowledge of recent changes, etc. Vanier (2000) lists the “Six What’s” of Asset Management, which gives structure to the underlying principle for the implementation of an integrated asset management approach as follows:
2.2 The six “Whats” of Asset Management

1. What do we own?
2. What is it worth?
3. What is its condition?
4. What is the deferred maintenance?
5. What is the remaining service life?
6. What do you fix first?

The first two questions address the need for a comprehensive immovable asset register. Included in an asset register are information relating to the ownership of land, site, facility, buildings, building specific information, component specific, etc as well as the replacement value of an asset. The replacement value of an asset is important in determining what percentage of maintenance budget should be. McDuling, (2007) advises that the internationally acceptable norm of the current replacement value (CRV) is four percent (4%).

The principles below address the need for condition assessments and the subsequent budgeting thereof. Prioritising and scheduling of maintenance activities are addressed in the remaining question.

An honest analysis of the above portrays the health of an organisation’s approach to strategic asset management and or the need for the implementation thereof.

The strategic asset management framework inherently necessitates the development of policies and procedures as guidelines for implementation and execution.

In Australia, the following principles have been formulated (Maintenance Management Framework for Queensland Government Buildings 1999):

- **Condition Assessment:** A structured Condition Assessment process must be part of the condition-based maintenance strategy and should be undertaken as part of the maintenance planning process. All Queensland Government building assets must be inspected, through the Condition Assessment process, at least once in every 3 years.
- **Arrange/conduct Condition Assessments:** As a minimum all Queensland Government buildings are to be assessed by site inspection at least every three years, depending on the nature of the facility.

NASA (2003:12) method for condition assessment includes “an independent rapid visual assessment of nine different systems within each NASA facility. Assessments are done for the “structure, roofs, exterior; interior finishes, HVAC, electrical systems, conveyance systems, program support equipment.” The elements can be expanded to accommodate client specific needs, as in the case of government and local authorities for example landscaping and grounds maintenance.
2.3 Standardisation, Condition Categories and Condition Ratings

Categories of assets should be defined and maintenance standards achieved in accordance thereof. Hospitals, for example, have a number of distinct requirements, especially regarding specialized mechanical and electrical installations. (E.g. HVAC, plumbing and drainage, auto-claves, kitchen and laundry equipment, three-phase back-up power supply, etc). The proper functioning thereof influences customer confidence and public relations. A high level of maintenance should be maintained in the overall performance of the facility.

Other demands on the facility are dictated by funding, general maintenance practices, adherence to National Codes and Standards, Occupational Health and Safety, Disability Act, availability of human resources, etc, but not limited to these demands.

Educational facilities also have their own unique requirements at different levels. These facilities are challenged by the type of user, governance, availability of funding and general culture of learners and or students.

The Maintenance Management Framework for Queensland Government Buildings (1999) from which Table: 1 is taken provides an example of such categories or performance standards.

<table>
<thead>
<tr>
<th>Performance Standard</th>
<th>Condition Standard Rating</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly sensitive functions with critical results (e.g. Hospital operating theatre)</td>
<td>Asset to be in best possible condition. Only minimal deterioration will be tolerated.</td>
<td>S5</td>
</tr>
<tr>
<td>high profile public building (e.g. Parliament House).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business operations requiring good public presentation and high quality working</td>
<td>Asset to be in good condition operationally and aesthetically, benchmarked against</td>
<td>S4</td>
</tr>
<tr>
<td>environments (e.g. Modern multi-storey CBD building).</td>
<td>industry standards for that particular class of asset.</td>
<td></td>
</tr>
<tr>
<td>Functionally-focused asset at utility level (e.g. Laboratory).</td>
<td>Asset to be in reasonable condition, fully meeting operational requirements.</td>
<td>S3</td>
</tr>
<tr>
<td>Functions are ancillary only, with no critical operational role (e.g. Storage),</td>
<td>Condition needs to meet minimum operational requirements only.</td>
<td>S2</td>
</tr>
<tr>
<td>or asset has limited life.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functions have ceased and asset is dormant pending disposal, demolition, etc.</td>
<td>Condition can be allowed to deteriorate and marginally maintained to meet minimum</td>
<td>S1</td>
</tr>
<tr>
<td></td>
<td>statutory requirements only.</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 Asset Standards (Queensland Government: 1999:5)
### Table 2: Condition based description rating (McDuling: 2007)

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>Rating</th>
<th>Maintenance Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good</td>
<td>5 (Royal Blue)</td>
<td>Preventative Maintenance</td>
<td>The fabric, element, installation or building is either new or has recently been maintained, does not exhibit signs of deterioration</td>
</tr>
<tr>
<td>Good</td>
<td>4 (Turquoise)</td>
<td>Condition-based Maintenance</td>
<td>The fabric, element, installation or building, exhibit superficial wear and tear, minor signs of deterioration to surface finishes and requires maintenance/serving. It can be reinstated with routine scheduled or unscheduled maintenance/servicing.</td>
</tr>
<tr>
<td>Fair</td>
<td>3 (Green)</td>
<td>Repairs</td>
<td>Significant sections or elements require repair, usually by a specialist. The fabric element, installation or building has been subjected to abnormal use or abuse, and its poor state of repair is beginning to affect surrounding elements. Backlog maintenance work exists.</td>
</tr>
<tr>
<td>Bad</td>
<td>2 (Yellow)</td>
<td>Rehabilitation</td>
<td>Substantial sections or elements have deteriorated badly, suffered structural damage and require renovations. There is a serious risk of imminent failure. The state of repair has a substantial impact on surrounding elements or creates a potential health risk.</td>
</tr>
<tr>
<td>Very Bad</td>
<td>1 (Red)</td>
<td>Replacement</td>
<td>The fabric, element, installation or building has failed, is not operational to the extent that does not justify repairs, but should rather be replaced. The condition of the element actively contributes to the degradation of surrounding elements or creates a safety, health or life risk.</td>
</tr>
</tbody>
</table>

Table 2 provides an example of a condition based rating system (McDuling: 2007) which is applied in the execution of condition assessments. Condition ratings are predetermined measures to ascertain the condition of the building or component applied to. Table 1.2 provides the assessor with these predetermined criteria to ascertain the condition and performance of the fabric, elements,
installations, etc of the building. Data is captured on site, assessed and used to prioritise planned or unplanned maintenance activities. Backlog and deferred maintenance issues can be adequately addressed for effective and efficient eradication in line with available funding or future budgetary allowances.

The fundamentals of sound methodology for scheduling of maintenance work in line with statutory procurement policies and the creation / generation of data for appointing the relevant successful contractor for execution of works that may be monitored and controlled on a performance-management basis is thus possible. In turn, cost, time and quality can be managed within the scope of the works ensuring completion on time and within budget.

2.2 An Integrated Budgeting Process Approach

RS Means (2001:269) discusses the various tools of cost planning and estimating with a practical application thereof for facilities maintenance. Areas of competencies for facilities maintenance managers include a comprehensive understanding of preventative, predictive or condition-based maintenance activities and their cost imperatives for new fabrics, elements, and buildings. In the case of existing buildings the focus is on general maintenance and repair and replacement issues.

Tools include proactive implementation of Computerized Maintenance Management Systems (CMMS) that provide access to asset registers and the full scope of “integrating the management of people (both internal and external users of the facility, including the management of external contractors) and the business process of an organization with the physical infrastructure to enhance corporate performance.” (Best, Langston and De Valence: 2003: 1).

Benchmarking and outsourcing are competencies which any facilities manager must integrate into maintenance management. Discussion however does not fit into the scope of this paper.

Managing finances in line with budget constraints is an imperative for facilities managers. External forces such as codes, regulations and zoning requirements are key driving forces of change within the facility environment. Situational circumstances often dictate the need for proactive solutions.

From the above, it follows that an integrated budgeting process is necessary to effectively manage the upkeep of service delivery regarding building maintenance.

Figure 3 as modified from RS Means (2001:297) gives an overview of tools and constraints within the context facilities management. The ever increasing need to track the cost of all types of maintenance activities related directly or indirectly to expenses to achieve continuous improvement must aim at increasing maintenance activities and decreasing deferred the maintenance backlog.

The operational and maintenance costs should be projected over time, and a maintenance program determined at occupation of the building by the
user. Cloete (2001:43) describes the building proforma as “a series of reports of which the budget is a document setting out, in comprehensive detail, forecasts for the future performance of the property, and the budget variance report are most important in presenting to the owner a comprehensive picture of the health of the property.”

The dynamic nature of facilities presents the facilities manager with challenges that must be anticipated. The proforma provides a management tool that equips the facility manager to strategically integrate the maintenance activities of new facilities with business objectives in order to enhance corporate performance.

**Figure 3:** Integrated Budget Process Source: RS MEANS (2001:297)
3. OVERVIEW

3.1. Namibia

3.1.1. Department of Works – Custodian

In Namibia the custodian of institutional buildings is the Department of Works (DOW) in the Ministry of Works and Transport (MWT). The department is responsible for maintenance of government buildings. Maintenance is budgeted for as part of the operational budget of the department. Ministries, agencies and or government offices, (often referred to as the user or line ministry) occupying the facility, budget for renovation, upgrading and rehabilitation on the development budget.

Observations concerning the challenges that the department are often faced with, by Maintenance Director, Booysen (2010: personal communication) include “A lack of all user ministries adhering to the latter principle of budgeting; a lack of stewardship (ownership) and sense of duty towards government property result in defects not being reported on time. Occupants of government property rarely take any care of buildings. Shortly after newly constructed facilities are handed over, one will notice broken windows, ripped off door handles, filthy carpets and dirty walls, etc. Ninety percent (90%) of blocked drains are the cause of occupant’s willfully throwing plastic bags and other unwanted items into toilet pots and other direct entries of the drainage system.”

Another challenge is to address the concept of maintenance at user level as not all users have the awareness for making a distinction between, the concept of maintenance and the actions discussed below, which has to be clearly understood in order to properly define responsibilities for funding.

(i) Maintenance versus renovations and rehabilitation.

The operational budget of the government only provides funding to maintain existing infrastructure. (i.e. all services and repairs needed to ensure that an item remain in a working condition) It also includes the replacement of some small components Replacement of entire systems e.g. boilers, lifts, central air-conditioning, etc is the responsibility of the user ministry to properly budget for on the Development Budget.

Currently projects falling in this category are done in phases to accommodate as many projects on the development budget as possible.

International standards for renovating property follow a cycle of eight to twelve years. Government property in Namibia is currently on no cycle and some buildings were renovated 25 to 30 years ago. Some not even since they were constructed.

(ii) Maintenance versus minor new capital works.

When line Ministries request DOW to attend to maintenance items they often include numerous requests for new items like portioning, carpets, additional toilets, etc, to mention but a few. Limited maintenance funds are then utilized for items that should have been
provided for under the development budget of the line ministry concerned.” Booysen (2010)

At this juncture it is important to mention that there is no link between the planning and execution of capital projects and maintenance, and a greater need for improvement of communication exists, as many projects are found to overlap, adding to over-spending on maintenance activities.

From discussions, the following was established:

- Maintenance budget – N$35 to N$40 million per annum (static for the last couple of years, after deduction of operational costs)
- Government properties - 14,000 (Nation-wide)
- Estimated current replacement value (CRV) – N$21.5 billion

The international norm for maintenance budget being 4% of the current replacement value. Thus, the annual maintenance budget is insufficient at 0.18%, allowing approximately N$240 per building per month over the spectrum of different types of building within the asset portfolio. Maintenance functions can thus not properly function and a re-active maintenance approach is the order of the day. The asset portfolio is said to be increasing at approximately N$1 billion per annum and places DOW in a position where it is impossible to perform at an effectively.

3.1.2. A move towards continuous improvement

The department have obtained Cabinet approval by decision No.22nd /11.12.07/006 (Booysen: 2010) “to ensure that user ministries accept responsibility towards the proper casing and up keeping of the property, by ensuring that they create units in their institutions responsible for coordinating the maintenance of government buildings and that staff members of such units receive the necessary basic training.”

Preventative and routine maintenance activities will be the responsibility of the proposed maintenance units.

DOW, as custodian will attend to major repairs, structural failures, rendering of technical services and assistance, setting standards and conducting regular control inspections. DOW is in the process of developing a Maintenance Management Framework (MMF) to be used as a manual and guide to prepare and implement inter-ministerial policies for maintenance activities. DOW will use the MMF as a monitoring tool for proper inter-ministerial planning and co-ordination of activities.

Maintenance functions transfer at Regional Council level is be finalised in line with the Government’s Decentralisation Policy “to provide services on a regional bases, and to bring Government closer to the people on grass root level” the process will hopefully to speed up maintenance response times, as well as to enhance efficiency and customer satisfaction levels regionally and ultimate Nationally.
4. SOUTH AFRICA – A CONCERTED EFFORT TO CHANGE

In South Africa, Department of Health in the Gauteng Province has gained significant results through a concerted effort to change. These are well documented by McDuling (2003). A case study for improved service delivery reflects the establishment of 47 facilities management (FM) units at the Gauteng Department of Health to “create awareness of FM principles amongst management structures at hospitals and other health facilities towards improved FM service delivery through effective communication, participation and capacity building.”

While the case study does not discuss the details of condition-based maintenance budgets, it does provide a road map for establishing the right set of values between primary and secondary management functions which is a great enabling tool for the establishment of condition-based maintenance budgets.

Key aspects for establishing Facilities Maintenance Units include the identification of needs for:

- Facilities management skills amongst those responsible for the management of facilities
- Guidelines for the allocation of funds for maintenance work
- Guidelines for the execution of condition based assessments, budgeting and prioritising of maintenance work
- Training opportunities in facility management skills, including maintenance management competencies.

It can be ascertained that the further analysis of the above needs will result in the proactive development of strategic maintenance management frameworks in order to support the objectives for the effective implementation and success of the Facilities Management Units (FMU).

Moreover, the guidelines will aid the execution of condition-based maintenance budgets in terms of its intended purposes.

Gauteng Province has experienced the taste of success for more than two years; others are yet to experience it.

5. DEVELOPED COUNTRIES

Some countries that have developed Maintenance Management Frameworks (MMF) to achieve consistency in the planning, implementation and reporting of building maintenance are:

- Queensland Government – Australia
- New Zealand
- Canada, etc

More evidence of the use of MMF’s includes parastatals; local authorities and private building owners of many other developed countries.
6. CONCLUSION

It can be concluded that the establishment of facilities management units (FMU’s) is an effective means for addressing the prevailing maintenance shortcomings. The transfer of skills can aid the exchange of accurate and reliable information, while the development of policies and guidelines can contribute to more accurate results in terms of financial and technical aspects. Building maintenance activities could be prioritised correctly and training and development of FM staff can lead to better communication.

This means that the use of condition-based maintenance budgets as a universal tool can be deployed with more success in developing countries, creating greater appreciation of sustainable maintenance management, asset management and improved economic growth.

The establishment of FMU’s to improve service delivery objectives in the public sector can create building maintenance strategies that are flexible enough as a professional approach to customer satisfaction and accountability.

7. RECOMMENDATION

It is recommended that the Namibian Government review the development of the MMF in line with the implementation of an immovable asset register. Rigorous involvement, equipped to access the asset register, establish location, replacement values and to perform condition based assessment, in order to create linked budgets for the maintenance of buildings should be paramount. Policy and procedural documentation that forms the underlying basis of condition-based budgets should be developed and consistently applied. Monitoring and reporting techniques should be employed to support budget applications effectively (and to prevent corruption).

8. REFERENCES


McDuling, J.J. 2003. Improved Service Delivery through the Establishment of Facility Management Units at Health Facilities: A Case Study (World Work Place)


ABSTRACT AND KEYWORDS

Purpose

The aim of this research is to determine housing subsidy beneficiaries’ view on the physical condition of subsidized housing unit since they were allocated to them. The study also determines beneficiaries’ overall housing satisfaction and their satisfaction with the Department of Housing in terms of feedback/maintenance of the housing units.

Methodology/approach

The research design of the post-occupancy evaluation of housing subsidy beneficiaries was exploratory and descriptive in nature, yielding qualitative and quantitative data. A survey was done by means of a structured questionnaire. A total of 78 responses were obtained from beneficiaries who were randomly selected in four locations in Gauteng.

Findings

The survey results showed that, the Gauteng Department of Housing and indeed the country, has not yet fully shifted from the issue of numbers (quantity) to the enhancement of quality of houses been delivered. The result also indicated that the respondents were satisfied with their overall housing situation, but had complaints about specific aspects of the housing unit. Among others, the respondents felt that most of their housing needs
were not met and the housing units were too small. Respondents were also
dissatisfied with the non consultation by the Department of Housing, and
that the government has to a large extent not promoted and establish,
development and maintenance of socially and economically viable
communities and of safe and healthy living conditions to ensure the
elimination of slums conditions.

**Originality**

Housing subsidy beneficiaries view has not been extensively explored even
though it is widely accepted that the quality of the subsidized houses is
very low. Beneficiaries housing satisfaction and post consultation with the
government is as important as the housing been delivered. The paper
contributes to this body of knowledge.

**Keywords**

Post-occupancy evaluation, Housing Beneficiaries, Housing, Low-
income, Housing satisfaction

1. **INTRODUCTION**

One of the governments’ responses to the chronic housing shortage was
the formation of the National Housing Subsidy scheme. The housing
subsidy scheme is part of the South African Housing Policy’s seven
strategies to address the housing challenge. The Housing Subsidy Scheme
has been the key to delivery of housing since the advent of government’s
low-cost housing programme mechanism which provides government-
funded assistance packages to households categorized as ‘poor’
(Research Channel Africa, 2008). The Housing Subsidy Scheme is the
primary means of assistance in terms of the national housing policy. On
March 15, 1994, the housing subsidy scheme replaced all previous
government subsidy programmes for households with an income of R3 500
per month or less. The households should not have owned property or
received a government housing subsidy before and were expected to meet
a range of criteria (Department of Housing, 1997)

Recent policy shifts have been attempting to simplify the
administration of housing subsidies and increasing the subsidy amount. In
addition, government policy is placing an increasing emphasis on the role
that beneficiaries of government-funded subsidies should play in delivery,
partly in response to concerns of the culture of entitlement’ that outright
subsidies could create (Research Channel Africa, 2008). As a result,
government now requires that subsidy beneficiaries contribute to the
construction of their homes either through physical participation in the
building of the home, in what is known as the People’s Housing Process or through the payment of a financial contribution. Due to the complaints that has arisen from the government housing subsidy scheme over the low standard of the houses being delivered and the government commitment to shift from quantity to quality; this study is on the post occupancy evaluation of beneficiaries view on the state of the houses. Post occupancy evaluation is the process that attempts to establish whether the needs of the current occupants are being met by the housing subsidy scheme and the environment provided to achieve it. The purpose of the research is to determine the beneficiaries view on the physical condition of the subsidized housing units, to determine the overall housing satisfaction of the beneficiaries and satisfaction with the Department of Housing in terms of feedback/maintenance of the housing units.

2. POST OCCUPANCY EVALUATION

Post Occupancy evaluation (POE), is a process that allows the systematic study of buildings once occupied from the perspective of the people who use them, so that lessons may be learned that will improve their performance and future design (Watson, 2003).

Occupants’ indisputable, but unfulfilled expectations of building quality are documented within the recorded opinion in post occupancy evaluation. POE identifies ways to improve building design, performance, the role the housing plays in the lives of the occupants and how it can facilitate the purpose for which it was built. POE systematically analyses a particular environment to gain understanding of the impact it has on occupants of a building and its environment, hence how it facilitates or inhibits daily activities of the occupants (Watson, 2003). POE is conducted after the building has been occupied for some time so that occupants are accustomed to the new space and the experience of moving does not bias the results (Huizenga et al., 2003).

In POE, occupants ask questions and also provide answers to design professionals. Occupants can have a significant impact on creating change in terms of improving the use of the building (Darkwa, 2006). Beneficiaries input are three-fold in POE; they provide information and feedback to the architect and the construction company responsible for the design of the building environment. This can lead to improved building design and can influence and change the roles of the professionals involved in a building projects so that flaws in design or construction related mistakes are not repeated. Secondly, by empowering end-users through POE, occupants help to provide benchmarks and contribute towards research on the built environment to show how the end product will meet the needs of the occupants. And thirdly occupants can also help to provide valuable feedback to the policy makers on how best the implemented policies are making impact in the lives of the beneficiaries and the
necessary improvements to be made. POE consists of collecting information in several forms, including the use of data, occupant’s satisfaction data and interviews with key design construction and operation personnel (Carmody, 2002). POE uses direct experiences of occupants of an environment as the fundamental principle to evaluate the intended use of a building (Darkwa, 2006).

3. BENEFITS OF POST OCCUPANCY EVALUATION

There are many benefits of post-occupancy evaluation (POE). By understanding how building support or inhibit activities, building can be fine-tuned and management practices can be adjusted. The smallest adjustments to buildings and the ways buildings are used impact the most and benefit occupant’s more than drastic measures (Darkwa, 2006). Through POE designers can discover how similar building performs once they are in use, policy makers can also use it to help to develop and improve on the existing programmes and projects being delivered.

Post occupancy evaluation is also a valuable tool for assessing building quality, since building designers, owners and even the government in case of state subsidized building are held accountable for the success or failure of the building and policies creating the buildings. POE identifies ways people can use buildings and equipment more efficiently and more cost-effectively. POE also eliminates dysfunctional and seldom used areas in a building or replace and mistakes corrected in future design and policies (Darkwa, 2006).

The greatest benefits from POE’s come when the information is made available to as wide an audience as possible, beyond the institution whose building is evaluated, to all sector and construction industry. Information from POE’s can provide not only insights into problem resolution but also provide useful benchmark data with which other projects can be compared. This shared learning resource provides the opportunity for improving the effectiveness of building procurement where each institution has access to knowledge gained from many more building projects than it would ever complete (Barlex, 2006).

POE involves the occupants (beneficiaries) by requiring them to define how buildings work for them. Participation in evaluation identifies ways to design and use buildings and equipment more effectively. The way a setting supports or inhibits the occupant’s activities will impact on how they relate to the building (Watson, 2003).

According to Barlex (2006) POE serves the following outlined purposes:
3.1 Short term benefits of POE

- Identification of and finding solutions to problems occurring with start-ups and initial occupancy;
- Response to user needs;
- Improve space utilization based on feedback from use;
- Understanding of implications on buildings of change whether it is budget cuts or working context;
- Informed decision making;

3.2 Medium term benefits of POE

- Built-in capacity for building adaptation to organizational change and growth;
- Finding new uses for buildings;
- Accountability for building performance by designers;

3.3 Longer term benefits of POE

- Long-term improvements in building performance;
- Improvement in design quality and standard;
- Better policy formulation;
- Strategic review and set criteria for the organization.

Presiser et al (1988) differentiate between short-term, medium-term and long-term benefits of POE. Short-term benefits result from the immediate use of the POE findings, namely the successes and failures in the building. Medium-term benefits relates to the major decisions made about the re-use and remodelling of the new construction. These decisions are used to solve the existing problems of the building. Long-term benefits involve findings that will improve the entire building construction industry and policies makers directing building construction in a given set-up. According to Strategic Assessment Management (2003), other benefits are to improve project briefings, housing policies, thus promoting the functionality and cost effectiveness of the building, to improve the management of buildings by identifying maintenance and other recurrent costs and to improve the operational process by providing better services that meet the needs of beneficiaries.

The benefits of POE are directly proportional to the extent of the investigation performed. The more you investigate the more return you will get. However, it is critical to remember the beneficiaries as well as those responsible for housing in a given situation must enjoy this benefit. They must know in advance what advantage their time and effort on the POE will provide them.
4. THE HOUSING SUBSIDY SCHEME

A housing subsidy is a money grant provided by the South African government to help beneficiaries who qualify to obtain housing. This housing refers to the provision of permanent residential structures with secure tenure and privacy. These structures provide adequate protection against the elements, potable water, adequate sanitation facilities and domestic electricity supply (Department of Housing, 2002a).

Housing subsidy assistance is not paid back to the government by beneficiaries and the money is not paid out in cash to beneficiaries. The money is made available to developers or builders of housing projects to obtain land and pay for the acquisition of goods and services in order to complete the houses. The provincial board manages this money, approves subsidy application and pays out the money to developer of specific housing projects (South Africa Year Book, 2002/2003). The developers either private companies, local authorities or a community organization, use the money to buy a site, install services, obtain building materials and to erect the houses (Darkwa, 2006).

Chapter 2 of Part 3 of the National Housing Code provides a set of general rules in order to establish eligibility criteria, the value of the subsidy and how the subsidy should be used. According to the Department of Housing (2002b) there are six main criteria that are needed to be fulfilled in order for a person to be eligible to apply for the subsidy as contained in the National housing code. A person only qualifies for a housing subsidy if, (a) Married or Financial Dependents; (b) Resident, he or she is lawfully resident in South Africa; (c) Competent to contract; (d) Monthly household income of his or her household does not exceed R3,500; (e) Not yet benefited from government funding; (f) First time property owner (Department of Housing, 2002a).

The National Housing subsidy has been increased annually to account for inflation and rising building costs. In 2008, the increase was significant; it went up by almost 12% for the most poor. Tables 2.1 below shows various subsidizes as approved by the department of housing and the amount of contribution to be made by beneficiaries and the government’s commitment. There are only two situations under which the subsidy amount will be increased. This is when there is a geophysical variation that causes the development costs to be particularly high because of location and topographical conditions. The other situation is when the subsidy is awarded to a beneficiary with a disablement or if a household member of the beneficiary is disabled (Department of Housing, 2002a).
Table 1: Housing subsidy amounts for 2008/2009

<table>
<thead>
<tr>
<th>HOUSING SUBSIDY SCHEMES</th>
<th>HOUSING SUBSIDY AMOUNTS</th>
<th>PERSONS</th>
<th>HOUSING SUBSIDY AMOUNTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0 – R1 500 (Project-linked &amp; Individual subsidies)</td>
<td>R43 506.00</td>
<td>None</td>
<td>R43 506.00</td>
</tr>
<tr>
<td>R0 – R3 500 (Project-linked &amp; Individual subsidies)</td>
<td>R41 027.00</td>
<td>R2 479.00</td>
<td>R43 506.00</td>
</tr>
<tr>
<td>R0 – R3 500; Indigent: Aged, Disabled and Health Stricken (Project-linked &amp; Individual subsidies)</td>
<td>R43 506.00</td>
<td>None</td>
<td>R43 506.00</td>
</tr>
<tr>
<td>R0 – R3 500 (Institutional subsidies)</td>
<td>R41 027.00</td>
<td>Institution must add Capital</td>
<td>At least R43 506.00</td>
</tr>
<tr>
<td>R0 – R1 500 (Consolidation subsidies)</td>
<td>R43 506.00</td>
<td>None</td>
<td>R43 506.00</td>
</tr>
<tr>
<td>R1 501 – R3 500 (Consolidation subsidies)</td>
<td>R41 027.00</td>
<td>R2 479.00</td>
<td>R43 506.00</td>
</tr>
<tr>
<td>R0 – R3 500; Indigent: Aged, Disabled and Health Stricken (Consolidation subsidies)</td>
<td>R43 506.00</td>
<td>None</td>
<td>R43 506.00</td>
</tr>
<tr>
<td>R0 – R3 500 (Rural subsidies)</td>
<td>R43 506.00</td>
<td>None</td>
<td>R43 506.00</td>
</tr>
<tr>
<td>R0 – R3 500 (People’s Housing Process)</td>
<td>R43 506.00</td>
<td>None</td>
<td>R43 506.00</td>
</tr>
</tbody>
</table>

Source: Department of Housing, 2008

5. RESEARCH METHODOLOGY

The quantitative research was conducted in four already established housing subsidy locations in Johannesburg, Gauteng Province of South Africa. A structured questionnaire with dichotomous, multiple choice, scaled, matrix-type and open-ended questions was used to conduct interviews and obtain data during the survey. Rating scales based on the 4-point Likert scales was used for respondents to mark levels of satisfaction with regard to the unit and the overall housing situation. The 4-point Likert scale was used against the 3 or 5-point scale because the study was...
demanding more from the beneficiaries and in order to get definite answers and to prevent faking. The neutral level (such as just satisfied) was omit from the list of options. With this, beneficiaries were forced to sincerely rate their level of satisfaction based on the 4-point scale provided.

Questionnaires were preferred to face-to-face interviews because the researcher is of the view that respondents find it easier to answer questionnaires in private and in their spare time. On the negative side, the response rate is usually lower with questionnaires that have to be returned. However, with this study the response rate for return of questionnaire was relatively high. This is due to the fact that beneficiaries saw the study as a voice to echo what their needs have been. Questionnaires are generally a good way of obtaining information because it is cheap and less time consuming. The calculation of the relative satisfaction index was also done to establish the level of satisfaction.

Beneficiaries were randomly selected in all four locations visited; these were interviewed given the fact that they have been resident in the areas for more than a month. Out of the 120 questionnaires sent out, 78 were received back. The generalisation of the findings of the study to the entire Gauteng Province is in line with the recommendation of Tan (2002) for the determination of sample size. However, considering the nature of subsidized housing and housing subsidy allocation criteria and the entire Housing Subsidy Scheme and beneficiaries’ behaviour, the findings are indicative of what the likely trends are and the issues that need urgent attention.

The semi-structured interview questionnaire was administered to the heads of households or to the spouses of the heads of household in the sampled household. One household head per house was engaged in the interview and questionnaire administration. The research was conducted between the months of July to September, 2009.

6. RESEARCH DATA

In this section, the data obtained from the questionnaires is presented.

6.1 Section A: Beneficiaries’ view on the physical condition of subsidized housing units

Respondents were asked about the physical condition of the houses when it was allocated to them and how it currently looks.

6.2 Section B: Beneficiaries’ overall housing satisfaction

A Likert 4-point type scale was used to determine respondents’ levels of satisfaction with regard to the unit and the overall housing situation. The
scale read as follows, 1=Very dissatisfied, 2= Dissatisfied, 3= Satisfied, and 4= Very satisfied.

The relative satisfaction index was calculated from computation of the total of all weighted responses and then relating it to the total responses on a particular aspect. Weighting were assigned to each responses ranging from one to four for the responses of ‘very dissatisfied’ to ‘very satisfied’. The weighting has been allocated as presented in Table 2 below. The weighting was developed based on the Likert scale of 1-4. Computation of the relative satisfaction index was done from the following formula:

$$\text{RSI} = \frac{1\alpha_1 + 2\alpha_2 + 3\alpha_3 + 4\alpha_4}{\sum \alpha}$$

Where RSI is the relative satisfaction index and $\sum \alpha$ is the total sum of the number of the responses; $\alpha$ is the response per each variable rated as shown on table 2 below. Using the equation stated above, the indices for housing satisfaction (RSI) were evaluated for all the variables of housing rated. The results are presented in table 3 below under section C of discussion of findings.

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Responses</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very dissatisfied</td>
<td>$\alpha_1$</td>
<td>1</td>
</tr>
<tr>
<td>Dissatisfied</td>
<td>$\alpha_2$</td>
<td>2</td>
</tr>
<tr>
<td>Satisfied</td>
<td>$\alpha_3$</td>
<td>3</td>
</tr>
<tr>
<td>Very satisfied</td>
<td>$\alpha_4$</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 2: Opinion on the level of satisfaction
7. FINDINGS AND DISCUSSION

7.1 Section A: Beneficiaries’ view on the physical condition of subsidized housing units

![Figure 7.1: beneficiaries’ views on the condition of the houses when it was first allocated to them](image)

When beneficiaries were asked to rate the physical conditions of their houses when they were allocated to them, 38.5% of the respondents indicated that the houses were neither good nor bad as shown in figure 7.1 above, while 20.5% said the physical condition of the houses was good. A further 10.3% respondent said it was bad. Figure 7.1 also showed that 15.4% indicated that the houses were very bad. The result indicates that the government has not really put in place proper measures to ensure that the intended standard for the houses is achieved by the developers.

![Figure 7.2: beneficiaries’ view of the current physical state of the houses.](image)

When beneficiaries were further asked about the current physical state of the houses, 64.0% respondents who answered this question said that the physical condition of the houses has not worsened. 36% said that the
physical condition has worsened as shown in figure 7.2 above. Findings further revealed that 47.0% of the houses were built in the last five years (2005-2009), of which 29.0% of those houses were allocated to beneficiaries in the last 3-4 years ago.

Figure 7.3: beneficiaries’ view of what is responsible for the current changes seen in the physical state of the houses

Figure 7.3 revealed that 37.0% respondents indicated that the present bad condition of the houses is due to poor quality of materials that was used in constructing the houses, while 25.9% said that the changes had occurred as a result of poor workmanship during construction. A further 11.1% said it was caused by lack of maintenance. The lack of maintenance on the part of the beneficiaries would have been a result of lack of formal housing education to them. If beneficiaries are given education on the care and value of their houses, they would be more responsible in taking care of it.

Figure 7.4: Type of repairs/upgrading beneficiaries have done in the houses.

Further findings emanating from the survey revealed that 59.0% respondents have done repair or upgrading works on their houses since
they were allocated to them. Within the respondents that have carried out repairs or upgraded their houses, 27.2% respondents as shown in figure 7.4 above had plastered and painted their houses. Since there was no visible paint or plaster in the interior of most units, the aesthetic quality of the interior was low as observed. The colour of the unfinished walls (cement colour of bricks) and the absence of ceiling in most housing units influenced lighting levels inside the unit and this was observed to be low during daytime (Winston & Turner, 2001). When walls are plastered and painted white or any other light colour, it may improve lighting inside the housing units. The lack of plaster finish on the walls, as well as the use of poor quality material and poor construction, may cause units to leak during rainy seasons. Survey result showed that 2.2% respondents constructed the entire roof of their units, 2.2% had fixed leakages on their roof. When this is compared to where beneficiaries used to live, the percentage is still better off, but the government can do more to prevent occurrences of this nature. The roofs, manufactured from corrugated roofing sheets, were poorly constructed. Gaps were observed between the fitted roof sheets, and the nails that secured the roof sheets made holes in the corrugated roofing sheets. This caused further leakage when it rained. The holes should have been closed, and if the government had a monitoring arm in its implementation team or if there was a consultation with the beneficiaries, this would had been spotted and corrected before beneficiaries are allocated and subsequently moved into the units.

Figure 7.5: where beneficiaries got money to carry out repairs/upgrading of their homes

Respondents, representing 37.0% of those that had made repairs/upgrading to their homes, indicated that the repairs/upgrading was done in less than one year ago. Respondents (8.7%) still within those that had made repairs/upgrading to their homes, indicated that the repairs/upgrading was done in between one to two year ago. If this figure is
interpolated with the nature of repairs/upgrading, it means that the problem might have been there since the houses were allocated, but beneficiaries had to save to be able to effect the repairs/upgrading. As such, 87.0% beneficiaries as shown in figure 7.5 above said that the repairs/upgrading was done from their personal saving. However 82.1% respondents of those that made repairs/upgrading to their homes indicated that there has not been a reoccurrence of the problem since the repairs was done. This supports findings from the survey of housing beneficiaries conducted by Tomlinson (1996) that beneficiaries prefer to choose voucher which would allow them to buy their own building materials than the option of a capital subsidy (paid to developers). This is because respondents felt that they would acquire cheaper materials and better workmanship in the construction of the buildings than the developers.

7.2 Section B: Beneficiaries' overall housing satisfaction

Beneficiaries were asked to state what they were satisfied with in the housing units based on a list of the elements in the unit. This was in turn used to explain the level of satisfaction of the beneficiaries. Therefore, beneficiaries were asked to rate the satisfaction of various aspects to determine the level of satisfaction with regards to the unit and the overall housing satisfaction.
According to the beneficiaries, the position of the windows and number of doors were rated as very satisfactory followed by the position of the unit. However, space in the unit and the exterior finishes were ranked fifteenth, whilst interior finishes was identified as very dissatisfactory as in table 3 and it was ranked the least (eighteenth). The units were neither painted nor plastered. The interior observations revealed that the walls of most housing units were cracked. Winston and Turner (2001) state that walls act as a support system for the roof and should be constructed from good quality material otherwise the walls will not be strong and will crack. Cracks in the wall were part of the structural defects in the housing units which respondents did not expect to find in the units. Generally, lack of interior finishes was identified as very dissatisfactory (eighteenth) in table 3.

### Table 3: Perceived Level of unit satisfaction according to beneficiaries

<table>
<thead>
<tr>
<th>Aspect:</th>
<th>Response (n)</th>
<th>range 1 = Very dissatisfied</th>
<th>4 = Very Satisfied</th>
<th>Satisfaction Index</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position of windows</td>
<td>1 14 44 19</td>
<td>3.04</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of doors</td>
<td>4 16 31 27</td>
<td>3.04</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position of unit</td>
<td>5 14 31 28</td>
<td>3.05</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position of doors</td>
<td>4 11 43 20</td>
<td>3.01</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position of bedrooms</td>
<td>5 14 38 21</td>
<td>2.96</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety around the unit</td>
<td>6 19 46 7</td>
<td>2.69</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position of lounge</td>
<td>10 24 28 16</td>
<td>2.64</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen bathroom/toilet</td>
<td>7 28 31 12</td>
<td>2.62</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Privacy in the unit</td>
<td>11 26 33 8</td>
<td>2.49</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Layout of the unit</td>
<td>5 35 34 4</td>
<td>2.47</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise level around the unit</td>
<td>6 31 39 2</td>
<td>2.47</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise levels in the unit</td>
<td>6 34 35 3</td>
<td>2.45</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety in the unit</td>
<td>15 18 37 7</td>
<td>2.44</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size of unit</td>
<td>16 27 25 10</td>
<td>2.38</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position of kitchen</td>
<td>14 35 17 12</td>
<td>2.35</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate conditions of unit</td>
<td>16 24 33 5</td>
<td>2.35</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Space in unit</td>
<td>16 32 24 6</td>
<td>2.26</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exterior finishes</td>
<td>12 39 22 5</td>
<td>2.26</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of rooms</td>
<td>12 40 23 3</td>
<td>2.22</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilation in the unit</td>
<td>15 38 20 5</td>
<td>2.19</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interior finishes</td>
<td>21 39 11 7</td>
<td>2.05</td>
<td>18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
and exterior finishes in most of the housing units influenced the satisfaction levels of the respondents. With regards to the space in the unit ranked fifteenth, respondents indicated that the units were too small as seen on the rating of the size of the unit which is ranked thirteenth, there was little space for movement after putting their furniture and most were not partitioned and could not take all their furniture. Also, the ventilation in the unit ranked seventeenth as very dissatisfaction, was because the units were not hot inside in winter and cold in summer. Respondents expected a housing unit that would protect them from the elements and especially the harsh, cold winter. According to the World Health Organization (2004), the quality of a house plays a vital role in the health status of residents. The indoor air quality, humidity, low temperature and overcrowding in a house usually poses threats to the health of the residents (The World Health organization, 2004).

Table 4: Level of housing satisfaction according to beneficiaries expectations

<table>
<thead>
<tr>
<th>Elements</th>
<th>Expectation met</th>
<th>Expectation met</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before allocation</td>
<td>After allocation</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Bigger units</td>
<td>81.8%</td>
<td>18.2%</td>
</tr>
<tr>
<td>Structure with quality finishes</td>
<td>93.4%</td>
<td>6.6%</td>
</tr>
<tr>
<td>More comfort than previous living environment</td>
<td>98.7%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Improved living conditions from shacks</td>
<td>98.7%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Free services</td>
<td>74.0%</td>
<td>26.0%</td>
</tr>
<tr>
<td>Bigger plots</td>
<td>84.4%</td>
<td>15.6%</td>
</tr>
<tr>
<td>Good sanitary systems</td>
<td>97.4%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Adequate hot and cold water</td>
<td>89.6%</td>
<td>10.4%</td>
</tr>
<tr>
<td>Clean environment</td>
<td>96.1%</td>
<td>3.9%</td>
</tr>
<tr>
<td>More consultation with the municipality</td>
<td>92.2%</td>
<td>7.8%</td>
</tr>
</tbody>
</table>

Although the respondents were satisfied with the layout of the unit and other things, however, their expectation for bigger housing units (81.8%) and free service (74.0%) were not met. Respondents (98.7%) indicated that their expectation to get a housing unit with improved living condition from shacks was met representing 87.0% of the expectation met; likewise, 83.1% said they now have more comfort than their previous living environment as shown in table 4.
Beneficiaries had expected more consultation with the government prior to them being shortlisted to receive housing, but the survey result showed that the expectation was not met (63.0%). This was not in line with the Department of Housing goal which mandated the provincial and local spheres of government to consult meaningfully with individuals and community affected by housing development and to facilitate the active participation of all relevant stakeholders in housing development.

Further findings to weigh the original intended expectations when first shortlisted to be given a house and when given the house; revealed that four out of ten different elements of the housing units were met. It can therefore be subjectively concluded that the Department of Housing did not succeeded in meeting the housing needs of the occupants, but from the basic expectation of an improved living conditions from shack and more comfort that previous living, it can be said that beneficiaries are thus satisfied with the overall housing condition even though most of their expectations were not met. Literature did inform that when the gap between what is expected and what is received decreases; residential satisfaction increases (Darkwa, 2006). Residential satisfaction is a subjective evaluation and relies heavily on the beneficiaries’ views, perceptions, previous experiences, behaviour, norms, values and emotions (Francescato, 1998). Lu (1999) also observed that residential satisfaction is a complex construct, affected by a variety of environmental and socio-demographic variables.

8. CONCLUSION

Although some beneficiaries are carrying out maintenance to their homes, those not able to afford it will see their houses rot. In order to avoid this, the Department of Housing must implement properly the provisions as contained in the housing subsidy administration phase. The administration phase states that the subsidy administrator should ensure the home builder issue a completion certificate and must obtain a letter of satisfactory completion signed off by beneficiaries prior to moving into the housing units. If this is done, the problem of quality and defects being spoken about will be done away with and as such the subsidized houses of today will not be the slums to be upgrade tomorrow. Post occupancy evaluation studies have the capability to provide behavioural and environmental information that can be used to formulate idea design and manage guidelines and housing standards for new subsidized housing development to be developed in Gauteng. The Gauteng Department of Housing should conduct more POE of housing subsidy beneficiaries’ experience. By conducting more POE, the Department of Housing will be informed of the determinants of housing satisfaction of the occupants.
9. RECOMMENDATIONS

Findings indicated that the housing needs of respondents had not been met even though the beneficiaries are satisfied with the overall housing condition. However, the following are therefore recommended:

- The Department of Housing and administrator of subsidized housing units in Gauteng should conduct a complete and thorough needs assessment of the beneficiaries of a proposed housing subsidy development. Apart from identifying the needs, the results of such an assessment will give an indication of aspects that need to be explained to beneficiaries.
- Meaningfully consultation should be held with individuals and community affected by housing development to facilitate the active participation of all relevant stakeholders in housing development to improve the overall housing delivery and the satisfaction of the housing subsidy beneficiaries. The results of the needs assessment should be explained and limitations of the housing development need to be identified.
- It is also recommended that the Department of Housing should formulate better quality control mechanisms to ensure that the houses that will be delivered through the Housing Subsidy Programme will be of good physical quality. The Department of Housing must ensure that the building inspectors visit housing subsidy sites at specified stages of construction work and submit reports on the quality of houses on every site and unit visited.

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Development of an Industry Maturity Framework for Facilities Management

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ABSTRACT AND KEYWORDS

Purpose

This conceptual paper presents an Integrated Feeder Factors Framework (I3F) as a common yardstick in assessing maturity of Facilities Management (FM) industry.

Design/Methodology/approach

This paper is based on a critical analysis of existing literature with a focus on existing organisational maturity models, and identifying potential ‘feeder’ factors that impact on the development of any industry sector within an economy. Literature related to FM and maturity models have been evaluated, categorised and collated to provide thematic groups that are used in identifying feeder factors. The study also, used similar method in patterning critical success factors (CSFs) that are essential in establishing internal strength of the feeder factors.

Findings

The I3F framework provides a consistent basis for evaluating maturity of FM industry at national, sector-wise and organisational levels, unlike existing process-focused organisational maturity models.
Research limitation/implications

The proposed framework has to be validated for functionality before application.

Practical implications

The study introduces the framework that is aimed at assessing the state of maturity of facilities management as an industry.

Originality/Value

The study introduces the I3F framework as a potential yardstick for assessing the developmental levels of the FM industry within an economy. It aims to serve as a potential ‘road map’ for charting the growth of facilities management as an important economic activity from a ‘least developed’ to a ‘fully matured’ stage.

Keywords

Facilities management, Feeder factors, Industry development, Maturity model.

1. INTRODUCTION

As an industry, discipline and profession, Facilities Management (FM) has received a lot of attention from both academics and practitioners (Price, 2003a). A multitude of issues have been scrutinised and received lengthy discussions. Some of these included: FM in identity crisis (Tay and Ooi, 2001); nature or status of FM (Green and Price, 2000); and potential focus of the FM industry (Then 1999). However, despite these problems FM is by all factors growing and is now recognised in five continents (Then, 2004). FM, as an industry, provides support services to core businesses and is a global business measured in billions in terms of major international currencies. The International Facility Management Association (www.IFMA.org, 2009) estimates the global value of the FM market to be in the tune of US$ 100 billion. In the UK alone, the British Institute of Facilities Management (www.BIFM.org.uk, 2009) estimated the FM sector is worth between 40b and 95b pounds. In Germany, the FM market is estimated to be in the region of 55 billion Euros (www.GEFMA.de, 2009). FM is the largest contributor to gross national product (Ballesty, 2008). The author
noted that FM in Australia in 2002-03 contributed about A$12.2 billion of value added, A$12.4 billion in GDP terms and employed 172,000 persons. Apart from direct contribution of the FM sector to the economy, it is entrusted with the crucial function of overseeing important buildings used to provide crucial services to society. The introduction of public-private partnerships (PPP) and private finance initiatives (PFI) have opened up the FM market and created direct relationship between the public sector and the FM sector. It is evident therefore that despite its relatively short history, the importance of the FM industry as an economic sector of the national economy and as a critical service sector is being acknowledged by governments and businesses alike. Nevertheless, in its current settings, FM as an industry is perceived in three ways as noted below.

• It is an emerging industry (Grimshaw, 1999; Price 2003a; and Ballesty, 2008).
• It is a growing industry (Price 2003b; Then, 2004; Noor and Khumpaisal, 2009).
• It is a mature industry (Then, 1999; Barret and Baldry, 2003; and Ventovuori et.al, 2007)

The analysis of the above studies reveals that there is no specific pattern of perception related to a particular timeline. For example, while some studies conducted in the late 1990s and early 2000s viewed FM as having indicators of maturity or being mature, some of those conducted in late 2000s regarded the industry as emergent. This is, in a way, an indicator of a lack of a common yardstick that can be used to measure the degree of its development. It can also be a result of diversity of functions that form FM. Other factors contributing to this dilemma can be unlimited horizontal expansion and the use of specific criteria such as market, function or country in assessing maturity. It is in the light of these shortcomings that this study aims to identify feeder factors and construct a framework that can be used in determining the level of development and maturity of the FM industry within an economy.

The paper introduces a framework to be known as an “Integrated Feeder Factors Framework (I3F)” that can be used in measuring maturity of FM industry in developed and developing economies. In more specific terms, it intends to achieve the following objectives:

• To identify factors and parameters to be included as ‘Feeder Factors’ for the continuous development of the FM industry; and
• To construct an ‘Integrated Feeder Factors Framework’ (I3F) based on the identified feeder factors and parameters.
2. FACILITIES MANAGEMENT IN THE 21ST CENTURY

Facilities Management (FM) is a business of managing work space (McGregor and Then, 1999). The work space in this context is not considered in its narrow view of physical space but rather as a resource capable of influencing production as is the case for other factors of production i.e. information, labour, capital and technology (Stallworth and Ward, 1996). The management of work space in modern businesses has become increasingly complex, both at organisation and country level. At an organisational level, workplace is no more defined by four walls of a building. Technological advancement has made it possible for a work to be conducted from outside of the headquarters building. Unlike in the past where the functions of the Facilities Manager were to ensure availability of workspace; today’s challenges lie in the provision and management of strategic infrastructure and support services that enable business continuity. The Facilities Manager is required to anticipate change in demand and act swiftly while considering adding value to the core business. At country level, Facilities Management is an economic activity that contributes to GDP and which accounts for a significant proportion of government’s expenditure. Prudence will dictate that diligence is at the fore and only professional companies are engaged in managing and running long term projects. It is therefore apparent that the Facilities Manager has to be vigilant, astute, competent, ethical and knowledgeable in order to effectively provide the required range of services. One of the striking features of FM according to Atkin and Brooks (2001) is the lack of a universal approach to managing facilities and that each organisation, even within the same sector, will have different needs. Also, it is multifaceted and formed by diverse functions and core competencies. FM practice is a case-specific endeavour dealing with a diversity of facilities, organisation, business sector, surrounding environment, context and circumstances (Barret and Baldry, 2003). Due to this diversity it is indeed difficult to construct a framework based on the internal processes alone.

In its simplest form, FM deals mainly with technical and operational aspects of providing services necessary to support the core business. The focus at this stage is to minimise operational costs associated with the provision and management of work space. At the highest level, it is concerned with the management of work space at strategic level and abilities to cope up with the rapid changes in business environment. The focus of the industry at this level is to add value through effective management of facilities provision and support services (Then, 2004).
Available literature suggests that over the last 30 years FM has evolved from operational focused to strategic orientation. Then, (2004) noted “FM has grown from managing and maintaining corporate property (operational buildings) with a deliberate slant towards meeting stakeholders’ expectations”. The evolution of FM from operational based functions to strategic orientation is a prime indicator of the industry maturity.

Based on literature review, the high performance FM practice today is strategy-driven in the provision and management of support services. It is at the strategic level where the FM industry can forecast and match supply to existing demand with the highest efficiency by influencing high level decisions and add value to corporate performance. Businesses and country both aspire to attain this level, which is an immediate maturity level. This study looks at the contribution of feeder factors into enabling an organisation or a country to reach this level.

3. ANALYSIS OF THE EXISTING MATURITY MODELS

According to Cookie-Davies (2004) the term “maturity” has a number of usages; but when used in conjunction with organisation or industry development signifies full development or perfection. According to Lahti et.al (2009), maturity conveys the idea of evolution from some initial state to some advanced state. Generally, a maturity framework is a measure to aid organisation in gauging their performance relative to industry best practice. According to Fraser et.al (2002), all maturity models share the common property of defining a number of dimensions at several maturity stages, with a description of characteristics performance at various levels of granularity. The basic components of the models are number of levels, descriptors, generic description of each level, a number of dimensions (such as process areas or critical factors) and element or activities to be performed.

3.1 An Overview of Maturity Models from other Disciplines

Maturity models are popular in Project Management (PM), Knowledge Management, Information Systems (IS) and Supply Chain Management (SCM) industries. In these industries there are plenty and elaborate literature on maturity models and their application. Nevertheless, some of maturity models have had influence beyond the sphere of their intended application and worth a mention. The most popular maturity model in use is the Capability Maturity Model (CMM). This model is based in the work of
software engineering pioneer Watts Humphrey (Cookie-Davies, 2004). The model addresses problems that arose from organisation inability to manage the software development “process” (Pauk, et al. 1993). The Capability Maturity Model is a five levels model starting from ‘initial stage’ being least developed to ‘optimising’ which is the highest level. In between these levels there are ‘repeatable’, ‘defined’ and ‘managed’ stages in ascending order. The model has received significant application in human resources, project management and information system (Lahti et al. 2009). Another maturity model in use is the Organisational Project Management Maturity Model (OPM3) developed by the Project Management Institute (PMI). This model looks into the best practices achieved within the project, program and portfolio domain. Also in application is a concept by Vaidyanathan and Howells (2007) of the Construction Supply Chain Maturity Model (CSCMM). The objective of CSCM model is to provide a roadmap for members to realise their operational excellence, so that collectively the construction project can realise the benefits of improved performance (Lahti et al. 2009).

Standardised Process Improvement for Construction Enterprises (SPICE) is another maturity model in construction industry based on CMM. SPICE addresses challenges inherent in the construction industry that was not dealt with in CMM (Sarshar et al. 2000).

3.2 Facilities Management Maturity Models

The influence of process and/or project-based maturity models has also been extended into the FM industry. Literature survey and internet search reveal that there are two FM maturity models in existence. These models are Facilities Management Organisation Model (FMO) developed in the United States and SPICE FM which in the United Kingdom. These models are discussed below in order to assess their potentiality of being used in this research.

3.2.1 Facilities Management Organisation Model (FMO)

Internet search reveals that IWMSNews.com in America has been hosting a series of articles in Facilities Management Organisation (FMO) maturity model. The model is based on concepts similar to that of the Project Management Institute process model. The FMO model is developed by James Turner and is formed around 11 competencies that are organised in five levels (http://www.iwmsnews.com/fmo-maturity-model). The model looks into five questions that are important to identify the competencies required to deal with them (Table 3.1). The identified areas in the questions are size of portfolio, access to management information, focus and...
improvement, budget allocation and budget justification. Each of the questions corresponds to FM maturity level attained by the FM organisation. Unlike common maturity models, FMO does not use identifiers in labelling maturity levels, instead number 1 signifies the lowest level 5 (the highest) have been used.

**Table 3.1: Facilities Management Organisation Model**

<table>
<thead>
<tr>
<th>FMO Maturity Model level</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Management Question Answered</td>
<td>What am I responsible for managing?</td>
<td>How can I access the management information I need</td>
<td>What improvement should I be focused on now (short term improvements)</td>
<td>What is the best allocation of my budget?</td>
<td>How can I justify a request for a budget increase (long term improvements)?</td>
</tr>
<tr>
<td>Core Competencies</td>
<td>Organisation, policy, inventory</td>
<td>Process, systems</td>
<td>Metrics and assessment</td>
<td>Short term planning performance improvement</td>
<td>Mission validation and long term planning</td>
</tr>
</tbody>
</table>


3.2.2. Standardised Process Improvement for Construction Enterprises (SPICE-FM) model

In a more recent development, Standardised Process Improvement for Construction Enterprises model (SPICE) has been used to assess FM process capabilities in the UK. The model is known as SPICE FM and is primarily concerned with management processes and its philosophy is that if the management processes are well performed, they will have an impact on the performance of the core processes (Amaratunga, *et al.* 2008). The model is organised in five tiers beginning from ‘initial’, ‘service delivery management’, ‘knowledge management’, ‘quantitatively controlled’ and the highest ‘continuously improving’ (Table 3.2). These maturity levels are determined based on seven key processes which are service requirement management, service planning, service performance monitoring, supplier and contractor management, health and safety management, risk management and services coordination.
Table 3.2: Standardised Process Improvement for Construction Enterprises (SPICE-FM) model

<table>
<thead>
<tr>
<th>Maturity levels</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifiers</td>
<td>Initial</td>
<td>Services delivery management</td>
<td>Knowledge Management</td>
<td>Quantitatively improved</td>
<td>Continuously improving</td>
</tr>
<tr>
<td>5 Process enablers</td>
<td>Commitment</td>
<td>Ability</td>
<td>Verification</td>
<td>Evaluation</td>
<td>Activities</td>
</tr>
<tr>
<td>7 Process areas</td>
<td>Service requirements, Service planning</td>
<td>Service performing monitoring</td>
<td>Supplier and contractor management</td>
<td>Risk management</td>
<td>Service coordination</td>
</tr>
</tbody>
</table>

**Source:** Amaratunga et.al (2008)

3.3 Suitability of the Existing Maturity Models to this Research

The FMO and SPICE FM models like other maturity models such as CMM, OPM3 and CSMCM are process, project, object or activity based models. These models are useful in addressing processes within a particular organisation and/or terminable projects. Terminable projects, tasks or activities are objective specific, carried out within stipulated time and budget. They are not life long endeavour. Progress of a project and a task can be determined by the efforts by individuals within the team. On the other hand, FM, as an economic activity, is a continuous on-going process and its progress is not determined by internal factors alone. There are external factors that have direct influence in its development and maturity. It is therefore opined that existing maturity models within and from other disciplines and specifically terminable projects, cannot be directly applied to FM industry, defined in its widest meaning to include not only processes but also external factors (Figure 4.1). In order to assess the degree of maturity of the FM industry, measures that incorporate and integrate external factors should be adopted. It is evident that process based models concentrates on practice only which is one of the six factors identified in Figure 4.1. Concentration of these models into practice (internal provision of services) limits their application in assessing industry maturity especially in a unique industry like FM.
4. DEVELOPMENT OF FACILITIES MANAGEMENT INDUSTRY MATURITY FRAMEWORK

As mentioned above, FM is highly localised in terms of solutions to be used in solving a particular problem. There is no one ‘fit all solution’ to FM issues (Atkin and Brooks, 2001). This situation and the fact that it is an amalgamation of various competencies make FM unique when compared to many industries. While understanding of the general principles and global perceptions of management issues may be crucial, it is a local knowledge that may prove to be an important asset. Knowledge about economic climate, market volume, regulatory frameworks, institutional culture, innovation, industry acceptance and availability of trained personnel may provide a highlight of FM developmental status within a country. The question at this moment is; how can FM developmental status be assessed? It has been shown in item 3.3 above that existing maturity models are biased towards processes and projects may not be used in this study. In responding to the question, this study introduces an Integrated Feeder Factors Framework (I3F) that can be used in assessing maturity levels of FM industry. I3F is a gauge against which FM industries can be compared internally and externally. It is a metric that countries can use to evaluate themselves within the FM development ladder. It is a decision support tool for countries and business that require or offer FM services. It starts by identifying key factors (feeder factors) from the literature related to facilities management.

4.1 Identification of Feeder Factors

Studies related to FM discipline and profession development are receiving increasing attention in recent years (Ventovuori et.al, 2007). Review of these studies has identified two modalities through which FM industry has developed. In the first modality, the FM industry grows organically (Price, 2004) purely responding to market forces of demand and supply. In this modality government plays a passive role. In the second, apart from market forces, the government and stakeholders joined forces and created initiatives within which the industry is encouraged to grow (Ballesty, 2008). FM development studies have also shade light in identifying the factors that are referred to in this work as ‘feeder factors’.

Feeder factors are defined as interdependent and interrelated.
factors crucial for the existence, development and maturity of the FM industry within any national economy. However, the presence of these factors alone will not ensure development of the FM industry. It is the internal strength of each individual factor and their absolute contribution to the industry that is of importance. These factors can also be used in any other industry of similar nature to FM. Feeder factors were identified by collating and categorizing information from published FM literary works. Table 4.1 provides a summary of this analysis.

Table 4.1: Identification of Feeder Factors by categorization/collation

<table>
<thead>
<tr>
<th>Author and Year</th>
<th>Original content</th>
<th>Collated content (key variables)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Then, S. S. and Akhlaghi, F., 1992.</td>
<td>The focus of facilities management skills and techniques should be in the areas that contribute to the overall management of a business by relating accommodation and support infrastructure issues to business, financial and personnel criteria.</td>
<td>Research, practice and education</td>
</tr>
<tr>
<td>Lomas, 1999</td>
<td>In analysing FM development in Hong Kong used three of the factors practice, research and education and identified the role played by IFMA Hong Kong chapter in organising the first workshop to discuss facilities management practices in Asian region in 1995.</td>
<td>Practice, research, education and professional bodies</td>
</tr>
<tr>
<td>Nutt and McLennan (2000)</td>
<td>To promote the FM discipline the practice and the research should be linked closely.</td>
<td>Practice and research</td>
</tr>
<tr>
<td>Warren and Heng, 2005</td>
<td>In trying to establish the relevance of the tertiary education had used three other factors i.e. practice, professional bodies and environment.</td>
<td>Education, practice, professional bodies and environment</td>
</tr>
<tr>
<td>Yiu, 2008</td>
<td>Management related disciplines have the capacity to become accepted professionally acknowledged, if only the business need (market conditions or organisational development) is there for them to evolve.</td>
<td>Professional bodies, market, and environment</td>
</tr>
</tbody>
</table>

Source: Authors' construct, 2009

Past studies summarised in Table 4.1 gave a historical account of the existence of feeder factors either as an individual factor or a group of factors. These studies did not map the link between the feeder factors or means to be used to ensure their co-existence, dependence and
development. Furthermore, no measure has been introduced to try and assess the contribution of individual factor. They had looked into the historical past of the factors and not at the present or into the future. This study intends to take already established history into the future by analysing the contribution of each individual factor and their potential impact when considered as a ‘feeder chain’ in the developmental growth of FM.

Table 4.1 identifies six feeder factors derived from the literature reviewed above which are considered to be essential in the development of FM industry. These factors are depicted in Figure 4.1 (i.e. rectangular boxes). Figure 4.1 also illustrates the potential interactions, and inter-relationships between and amongst the factors that are likely to influence and impact on the developmental potential of the FM industry within any national economy.

Figure 4.1: An illustration of Dependencies and Linkages of Feeder Factors

Figure 4.1 illustrates Market as a feeder factor that is been fed by Professional Bodies, Education, Environment, Practice and Research (in dotted lines) in order to exist and develop. This implies that in order for the FM market to develop from the lowest stage, it requires to be served by people from the practice, operate within conducive environment, employ educated professionals to cope with constant changes and apply innovations resulting from research. In case these other factors are not active, there is likelihood that the market will also be inactive. This in turn indicates dependence of market as a feeder to the existence of other feeders. Conversely, each of the five factors that feeds into market tend to exist in response to availability of the market. The practice, professional
bodies, FM education, FM research and regulations related to FM will not exist and develop if there is no market. It is indeed, this link between these factors that integrated feeder factors framework (I3F) is built upon.

4.3 Construction of the Integrated Feeder Factors Framework (I3F)

The proposed Integrated Feeder Factors Framework (I3F) is a framework of intertwined, interdependent and interrelated factors necessary for existence, development and maturity of any industry. Unlike other maturity models, I3F takes into consideration external factors that feed into the development of the industry at organisational, sector, national and regional levels. It transcends the common norm of looking into the internal processes of the practice alone. The rationale behind this framework is hinged on the fact that evolution of FM as an industry from one level to the next depends on the development of each one of these factors. Maturity of the industry is dependent on simultaneous growth of each of the feeder factors. Any one of the factors that lags behind hinder the development of the industry into the next stage of maturity level.

4.4 Research Propositions

In constructing the framework the study makes two propositions. These propositions are fundamental in the understanding and analysing the framework.

1. It is proposed that I3F can be a useful tool for analysis of existing industries which are at different levels of development and not non-existing ones. An industry is considered to be in existence when at least one of the feeder factors is in place. For countries that intend to evaluate its FM industry as an economic sector, the framework provides a consistent basis for indentifying and assessing key relevant factors that impact on the development of the industry.

2. Secondly, it is proposed that in order for FM industry to exist and effectively develop, all the identified feeder factors should co-exist and mutually develop into maturity. The simultaneous growth of each of the feeder factors is essential in resisting ‘industry maturity’ effect. It has been observed from literature that after maturity, industries will tend to decline in performance. For example, Hill and Jones (1998) noted that industries will go through embryonic/fragmentation, growth, shake-out,
maturity and then decline. It is postulated in this study that if all of the feeder factors attain maturity status at the same time then the industry maturity effect will not be felt or will have less impact. Since each one of the feeder factors will continue feeding into others and sustain the maturity. It is envisaged that if evaluation of the level of development, adoption and application of each individual feeder factors is conducted, the proposed framework can provide a picture of developmental stage and maturity status of the FM industry as a whole.

4.5 Establishing the Link

The study intends to establish the causal linkages between the identified feeder factors shown in Figure 4.1. The link between the feeders is expected to be analysed based on the strength of their relationship i.e. strong or weak. Strong relationship is a situation when the five active feeder factors feed into one active feeder factor at any given time. In this situation the industry is said to be at Full Maturity Stage (FMS). However, there are three more situations that can exist. In a situation where inactive feeder factors feed into active feeder factors, then the relationship is construed to be at Developmental Transition Stage (DTS). At this stage some feeder factors are active enough to influence the development of others. In the second situation, inactive feeder factors feed into another or other inactive feeder(s); the relationship is regarded as weak and the stage is known as a Formative Transition Stage (FTS). Lastly, is a situation where inactive feeder factor(s) feeds into non-existing feeder factor or factors, then the industry is said to be at the Least Mature Stage (LMS).

Two assessments are carried out to determine the maturity level of the FM industry. Assessment level one involves verifying the existence of the feeder. This is a straightforward and simple assessment when an assessor is required to only verify the existence of the feeder factors to ascertain their presence. It is suggested that a yes or no parameters can be used, it is however suggested that the assessor should establish reasons for non-existence of the other factors. The second assessment is a detailed treatise of the factors after the “yes answer” in the first assessment. This assessment has two levels. Level one, deals with evaluation of individual feeder factors based on the identified critical success factors that define the strength (Table 4.2). It is expected that each of the parameter will be assigned a unit score of 1 point. The more the factor scores indicate the more active it is. The results of the analysis will be classified as active or in-active. Factors with a score of more than 60% of the parameters will be considered active. Level two of the assessment
looks into the integrated contribution of individual factors into the overall development of the FM industry. In this assessment, the factors will be evaluated based on five attributes. These attributes are \textit{dependability, influence, stability, consistency and trustworthiness (DISC-T)}. The attributes will reveal a situation to be technically referred to as \textit{relational feeder capabilities interface} which shows a bonding between feeder factors. The Integrated Feeder Factors Framework (I3F) assessment is depicted in Figure 4.2.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Internal Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice</td>
<td>Innovation, Flexibility and response to changes and demands, strategies, Functions, Organisation, Focus, FM roles, FM position, Professionalism (association and knowledge), consistency and standards, business continuity</td>
</tr>
<tr>
<td>Education</td>
<td>Innovation, Catalyst for development, Localisation, Interaction with the practice, adoption of research results, adaptability, number of courses offered, take up rates and enrollments, level of courses</td>
</tr>
<tr>
<td>Professional Bodies</td>
<td>Setting of codes of conduct, Initiating and conducting research, Mobilisation and lobbying for recognition, Number of active members, Conduct of Meetings, Transparency within the organisation, Internal democracy and elections, Financial strength, Coordination and regulation of education, monitoring of core competencies</td>
</tr>
<tr>
<td>Research</td>
<td>Identify new areas for development, innovation, finding solutions for conceptual and functional issues, quantity of studies, quality of studies, adoptability, validity, reliability</td>
</tr>
<tr>
<td>Market</td>
<td>Nature of the services required, nature of clients (local/international and private/public), level of services required, Volume of business, contribution to GDP, Risks, diversity</td>
</tr>
<tr>
<td>Environment</td>
<td>Existing legal framework, recognition, trading information and data, competition, Financial commitment, Business relationship, Environmental considerations</td>
</tr>
</tbody>
</table>

\textbf{Source}: Authors’ construct, 2009
4.6 Determination of Maturity Levels using Integrated Feeder Framework (I3F)

4.6.1 Level 1: Least Mature Stage (LMS)

Least Mature Stage (LMS) is the lowest maturity level of the FM industry in which only one or two underdeveloped feeders exists. At this level, the FM industry is characterised by the existence of uncoordinated functions, lack of proper understanding of FM concept, unregulated education and knowledge, misunderstanding between pressure groups or existing professional bodies. Dominant FM functions at this stage are operational-related functions. In order for the FM industry to move one step further,
there is a need to harmonise the pressures between existing pressure groups, set regulated education system, and streamline the industry into a proper order. This stage is denoted by Level 1 in maturity axis in Figure 4.3.

4.6.2 Level 2: Formative Transition Stage (FTS)

The second stage in the framework is Formative Transition Stage (FTS). This is a formative stage of the essential feeder factors. At this stage the linkages between the six identified factors start to take shape and each of the feeders starts to develop its working procedures and identify a need to cooperate with others for overall development of the industry. The industry is dominated by both operational and tactical functions. Short term relationships are common and trust between service providers and customers is at a minimum. This stage is represented by Level 2 in Figure 4.3.

4.6.3 Level 3: Developmental Transition Stage (DTS)

The third stage of FM industry maturity is Developmental Transition Stage (DTS). It is expected that after formation of the feeder factors, the industry will strive to align and develop them into useful tools for its development. The dependence on each other at this stage is high. The industry prosperity is entirely dependent on the development of each of the factors. The industry is dominated by knowledge customers and professionalism is of paramount importance. The market is characterised by a mixture of operation, tactical and strategic functions. This stage is shown as Level 3 in Figure 4.3.

4.6.4 Level 4: Full Maturity Stage (FMS)

The last stage is the Full Maturity Stage (FMS). At this stage, the FM industry is characterised by quality FM services and efficiency that are responsive to changes. Professionalism and knowledge base are prerequisites in entering into the market. The feeding between the feeders is effective. The feeding chain continues to sustain the industry. This stage is dominated by quality research, stable market, professional and ethical personnel, enabling environment, developed education and knowledge base and high standard practices. At this stage, each of the factors is required to be in a mature stage to continue to uphold its position within the
feeder chain. The industry is characterised by strategic FM personnel delivering world class services at a very high rate of efficiency. Relationships are of long term nature and alliances between service providers and clients are common. This stage is represented by Level 4 in Figure 4.3.

Figure 4.3: Maturity Levels using Integrated Feeder Framework (I3F)

Source: Authors’ construct, 2009

5. CONCLUSION

This paper presents a new perspective of a yardstick that can be used to measure the maturity of the FM industry within a country. The paper uses a maturity framework in indentifying the pathway that the FM industry would evolve and its levels of development. It is an evolution from the existing maturity models as it does not look into the internal processes. The paper argues that existence and development of FM are dependent on the availability of six interdependent and interrelated factors known as feeder factors. These factors feed into each other to promote development and ensure the continuous growth of the FM industry in its widest context. The framework can be used by countries to evaluate and assess its FM industry as road map for their continuous development to maturity.
6. REFERENCES


The role of decision-making in Risk Management

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ABSTRACT AND KEYWORDS

Purpose of this paper

The purpose of this paper is to prompt critical thinking about the role of knowledge, empiricism within the domain of knowledge, and the role of judgement in decision-making and risk management for infrastructure project delivery.

Design/methodology/approach

Based on published literature in relevant disciplines this paper presents a framework of theory, empirical evidence and judgement to understand decision-making in the face of uncertainty.

Findings and value

The author notes that in order to effectively manage risks associated with the built environment, decision makers must strive to utilize knowledge to the maximum extent possible. Further, knowledge comprises theoretical coherence and empirical evidence along with an awareness of the context in which coherence and empiricism apply. Understanding the role of theory, empirical evidence and judgement in decision-making is necessary for the built environment community to improve the state of the art of project and program management and to positively influence the legislative, regulatory and professional development landscape. This paper advances that understanding by examining decision-making as it relates to the transformation of societal ideas and needs into sustainable assets.

Value and originality

This paper draws upon advances and lessons from economics, cognitive neuroscience, the history of management, and education, which are yet to
find a firm footing in the research, education and practice of sustainable built environment.

Keywords
Decision-making, knowledge, risk management

1. INTRODUCTION

Globalisation and the cause of sustainability of the built environment have broadened the horizons of engineers and managers working in the construction industry. As a consequence, there is recognition that decisions concerning the built environment affect business and society in ways that are often different from the past when sustainability was not in the forefront of project goals. The scope of the knowledge required to make effective decisions and manage risks is broader, as is the distribution of knowledge and leadership (Gronn, 2008). There is also a diffusion of the accountability for knowledge and the lack thereof. Therefore, it is imperative that engineers, managers and all stakeholders have a clear and consistent understanding of how knowledge informs decision-making for sustainability of the built environment.

According to the program criteria defined by the Accreditation Board for Engineering and Technology in the United States for civil and similarly named engineering programs, the program must demonstrate that graduates can explain basic concepts in management, business, public policy, and leadership (ABET, 2009). Although interrelated, the first criterion of being able to explain basic concepts in management is the most fundamental. The bewildering array of literature on management is not likely to properly "explain basic concepts in management" to a novice or even an experienced practitioner. The reasons are best explained by a Harvard professor of management who bemoans the narrow-mindedness of management as a profession and explains how exclusive reliance on particular economic theories has discredited the idea of training managers to exercise judgement and responsibility (Khurana, 2007). The basic concepts in management can be explained by using three simple constructs—the individual, knowledge, and cooperation. Effective management is required, first and foremost, to systematically actualize these three constructs in the pursuit of the stated purpose in its institutional context. The most comprehensively reasoned and passionately argued case for this view of management comes from the testimony of an American engineer to a committee of the United States congress almost exactly one hundred years ago, and remains relevant today (Wagner-Tsukamoto, 2007; The Economist, 2010). The first of the three constructs—the individual—is anyone directly or indirectly involved in or affected by management. The second construct—knowledge—is often fragmented because knowledge relevant to the purpose and the context does not all reside with one individual or stakeholder. Context implies the site, region or
market. As a consequence of the contextual and often incomplete nature of knowledge, judgement plays a role in decision-making. The third construct—cooperation—is a necessary condition for management because individuals perceive, interpret and use knowledge differently. A unified understanding of how available knowledge must inform decisions is what makes cooperation possible. Besides, knowledge is of little value if individuals do not have the motivation to cooperate in the pursuit of the stated purpose.

2. ELEMENTS OF EFFECTIVE DECISION-MAKING

With a basic understanding of management one can then seek to understand decision-making as a process that relies upon theoretical coherence, empirical correspondence, and judgement (Hammond, 1998). Coherence describes and explains the process by which human judgements achieve logical or mathematical consistency, also known as internal consistency or rationality. Rationality implies consistency irrespective of the empirical accuracy. The Subjective Expected Utility (SEU) theory and the variations thereof is the most widely used theoretical framework within which rationality informs decision-making. Benefit-cost analysis of projects and optimization methodologies are common examples of the use of SEU in practice. However, SEU assumes that the decision maker is informed about all alternatives, the consequences of choosing each alternative, and is able to synthesize all that information into a single utility function that helps him/her select the alternative with maximum utility. While mathematically elegant, the expected utility approach to human decision-making is theoretical and models how humans should decide, not how they actually decide. Therefore, empirical correspondence, the process by which human judgements achieve empirical accuracy irrespective of the cognitive activity of the judge, is just as important as the expected utility. Empirical evidence affords the decision-maker's brain the opportunity to seek external validation of what the brain deems to be coherent. A scientist at the University of California conducted experiments in the 1990s to study the coherence and correspondence phenomenon inside human brains and came up with some fascinating observations. His findings suggest that the left hemisphere of the brain seeks coherence from the information it has been provided and maintains that coherence "at all costs." The right hemisphere, concerned with the context, detects instances in which the coherence model in the brain is empirically erroneous, i.e. the model does not correspond to reality. After reaching a threshold, it is the job of the right hemisphere to force the left hemisphere to revise the coherence model and build anew (Ramachandran, 1996). The coherence and correspondence processes in the human brain constantly refine and update the brain's understanding of the information presented to it, thereby guiding judgement and learning. The learning process becomes increasingly challenging with age because of the persistent tension between the coherence models built into the brain or how one has learned...
to see things, and how they are in reality. The interplay between coherence and correspondence also explains why early childhood learning is easier relative to adult learning. Over time the adult brain accumulates numerous coherence models that include false beliefs, incomplete understandings, and naïve renditions of concepts that sometimes do not correspond with facts (National Research Council, 2000). As a consequence, and also when decisions are made quickly, poor judgement is likely to override a more thoughtful and time consuming analysis. The exercise of good judgement in such circumstances is often attributed to experience or wisdom and poor judgement to the lack thereof.

The rationality implicit in coherence (expected utility model) is contingent upon the decision-maker being informed about all alternatives and their consequences, and having the ability to accurately synthesize that information. However, there are two problems with relying on coherence alone. First, rationality operates in a closed system within which it is possible to mathematically prove internal consistency or coherence. Second, rationality is contingent upon the assumptions on which the mathematical consistency is based. Therefore, individual as well as organizational rationality is bounded by the domain or the context in which the underlying assumptions hold true (Simon, 2001). When applying the rationality based models to problems encountered in practice, such as benefits-cost analysis of projects, it is necessary to assess or have in place the systems to assess the empirical accuracy of proposed solutions. One way to assess empirical accuracy is through benchmarking with comparable projects, which requires prior arrangements for data collection, integrity testing and processing of data pertaining to other similar projects. When the personnel who actually work on projects see the value of their decisions based on empirical evidence, they are more likely to embrace the concepts and practices and assume ownership more readily. (Patil, 2008)

Human judgement used in the absence of empirical evidence is often biased, partly because of the pre-existing coherence models in the brains of those making decisions. These pre-existing coherence models have the potential to distort the understanding of risks associated with decisions, all the more so when the decision-makers have a stake in particular outcomes. Therefore, transparency within the team and the use of credible data must guide judgement in decision-making.

2.1 Rationality

The idea that decision makers rely on the expected utility of outcomes when assessing risk has been central to decision analysis for 300 years. The utility-based approach to the measurement and analysis of risks was first presented by Daniel Bernoulli in 1738. Since then many mathematicians have advanced the use of expected utility of outcomes in decision-making. This methodology, entrenched in mainstream economics, is predicated upon the notion of rationality in contracts. The rational behaviour ideology is highly compatible with the pursuit of short-term
interests in contracts, but short-term thinking of participants is incompatible with the long-term perspective of sustainable built environment. Yet, the mathematical modelling with tools like Game Theory to model human behaviour has such hold, that few academic researchers entertain questions about empirical validity of the rationality doctrine institutionalized in contracts. The reasons behind the prevalence of game theoretic approaches to decision-making are best articulated by Fabrizio et al. (2005) as follows: "Subtle cooperative or competitive priming could produce effects on both perceptions of the norms for the game and subjects’ own willingness to cooperate or defect. Because research in such studies and in other prisoner’s dilemma experiments shows that, in multiplay games, subjects respond to what their counterparts do, the self-fulfilling nature of the language is clear: subjects primed to defect or compete are more likely to do so and, therefore, will be more likely to induce a comparable response in their counterpart, validating their initial impressions of the competitive nature of the situation and the untrustworthiness of their counterpart. Conversely, subjects primed, through the naming of the game, to cooperate, will elicit more cooperative responses from their counterparts, again validating their initial beliefs about the nature of the situation and the person they are playing with....Theories become dominant when their language is widely and mindlessly used and their assumptions become accepted and normatively valued, regardless of their empirical validity."

The most significant challenge to rationality-based theories came from Daniel Kahneman, winner of the Nobel Prize (Kahneman, 2002; Kahneman et al., 1982). According to Kahneman, the scientific community is only beginning to appreciate that decision making under risk is reference-dependent. In other words, choice varies with the context in which the options are presented to a decision maker. Kahneman further observed that judgement is contingent upon intuition and reasoning. Therefore, for reasoning to prevail over intuition, judgement must be guided by theory as well as empirical evidence along with an awareness of the context. Practitioners who make decisions with broad implications for the society at large need to be thoroughly grounded in the science of decision-making as explained by the interplay between the theory, empirical evidence, and judgement. This interplay is best explained with a three-legged stool analogy, with the opposing forces of certainty and uncertainty persistently pushing the decision-maker off-balance. Any one of the legs of the stool—coherence, correspondence, or judgement—has the potential to become the weakest leg and cause collapse, i.e. result in a bad or ineffective decision.

2.1 Uncertainty and risk management

Decision-makers are often required to make decisions in the face of uncertainty, that is, with incomplete knowledge. While it is possible to address parts of the uncertainty using estimated probabilities, often based
on historical data, an element of ignorance is inherent in all decisions made in the face of uncertainty because part of the uncertainty is irreducible cannot be addressed through mathematical or probabilistic methods, requiring the decision-maker to invoke judgement.

Adapting the definition from the Guiding Principles of the American Society of Civil Engineers, risk management for built environment is the application of a systematic process for identifying, analyzing, planning, monitoring, and responding to future events for which probabilities can be reliably estimated, so that the built infrastructure will meet safety, health, welfare, service and sustainability expectations of the stakeholders (ASCE, 2009). The last of these expectations—sustainability—is fraught with incomplete knowledge about how the present affects the future, i.e., uncertainty. However, rationality implicit in decision-making based on the expected utility of outcomes is contingent upon knowledge. When pursuing goals such as sustainability the decision-makers are often required to make decisions based on incomplete knowledge. Therefore, risk management for a sustainable built environment requires the exercise of judgement informed by knowledge that comprises coherence and empirical accuracy.

3. THE NATURE OF KNOWLEDGE IN DECISION-MAKING

Human knowledge is by definition incomplete. Incomplete knowledge implies uncertainty, particularly when the consequences of decisions materialize well into the future. The lack of certitude leads individuals and organizations to constantly pursue knowledge, or certainty, and rely on judgement when certitude is not achievable or is too expensive or time-consuming to attain. Committees or teams of individuals are sometimes formed when decisions have to be made in the face of uncertainty. Conversely, forming a committee of individuals is unnecessary if all necessary knowledge to make informed decisions exists. For example, the rehabilitation or renewal of old or deteriorating infrastructure is preceded by an assessment of the condition of the existing facilities. Even with the most advanced technologies the knowledge acquired from condition assessment is far from certain, requiring the exercise of informed judgement. Regardless of whether a committee is formed, judgement plays a critical role in decision-making. The challenge is to make effective decisions that maximize the use of knowledge and minimize poor judgement. In one of the original contributions on the subject, the following guidelines are proposed for engineers and planners seeking to use probabilistic methods for decision support (Ang and Tang, 1984):

1. Prepare a list of all feasible alternatives including acquisition of additional information;
2. Prepare a list of all possible outcomes associated with each alternative;
3. Prepare an estimate of the probability associated with each outcome;
4. Perform an evaluation of the consequences associated with each combination of alternative and outcome;
5. Establish the criteria for the decision;
6. Perform a systematic and transparent evaluation of all alternatives;

Such guidelines ensure that knowledge informs the judgement of the
decision-makers when selecting the alternative that is best aligned with the
purpose. The guidelines rely on estimates of probabilities associated with
all possible outcomes. The task of estimating probabilities often requires
the use of judgement even when the probabilities are computed from
historical data. For example, when rehabilitating existing structures and
facilities, employing measurement technology for condition assessment
provides data but the users of the data are required to exercise judgement
when using the data to inform decisions. A group of expert professionals
may be engaged and the following steps implemented to incorporate their
judgement into decision-making (Clemen, 2001):

a. Identification of variables for which expert judgement is needed, to
complement existing scientific knowledge;
b. Identification and recruitment of experts;
c. Motivating the experts/overcoming hesitation to provide “opinions”;
d. Structuring, decomposition, and modelling of experts’ thinking;
e. Probability assessment training;
f. Probability elicitation and verification;
g. Aggregation of probability distributions where possible;

Independent, informed facilitation of such exercises is paramount because
it is easy for the participants to lose track of the purpose or get bogged
down in the method. Indeed, when judgements are made with messy,
incomplete data, statistical and methodological wizardry can blind rather
than illuminate (Bennis and O’Toole, 2005).

4. CONSENSUS OR CONSENT?

An important aspect of decision-making, especially when the decision
affects many stakeholders or large populations, is whether to seek
consensus or to seek informed consent. Consensus implies general
agreement. Informed consent, on the other hand, is a legal term that an
individual may use to indicate whether or not the decision meets the
minimum expectations. Informed consent sets a lower threshold for
decision-making than consensus and is the basis for medical treatment
decisions involving complicated procedures that pose risks for patient life or
well-being. Some key considerations when seeking informed consent are
as follows (Vick, 2002):
• Probabilities communicate information to inform the decisions;
• Judgement is expected to be incorporated in probability estimates;
• Probability estimates incorporate ranges where appropriate;
• Probabilities for adverse consequences are accompanied by means
to reduce those consequences;
• The decision-maker is encouraged to seek other opinions/options;
• The decision rests with the one giving consent;
• Motivational bias, which is an individual's stake in particular
outcomes, is not tolerated in probability estimates;

Motivational and cognitive biases in decision-making have the tendency to
skew the assessments. Motivational bias occurs when the decision-maker
has a stake in the outcome—something to gain or lose, mitigated by the
tension between bureaucratic loyalty demanded by organizations and the
autonomy implicit in professionalism (Vick, 2002). Cognitive bias refers to a
biased opinion based on inadequate understanding or the inability to
reason. Cognitive bias can be minimized by engaging knowledgeable
persons in the decision-making process but motivational bias is harder to
address, requiring disinterested, independent facilitation of the process.

5. THE NATURE OF DECISION-MAKING

Decision-making can be routine or operational and strategic or highly
unusual. In most organizations routine decisions pertain to day-to-day
operations and are informed by precedent, written specifications that are
part of contracts, codes for design, enforceable guidelines or standards, or
proven skills of the workers. The context in which routine decisions are
made is well-defined, be it a manufacturing plant or a construction site. A
the decision-maker moves away from the work-face into supervisory levels
and upper management, the context of the decision-making broadens as
decisions affect suppliers, customers, other stakeholders, and the well-
being of all participants. Tangible guidelines become sparse, and
individuals at the executive and the board level are expected to exercise
proper judgement and engage appropriate counsel when making decisions.
Therefore, decision-making throughout the organization is a mixture of the
enforceable and the intangible. Organizations with strong governance
provide discipline and structure; instil ethical values in employees and train
them in the proper procedures; and exhibit behaviour at the board and
executive levels that the rest of the organization will want to emulate
(Wagner and Dittmar, 2006).

5.1 Decision-making in the life cycle of a project

Managers are constantly faced with unforeseen situations when making
decisions and generally have incentives to pursue relevant knowledge to
the fullest extent possible before exercising judgement. Some managers
rely on intuition to guide judgement, aware of the fact that the certitude that
knowledge can provide isn't always forthcoming with intuition. So how does "knowledge" manifest itself in the life cycle of a project? The cost estimate classification system of the Association for the Advancement of Cost Engineering - International presents a framework to describe the evolution of knowledge in the life cycle of a project (Christensen and Dysert, 2005). The main premise of the cost estimate classification system is that as more investigative, discovery, design and analysis work is performed starting with the inception of a project, more knowledge becomes available to the project engineers, planners and estimators. For example, when a new idea or need for a project is identified, very little information about the soil may be available. The project leader might rely on any one of or a combination of visual inspection, data from nearby sites, a cursory investigation using a single or a few soil bores, or numerous soil bore logs along a grid staked out by surveyors to gain more complete knowledge of the underlying strata. Detailed understanding of the strata is a key input to decisions about foundation design as well as remediation measures that might be necessary. Similarly, all aspects of a project including the project scope itself go through an investigative and discovery process that feeds knowledge to those managing the project. The project team may also draw upon other similar projects in the past to inform decisions if such information is available. Equipped with knowledge the project team can make more accurate claims about the likely cost, the time required for completion, safety and welfare of the participants and the end users, quality or serviceability of the facility to be built, and its sustainability. How much money to spend on acquiring such knowledge for decision support is itself a decision that requires the team to prioritize the available resources. Therefore, risk management for a project begins long before the commencement of design or construction.

6. PROJECT AND PROGRAM RISK MANAGEMENT

A program is a portfolio of projects that are related. Within the program each project is a distinct unit of analysis for risk management, because accountability is generally ascribed for each individual project. A project is what an owner defines to accomplish a purpose or to transform ideas and needs into an asset. The cost estimate of a project evolves with the project team's knowledge of the project. Knowledge comprises stakeholder expectations, funding policies, specific information about the site, applicable regulations and laws, project scope, design details and planning for execution. A key element of the knowledge, defined in the policy document of a United States public transportation agency, is a clear and formal definition of what the project is and what it is not (Minnesota Department of Transportation, 2008). Without such clarity of purpose, practices like project controls and change management lack the necessary frame of reference for safe and effective project delivery.
The first cost estimate is usually prepared when a project is identified on the basis of safety, economic, environmental or public health needs. A project manager may or may not be assigned at the time of project identification, and the cost estimate is at best an educated guess that reflects the likely range of costs. The quality of the cost estimate improves as the quality of knowledge about the project improves during project development. A lack of focus on knowledge leads project teams to lose perspective of the quality and completeness of the factors that contribute to a cost estimate, and the fact that the cost estimate is not a number. Accounting procedures may force project teams to express the cost estimate as a number but that is merely a reflection of artificial rules rather than the true nature of a cost estimate. As part of the contracting or tendering process contractors may also have to express the cost estimate as a specific amount of money but that again is not a reflection of the nature of the cost estimate. No owner can realistically express a cost estimate as a number because of the numerous variables that make up the cost estimate even for small and simple projects. With sophisticated statistical analysis the cost estimate can be expressed as a probabilistic distribution. The contractor, on the other hand, is forced to set a target cost estimate that is consistent with the contractor’s risk exposure.

6.1 The relationship between project and program

Individual projects are usually part of a larger program in the owner organization. Programs comprising a portfolio of projects are prepared within budgetary limits that may exclude the effects of inflation and other factors deemed to be outside the control of the program managers. As individual projects move forward through the planning, design, and construction phases, each project is subject to its contractual constraints and the overall expenditure at the program level is subject to budgetary constraints for the program. Based on the range or distribution of the cost estimate of each individual project, the program manager is required to manage the program within the budgetary limits.

The concept of evolving nature of the cost estimate is essential to understanding program management and risk management, illustrated in Figure 6.1. The actual cost of the project varies depending upon the extent to which the risks are realized during project execution. Any project accountant can attest to the fact that the true cost of a project cannot be determined and the cost cannot be expressed as a specific amount long after the project is completed, all outstanding payments and receivables are settled and the project account closed. Similar to cost estimates, budgets for accounting purposes also cannot be determined accurately in advance although budgetary constraints are deemed necessary to encourage project participants to effectively use available resources and to encourage competition. Just as cost estimators need to be aware of the probabilistic nature of estimates, managers and accountants also need to be aware of the fact that budgetary numbers do not reflect the inherent
variability. Therefore, decisions must be driven by the purpose and the needs of the projects or programs and the available knowledge instead of the amount of money available in the budget. The lack of focus on knowledge distorts the risk perceptions of participants and focuses them on “gaming” the system.

Figure 6.1 Risk Management illustrated (adapted from NCHRP, 2007)

7. CONCLUSION

The purpose of this paper is to prompt critical thinking among the professionals that shape the built environment. To that end, the framework of theoretical coherence, empirical evidence and informed judgement proposed in this paper is helpful because it utilizes recent developments in the understanding of human learning processes. Advances in cognitive neuroscience and education, suggesting that knowledge comprising robust theory and credible empirical evidence shapes human judgement have important implications for decision-makers in the built environment.
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Translating Policies into Services in South Africa Using Public Private Partnerships (PPPs)

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ABSTRACT AND KEYWORDS

Purpose of this paper

This paper is a continuation of the dissemination of findings of a doctoral study conducted at the Nelson Mandela Metropolitan University (NMMU) relative to South African Public Private Partnership (PPP) projects. The objectives of the research were to: contribute to the PPP body of knowledge (PPPBOK); further understanding of the challenges facing and issues affecting delivery of PPP projects; promote the use of the PPP model in the implementation of projects in Africa, Middle East, Asia, Far East, Europe, Latin America, Caribbean and North America.

Methodology / Scope

The output of the doctoral study conducted at the NMMU forms the basis of this paper. The research investigated perceptions of PPP stakeholders on the performance of operational PPP projects. A case study approach was adopted to examine various performance aspects of operational South African PPP projects. The research was a multi-case study design. Each individual case study consisted of a ‘whole’ study, in which facts were gathered from the selected PPP projects and conclusions drawn on those facts (Yin, 2003).
Findings

Findings from the research were reported in aggregate: existence of a robust policy and regulatory framework; inadequate PPP training and project management capacity. Furthermore, based on the findings, appropriate recommendations were made for policy changes, decision making and improvements. Research findings continue to be published in local and international forum.

Value

Publishing of research findings is the best way of sharing knowledge with the rest of the research and community. Furthermore, publishing provides opportunities for further research in other areas relative to use of ‘systems thinking approach’ within the broader context of procurement systems.

Keywords

Sustainability, Public Private Partnerships, projects, challenges and issues.

1. INTRODUCTION

The need for infrastructure development and accelerated service delivery are clearly articulated in the African National Congress policy framework, as contained in the ‘White Paper on Reconstruction and Development’ (Republic of South Africa, 1994). The policy document provides clear guidelines on priority areas of reconstruction and development so as to address core issues relating to the imbalances of development, some of which are due to historical and injustices of the apartheid era.

Infrastructure development and service delivery in South Africa is critical for the following reasons: catalyst for economic growth; provides an enabling environment for investment; creates employment opportunities; promotes industrial development, and provides much needed social services.

The apartheid era in South Africa saw selective and discriminative development of infrastructure, which was limited to certain geographical areas. Many townships and informal settlements were neglected, because the government’s priority was exclusively for a few selected areas. This approach created a huge gap, both in terms of real development and availability of services. Recent developments in the form of service delivery protests, demand corrective action and an innovative approach in terms of
turnaround strategies appropriate for better infrastructure development and service delivery.

The challenges facing South Africans require a re-examination of the following key issues within the context of existing and future policies: strategies; services; technology; resources such as people, equipment, and finance; structures; policies; systems; standards, and work culture. However, the focus of this paper is on the policy and regulatory framework and how the PPP procurement model can be applied to translate the policies into ‘bread and butter’ for the majority of South Africans. The other issues, namely strategies, systems, standards, work culture and resources, will be examined in greater detail in future papers.

2. POLICY FRAMEWORK AND PERCEPTIONS SURVEY

2.1 The White Paper of 1994

The ‘White Paper on Reconstruction and Development’ (Republic of South Africa, 1994) sets out clear policy guidelines on the importance of meeting basic needs and building infrastructure in South Africa. This paper saw the birth of the Reconstruction and Redevelopment Programme (RDP). According to the White Paper, the RDP was based on the notion that reconstruction and development was part of an integrated process. The programme broadly addressed major issues such as: reconstruction; redistribution and reconciliation.

According to the policy paper, the infrastructure programme was aimed at providing access to modern and effective services such as: electricity; water; telecommunications; transport; health; education; training, and housing.

There is an urgent need to develop infrastructure and provide social services, especially in the former ‘homelands’ and other disadvantaged rural areas with the aim of eradicating poverty, through: elimination of social backlogs in the construction of access roads, schools, clinics, water and sanitation; leveraging of economic growth through improvement of transportation facilities, and promotion of labour-intensive and community-based construction methods for job creation.

2.2 Overview of ANC Policy on Infrastructure

The ANC (2002) formulated policies since 1994 to provide an integrated approach to infrastructure development and service delivery. One of the major tasks undertaken during this period was the conducting of a survey to determine infrastructure and service delivery needs in South Africa. The survey investigated the conditions of South Africa’s social and physical infrastructure, the maintenance thereof, and an assessment of future needs. The study also addressed issues concerning implementation.
agencies and the role of different partners in development. The findings indicated that there was a backlog of infrastructure development, worth about R170 billion, across all sectors. Though efforts have been made to reduce the backlog, a lot of work still needs to be done.

2.3 Perceptions of South Africans Regarding Service Delivery

2.3.1 Introduction

According to Khosa (2000), there have been significant achievements in service delivery in South Africa. In 1998, a national survey targeting 2 200 adults was conducted during the months of February and December. The results of the survey were compared with the situation as it were in 1994 at the dawn of the new era of democracy. The data from these surveys provided an overall perspective of service delivery at the national level. It also attempted to provide an assessment of the perceptions, which change with time, of South Africans regarding the change in infrastructure service delivery since 1994. The results of the various sectors were as follows:
2.3.2 Running Water

Table 2: Delivery of running water

<table>
<thead>
<tr>
<th>Perception</th>
<th>February 1998 (%)</th>
<th>December 1998 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>Same</td>
<td>48</td>
<td>50</td>
</tr>
<tr>
<td>Worsened</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>Uncertain</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

_Data Source_: Empowerment through Service Delivery (2000)

During the survey of December 1998, 35% of South Africans perceived that the provision of running water had improved in their areas compared to 14% who felt that this had worsened since 1994. There was a 10% increase in absolute terms for those who perceived that there was an improvement between February 1998 and December 1998. These figures suggest that the delivery had been extended to a substantial proportion of the population during the period February and December 1998. During the same period, the number of people who had indicated a decline in the delivery of running water reduced by 10% in absolute terms.

This survey confirms the data obtained, which indicates that in 1994, 30% of all South Africans lacked access to a safe supply of running water, whereas by February 1999, only 20% lacked access to safe running water.

2.3.3 Electricity

Table 3: Electricity delivery

<table>
<thead>
<tr>
<th>Perception</th>
<th>February 1998 (%)</th>
<th>December 1998 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement</td>
<td>35</td>
<td>41</td>
</tr>
<tr>
<td>Same</td>
<td>42</td>
<td>41</td>
</tr>
<tr>
<td>Worsened</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td>Uncertain</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

_Data Source_: Empowerment through Service Delivery, 2000.

More people perceived that there had been an improvement rather than deterioration in the provision of electricity in their areas. The percentage of respondents that indicated a decline in the service delivery of electricity reduced by 6% in absolute terms between February and December 1998.
2.3.4 Housing

Table 4: Housing delivery

<table>
<thead>
<tr>
<th>Perception</th>
<th>February 1998 (%)</th>
<th>December 1998 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement</td>
<td>12</td>
<td>22</td>
</tr>
<tr>
<td>Same</td>
<td>50</td>
<td>38</td>
</tr>
<tr>
<td>Worsened</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Uncertain</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

Data Source: Empowerment through Service Delivery, 2000.

Data collected from the February and December 1998 surveys indicates that the percentage of people who perceived that there was an improvement in access to affordable housing increased by 10% in absolute terms between February and December 1998.

2.3.5 Healthcare

Table 5: Healthcare delivery

<table>
<thead>
<tr>
<th>Perception</th>
<th>February 1998 (%)</th>
<th>December 1998 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement</td>
<td>27</td>
<td>36</td>
</tr>
<tr>
<td>Same</td>
<td>43</td>
<td>32</td>
</tr>
<tr>
<td>Worsened</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>Uncertain</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Data Source: Empowerment through Service Delivery, 2000.

The survey indicates that the percentage of people, who perceived that the provision of healthcare services had improved, rose by 9% in absolute terms between February 1998 and December 1998. 32% indicated the situation had remained the same, representing a decrease of 11% in absolute terms. Those who felt the situation had worsened increased from 28% to 30%.

2.3.6 Roads and Drainage

Table 6: Roads and drainage

<table>
<thead>
<tr>
<th>Perception</th>
<th>February 1998 (%)</th>
<th>December 1998 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement</td>
<td>22</td>
<td>26</td>
</tr>
<tr>
<td>Same</td>
<td>42</td>
<td>38</td>
</tr>
<tr>
<td>Worsened</td>
<td>31</td>
<td>35</td>
</tr>
<tr>
<td>Uncertain</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Data Source: Empowerment through Service Delivery, 2000
Significant numbers of respondents believed there had been a deterioration of tarred roads and street drainage. The December 1998 HSRC survey revealed that about 26% of South Africans indicated that they perceived an improvement in the provision of tarred roads and street drainage in their areas, compared with more than 35% in absolute terms who felt the situation had worsened. The percentage of people who indicated that they perceived an improvement increased marginally, from 22% in February 1998 to 26% in December 1998. The study also revealed a marginal increase from 31% in February to 35% in December, for those who perceived the situation had worsened.

2.3.6 Waterborne Sewerage

Table 7: Delivery of waterborne sewerage

<table>
<thead>
<tr>
<th>Perception</th>
<th>February 1998 (%)</th>
<th>December 1998 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>Same</td>
<td>51</td>
<td>53</td>
</tr>
<tr>
<td>Worsened</td>
<td>29</td>
<td>21</td>
</tr>
<tr>
<td>Uncertain</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

Data Source: Empowerment through Service Delivery, 2000

When comparing the February 1998 and December 1998 data sets, the proportion of those indicating improvement of waterborne sewerage delivery increased from 14% to 22%, while those indicating the situation had worsened reduced from 29% to 21%.

2.3.7 Public Transport

Table 8: Delivery of public transport

<table>
<thead>
<tr>
<th>Perception</th>
<th>February 1998 (%)</th>
<th>December 1998 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement</td>
<td>29</td>
<td>33</td>
</tr>
<tr>
<td>Same</td>
<td>46</td>
<td>36</td>
</tr>
<tr>
<td>Worsened</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>Uncertain</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

Data Source: Empowerment through Service Delivery, 2000

The results of the study indicated that 33% perceived that public transport had improved, as compared to 29% in February 1998.
2.3.8 Waste Removal

Table 9: Delivery of waste removal

<table>
<thead>
<tr>
<th>Perception</th>
<th>February 1998 (%)</th>
<th>December 1998 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement</td>
<td>19</td>
<td>27</td>
</tr>
<tr>
<td>Same</td>
<td>50</td>
<td>45</td>
</tr>
<tr>
<td>Worsened</td>
<td>24</td>
<td>23</td>
</tr>
<tr>
<td>Uncertain</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>

_Data Source:_ Empowerment through Service Delivery, 2000

Data from the December 1998 HSRC survey revealed that 27% of the people felt there had been a significant improvement in waste collection. 23% of the people perceived the situation had worsened between February 1998 and December 1998 – a small decrease of 1% in absolute terms.

2.3.9 Telephone Services

Table 10: Delivery of telephones

<table>
<thead>
<tr>
<th>Perception</th>
<th>February 1998 (%)</th>
<th>December 1998 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Same</td>
<td>53</td>
<td>44</td>
</tr>
<tr>
<td>Worsened</td>
<td>22</td>
<td>32</td>
</tr>
<tr>
<td>Uncertain</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

_Data Source:_ Empowerment through Service Delivery, 2000

The survey further revealed that 21% of the people indicated a perceived improvement in the delivery of telephone services. There were proportionally more people dissatisfied with the provision of telephone services in December 1998 than in February 1998 – a decrease of 10% in absolute terms.
3. MANAGEMENT CRISIS CRIPPLES MANY SOUTH AFRICAN MUNICIPALITIES

According to the Minister for Cooperative Governance and Traditional Affairs (Shiceka, 2009) the current situation in South African municipalities may be summarised as follows:

- Thirteen municipalities failed to implement the new Municipal Property Rates Act as at July 1 as required;
- This meant that the respective municipalities could no longer bill for rates because they had no valid valuations to work from;
- The municipalities are from the North West, Limpopo, Eastern Cape and Free State provinces, and
- Emergency legislation had to be tabled to allow those municipalities another two years in which to collect rates based on old valuations.

4. ROLE OF PPPS IN IMPROVING SERVICE DELIVERY

According to Grimsey and Lewis (2004), over the past five years the debate relating to PPPs has focused on the: potential contribution of various forms of PPPs to sustain social / economic progress; need to create PPP knowledge and facilities within various government organisations; possibility of identifying promising PPP structures and opportunities; requirements for implementing PPP structures; possibility of extending PPPs to smaller, regional and poverty-focused projects, and management of expectations concerning PPPs.

However, Ramaema (1997) cites the following reasons for seeking the involvement of the private sector in the delivery of public services, arguing PPPs would result in the: injection of technical / managerial expertise into the sector and transfer of technological innovations; improvement in the economic efficiency of the sector in terms of both operating, performance and use of capital investment; injection of large-scale investment capital into the sector, or the creation of access to private capital markets; reduction in the level of public subsidies to the sector, and / or the reduction of these subsidies from the groups currently served to the poor and those not currently served; distancing of the public sector from short-term political intervention in the operation of a ‘utility’ and a reduction of opportunities for intervention by powerful vested interests; public sector that is more responsive to consumer needs and preferences, and supplementing capacity, currently not available in the public sector.

Building modern infrastructure for any country requires all sectors of the economy to play a key role. Governments should not presume that either the private or the public sector could deliver projects more efficiently
or effectively than the other. According to the Business and Industry Advisory Committee (BIAC) (2004), governments, more especially in developing countries, have to develop suitable investment models to realise their infrastructure development objectives. These models involve partnerships between the public and private sectors, under which decisions can be made on merit, and outcomes are based on public benefits obtained. According to a research initiative in the USA, a framework has been developed that measures the effectiveness of PPPs both at programme and project levels (Garvin, 2007).

Prior to a decision to commit to major infrastructure projects, the government authority will normally prepare a full cost benefit analysis and business plan for the potential project. This will include taking full account of the value of public land that is being committed to the project. The evaluation of infrastructure proposals will also receive independent verification of financing arrangements and a full assessment of risk.

Where there is private sector involvement in major public infrastructure projects, contractors are normally chosen through a rigorous and transparent system of public tendering. The public interest in any infrastructure development must be fully protected by ensuring that work is awarded to private contractors through a public tender process, under which there are clear and enforceable performance arrangements. This requires public release of tender specifications and disclosure of financial risks accepted by the state. The same procedures apply to PPPs at the procurement stage.

Governments normally allow for community inputs into infrastructure development through appropriate planning mechanisms. In all infrastructure developments, the government has to protect the public interest through: strong third party rights; fair appeals processes; effective conflict resolution; and transparency, which are stipulated in Public Finance Management Act (Republic of South Africa, 2002) and Municipal Finance Management Act (Republic of South Africa, 2003) respectively.

PPPs are focused on creating partnerships between the government and private businesses (Walzer & Jacobs, 1998), in which improved value-for-money is achieved by utilising the innovation capabilities and skills of both parties. This is done in order to deliver performance improvements and efficiency savings. PPP policies, where they exist, as in South Africa do provide high-level frameworks for implementation. Perez (2004) reviews current trends in transport partnerships and provides detailed case studies of three recent partnership projects: the M1 / M15 Motorway in Western Hungary, the Vasco da Gama Bridge in Lisbon, and the Bangkok Mass Transit System in the capital of Thailand. However to realise the full potential of good policies and guidelines (BIAC, 2004; Farlam, 2005), there is need to translate them into tangible goods and services.
5. CONCLUSIONS

The South African project delivery system faces a number of challenges which are both policy and management related. The issues discussed in this paper clearly indicate the existence of a robust legal and regulatory framework since 1994. The policies formulated in the 1990s have been enhanced by additional policy framework, more especially in the area of procurement of goods and services, PPPs in particular. Findings from the doctoral study conducted by Nyagwachi (2008) attest to the above scenario.

However, despite the efforts by the government, other institutions and industry experts, service delivery still remains as elusive as ever. People still lack adequate access to basic services, despite massive government funding allocation. One major inhibiting factor is the inadequacy of technical expertise to translate the existing policies into tangible services. The process of delivery of services involves procurement, a process that requires meticulous planning, implementation and monitoring. One of the available options is the PPP approach, which can leverage private sector resources of capital and technical expertise. Despite a robust regulatory framework for engendering PPPs into the service delivery value chain, there are serious concerns and issues related to: governance; transparency; conflicts; corruption; PPP standards; public acceptance, and PPP awareness and training, which must be tackled ‘head-on’ in order to unlock the opportunities existing within the private sector.

Recent developments from various countries in the world relative to the failure of the ‘economic systems’ illustrate the gravity of the problem that the African countries are facing. There is an urgent need to mainstream PPPs into all sectors for faster service delivery.

Political will is fundamental to a successful partnership programme. PPPs represent a significant change to the traditional procurement approach, and therefore governments need to build political support to facilitate PPP development and sustainability. Poor governance engenders a poor environment that is not conducive to investment.

It is recommended that continued research be conducted to inform policy formulation and decision making relative to the following issues: strategies; services; technology; resources in the form of people, equipment, and finance; structures; policies; systems; standards, and work culture. Furthermore, the broad themes of reconstruction, redistribution, reconciliation and transformation need to be researched further to inform government regarding future improvement.
6. REFERENCES


Shiceka, S., 2009, Sunday Times, 1 November, 2


Reducing Climate Change in the UK: the discrepancies between strategy and implementation in the domestic building sector

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ABSTRACT AND KEYWORDS

Purpose of this paper

Using the new build residential sector in England as its basis, this study examines how climate change is being tackled, and the practicality of implementing various commitments of current and proposed UK legislation.

Design/methodology/approach

This paper outlines the current climate change facts, analyses the global, national, regional and local requirements for energy strategy and highlights the differences that have been found. The impact of different design strategies on achieving the various requirements is then modelled, using case study data. The design strategies tested in this case study includes the use of different levels of fabric insulation and airtightness, ventilation strategies, fuel types, and renewable energy systems.

Findings

The preliminary findings of this study show that the methods being used in the residential sector in England to tackle climate change are fraught with problems and that there are many conflicts in the interpretation of the requirements at different levels. They also show that the current additional cost of a sustainable building are prohibitively high. In order to successfully
implement environmentally sustainable solutions, there is a need for
clearer regulations, guidelines and definitions, and for significant
incentives.

Practical implications/value of the paper

The study highlights the difficulties of implementing the UK energy and
carbon dioxide commitments and makes a number of recommendations to
make the implementation successful and to overcome the existing barriers.

Keywords

Climate change, sustainable construction, energy, carbon dioxide
emission requirements, implementation

1. CLIMATE CHANGE

There is now very strong evidence (IPCC, 2007) that since the late 1800s
the earth’s average surface temperature has risen by 0.74°C. During this
period, there has been an ever increasing consumption of fossil fuels as oil,
gas and coal, significant deforestation, and the practice of farming methods
that result in emissions of six principal greenhouse gases (GHG) (UN,
1998): Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxides (N₂O),
Hydrofluorocarbon (HFC), Perfluorocarbon (PFC) and Sulphur
Hexafluoride (SF₆).

One reason for the current concern about climate change is the rise in
atmospheric CO₂ concentrations indicated in parts per million as shown in
Figure 1.1.

![Figure 1.1: Concentrations of Greenhouse Gases from 0 to 2005](chart.png)
Another concern relates to the speed of the recent warming. Average global temperatures have risen by 0.55°C since 1940. During the ice age and warm interglacial periods the mean temperature changed between 4°C and 7°C, but this process took about 5,000 years (IPCC, 2007).

It fell to scientists to draw international attention to the threats posed by global warming. In 1988, the Intergovernmental Panel of Climate Change (IPCC) was created and the first assessment report issued. The Panel’s findings spurred governments to create the United Nations Framework Convention on Climate Change (UNFCCC). In 2005, linked to the UNFCCC, the Kyoto Protocol entered into force that sets binding targets for 37 industrialized countries and the European Community for reducing GHG emissions.

In the year 2000 the world’s GHG emissions were about 34GtCO₂e per year or 5.5tCO₂e per person. In 2006, the UK was responsible for a total of 652MtCO₂e of GHG emissions (DEFRA, 2008a), of which 85% have been CO₂ emissions (BERR, 2008). Data shows (DEFRA, 2008b) that the UK building sector accounts for 63% of this, and the residential sector is responsible for about 27% of the total CO₂ emissions in the year 2006. The heating sector (water and space) is responsible for 73% of the residential CO₂ emissions (DCLG, 2007).

2. INTERNATIONAL, NATIONAL, REGIONAL AND LOCAL ENERGY STRATEGY REQUIREMENTS

Different levels of hierarchy including international, national, regional and local intergovernmental/governmental institutions define energy strategies and set out targets for tackling climate change.

The UNFCCC is the overall framework for intergovernmental efforts to tackle the challenge posed by climate change. The core commitment under its Kyoto Protocol requires each committed industrialized country to ensure that its total emissions from the main six greenhouse gas resources do not exceed agreed levels.

Reducing energy consumption is among the main goals of the European Union (EU). With 40% of the energy consumed by 160 millions buildings (CIBSE, 2003), the EU has introduced the Energy Performance of Buildings Directive (EPBD, 2002). The EPBD aims to ensure that new buildings consume less energy and that the EU commitments and targets are kept.

In response to this directive, the UK Government set targets to cut the national CO₂ emissions by 80% by 2050, to save 20% of the European Energy Consumption by 2020 and to increase the renewable energy supplies by 20% by 2020.
To achieve these targets, the Government amended the Building Regulations (BR) Approved Document Part L in 2006 (ODPM, 2006) and is consulting on the changes that will come into force in October this year. Compliance with BR is mandatory. In addition, the UK Government introduced the Code for Sustainable Homes (CSH) (DCLG, 2008). The CSH is a discretionary environmental assessment method for rating and certifying the performance of new dwellings from level 1 (enhanced sustainability) to level 6 (zero carbon).

On a regional level the Greater London Authority (GLA, 2004a) published its Energy Strategy. The strategy aims to improve London’s environment, reduce the capital’s contribution to climate change, tackle fuel poverty and promote economic development by using less energy, using renewable energy and supplying energy efficiently.

On a local level, Richmond upon Thames is an exemplary Borough putting sustainability as a priority in its Core Local Development Strategy (LBRUT, 2009a). The Borough requires every new development to comply with its supplementary planning document, the Sustainable Construction Checklist (LBRUT, 2009b). The Checklist requires an excellent environmental rating for all new residences which is equivalent to a CSH level 3 and the predicted site CO₂ emissions have to be reduced by at least 20% through the use of renewable energy. Local policy therefore overrides regional and national policy.

3. CASE STUDY

3.1 The exemplary dwelling, calculation model and the assumptions

The dwelling chosen for this research is a real development located in a suburban area in the South West of London. The dwelling is a two storey, detached property with a total floor area of approximately 160m².

All calculations have been performed with the National Home Energy Rating (NHER) Plan Assessor Version 4.2.28. The NHER Plan Assessor software is government approved and authorised for Standard Assessment Procedure (SAP 2005), Environmental Impact (EI), Target Emission Rate (TER), Dwelling Emission Rate (DER) calculations and for issuing Energy Performance Certificates (EPC).

It is assumed that the dwelling is naturally cooled, no secondary heating system is specified, no chimneys and open flues are present and in total three extract fans are installed in kitchen and bathrooms.

The primary heating systems tested include gas boiler, warm air, warm air with heat recovery, biomass boiler, ground source and air source heat pumps and a communal combined heat and power (CHP) system. They are time and temperature zone controlled. Appropriate systems for an urban context, such as photovoltaic elements, solar hot water elements, biomass boiler, ground source and air source heat pumps have been
tested to comply with the local planning requirement to offset at least 20% of the predicted CO₂ emissions by renewable technologies.

Two different types of construction standards have been analysed:
1. Standard construction: the dwelling complies with BR Part L1A
2. Improved construction: the dwelling exceeds BR Part L1A requirements

<table>
<thead>
<tr>
<th>Building Element</th>
<th>Type 1, standard construction</th>
<th>Type 2, improved construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor, external wall, roof</td>
<td>0.25W/m²K</td>
<td>0.12W/m²K</td>
</tr>
<tr>
<td>Windows</td>
<td>2.0W/m²K</td>
<td>0.8W/m²K</td>
</tr>
<tr>
<td>Doors</td>
<td>2.0W/m²K</td>
<td>1.0W/m²K</td>
</tr>
<tr>
<td>Air tightness level</td>
<td>9m³/m²hr@50Pa</td>
<td>5m³/m²hr@50Pa</td>
</tr>
</tbody>
</table>

### 3.2 Results of the analysis

#### 3.2.1 The methodology to demonstrate the energy performance of a dwelling

In England, different calculations are required to demonstrate compliance solely with the energy performance of new build dwellings. To prove compliance with BR Part L1A and to produce Energy Performance Certificate (EPC) for SAP-ratings, SAP calculations are required.

For both verifications SAP determines the CO₂ emissions arising from the predicted energy demand of the dwelling, however, the CO₂ emissions through cooking and electrical appliances are disregarded. In addition, the assumptions made for secondary heating and for the use of energy efficient lighting are different.

For Part L1A the calculations determine the CO₂ emissions of the actual dwelling (DER) and these are compared with those of a notional dwelling, defined as the Target Emission Rate (TER). To comply with BR, the DER has to be equal to, or lower than the TER.

For Part L1A it is assumed that a secondary heating appliance always meets part of the space heating demand. The fraction provided by the secondary heating system is defined in SAP (BRE, 2008) and the efficiency is assumed as defined in Part L1A. For lighting, a fixed assumption of 30% low energy lighting is made.

To determine the SAP-rating for EPCs, the Environmental Impact Rating (EI) and the Energy Efficiency Rating (EE) need to be calculated. The calculation procedures for both ratings are also based on the DER.
However, contrary to Part L1A, for EPCs the efficiency of the secondary heating system is as actually designed. The CO$_2$ emissions from lighting are based on average energy consumption for lighting in UK houses and include a correction factor for fixed lighting systems.

Therefore, the CO$_2$ emission results of Part L1A and EPC calculation procedures vary as indicated in Figure 3.1 but are expressed using the same terminology “DER”. In addition, Figure 3.1 shows realistic CO$_2$ emissions (NHER), reflecting the emissions arising through cooking and electrical appliances.

![Carbon Dioxide Emissions of Different Calculation Methodologies](image)

**Figure 3.1** Predicted CO$_2$ emissions for house type 1 as defined for EPCs, Part L1A compliance and by NHER

### 3.2.2 The energy and carbon dioxide targets

Figures 3.2 and 3.3 demonstrate that the best heating option in terms of CO$_2$ emissions is not the best option in terms of energy demand.
The biomass boiler has for both construction types the lowest DER but the highest energy demand, whereas the options providing ground source heat pumps as heating systems show the best performances in terms of energy demand but have only average DERs. These discrepancies between energy demand and CO₂ emissions result from the divergent efficiencies of the heating systems, and the divergent CO₂ emissions that are released by producing the different fuel types (gas, electricity).
Therefore the definition of the DER as a decisive factor to conserve fuel and power is in conflict with the target to implement energy efficient heating solutions. Furthermore it is not reflected, that in the near future the proportion of electricity generated by renewable energy systems will increase and therefore heating systems running on electricity will have lower CO₂ emissions.

3.2.3 Cogeneration of heat and electricity

One target of the Mayor of London (GLA, 2004b) is to improve the use of efficient technologies, such as CHP systems. According to Grindfeld (BSD, 2009) CHP systems achieve 30% higher efficiencies than systems that produce heat and electricity separately. Figure 3.4 shows that the CO₂ emissions of a communal gas CHP system are the lowest of the systems tested.

\[ \text{Figure 3.4 CO₂ emissions of different heating strategies including gas CHP of house type 1} \]

Gas CHP systems are defined as Low or Zero Carbon Technologies in the CSH (DCLG, 2009) but are not recognised as renewable energy systems as defined in the London Toolkit (STI, 2004). Therefore, the CSH awards credits for the provision of gas CHP systems, however, they do not count towards the 20% renewable energy requirement of the Boroughs.
Therefore, although gas CHP systems are significant energy saving measures, in practice they are not often incorporated, as the capital cost for CHP systems are higher than those of gas boilers and additional investment has to be made to comply with the renewable energy requirements.

3.2.4 Renewable Energy versus Low or Zero Carbon Technologies

The CSH awards credits for the incorporation of Low or Zero Carbon Technologies (LZC). To demonstrate compliance, the CO₂ emissions of the actual dwelling are compared with those of a “Standard Case”, as defined in the CSH Technical Guide (DCLG, 2009).

On a local policy level a similar requirement becomes a mandatory criterion: to offset the predicted CO₂ emissions by at least 20% on-site renewable energy technologies. The systems that are accepted as renewable energy technologies vary on different policy levels, a generic definition is hard to find and they are divergent to the definition of LZC technologies. In order to demonstrate compliance, complex and confusing calculations are required. The CO₂ emissions of the actual dwelling are compared with those of a “Base Case”, which is defined differently than the CSH “Standard Case”.

In addition, Figure 3.5 shows that to meet the 20% renewable requirement the amount of energy generated from additional renewable technologies (for example photovoltaic or solar hot water panels) increases with improved construction standards where the primary heating system is a renewable energy technology, for example a GSHP, an ASHP, a biomass boiler. This clearly does not promote good basic design.
3.2.5 Financial aspect

The cost for the additional sustainability requirements arise through improved construction standards and building services, the cost for the renewable energy technologies and the procedures for the CSH assessment and certification. From experience it can be seen that the additional cost of achieving for example CSH level 4 and to incorporate 20% renewable energy technologies to a typical dwelling range between US $15,000-25,000.

Of the tested options, the biomass boiler has the shortest payback period time of less than 10 years and the heat pumps have the longest payback periods of approximately 25 years. The installation of a GSHP is complex and therefore expensive, and both heating systems running on electricity have a very low contribution towards the 20% renewable requirement as defined by the Borough. Therefore additional renewable energy technologies have to be provided which generate additional expenses.

To overcome the financial barriers several schemes have been put into place by the UK Government. Until 2011 grants are available for the installation of Low or Zero Carbon Technologies for new build residential developments. Stamp Duty Exemptions up to 4% are available for the first acquisition of zero-carbon homes. From April this year, a Feed-In-Tariff is paid for every kWh of electricity generated by renewable energy systems and a Renewable-Heat-Incentive is announced to be launched by 2011.

![Renewable Energy Demand in Addition to Highly Efficient Renewable Heating System](image)

**Figure 3.5** Amount of electricity generated by additional renewable energy technologies (photovoltaic and solar hot water panels) incorporated to house Types 1 and 2 in order to meet the 20% renewables requirement.
However, the financial incentives are complex and refer to various terminologies such as renewable energy systems, energy-generating technologies, energy-saving technologies, micro-generation, macro-generation and low or zero carbon technologies, which is confusing, and they cover only a fraction of the additional cost of a sustainable new building.

4. CONCLUSIONS

To implement the targets to tackle climate change, three strategies are pursued in the building sector of the UK: to be lean, to be clean and to be green. The implementation of these three strategies is regulated by the mandatory BR and the optional CSH on a national policy level and the mandatory supplementary sustainability planning documents on a regional and a local level.

The study undertaken shows firstly, that these regulations are not in line with each other and vary from region to region and from Borough to Borough. Their implementation therefore becomes confusing and unnecessarily complex. Secondly, the applied methodology of implementing the strategies “be lean” and “be clean” and “be green” are complex and conflicting.

Thirdly, the case study shows that the calculation procedure to determine the energy demand of dwellings is based on the CO₂ emissions which disregard the energy demand of cooking and electrical appliances. In addition, the calculations do not reflect that the heating systems that run on electricity and therefore are more energy efficient than systems running on gas will be less carbon dioxide intensive in the future, as a higher proportion of electricity will be generated by non-fossil fuels. Therefore these systems are often not incorporated to new designs which will be the building stock of the future.

In conclusion, the implementation of the strategies to tackle climate change becomes unnecessarily confusing, complex and therefore time-consuming and expensive. To overcome these barriers and to successfully tackle climate change, a number of recommendations can be made:

1. Targets and strategies addressing the reduction of the remaining 5 principle greenhouse gases but CO₂ are required.
2. Regulations are required that are valid on every policy level.
3. The calculation procedures for compliance with these regulations need to be clearly defined, and consistent, include all energy consuming processes of a dwelling and allow for situations where there is no primary heating system.
4. To overcome the conflicts and difficulties between the targets to be lean, to be green and to be clean, the required evidences need to be based on the predicted primary energy demand of the dwelling in kWh/m²yr, rather than on the CO₂ emissions in kg/m²yr.
5. One terminology, a clear definition of “renewable energy technologies” and a simple calculation procedure to demonstrate compliance with the renewable energy requirements need to be agreed.

6. Transparent, easily accessible and lucrative financial incentives need to be offered to build environmentally sustainable buildings.

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The Impact of the National Credit Act on the South African residential housing market

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ABSTRACT AND KEYWORDS

Purpose
The purpose of this paper is to show the impact of the National Credit Act on the South African housing market.

Design/methodology/approach
An extensive literature review was conducted as well as a number of interviews with consultants from the credit and residential industries as part of the research methodology. The data collection instrument had a structured as well as an unstructured section. The results were then analyzed and the findings were grouped relative to the sub-problems.

Findings
The critical finding from the literature review was that the effect of the National Credit Act 34 of 2005 as well the work of the National Credit Regulator imply that it is becoming increasingly difficult to access home loans from commercial banks. The field study finding was that the implementation of the National Credit Act 34 of 2005 had a temporary negative effect on the South African residential industry as a result of the strict lending criteria. However, these findings also show that the long term effects seem to outweigh the problems faced by the residential market at the time.

Originality/Value
This research contributes to Property Economics and Management body of knowledge and provides a further understanding of the
South African residential and credit industries at large. The conclusion is that the South African residential industry may suffer temporary setbacks whilst the system stabilizes, but will benefit from a healthy, self regulating credit system in the future.

Keywords

National Credit Act, Mortgage bonds, Banks, Residential market

1. INTRODUCTION

Mortgage bond agreements play a prominent role in the South African residential industry as a result of the considerable percentage of change in ownership of immovable property financed. Mortgage bond agreements are governed by the National Credit Act 34 of 2005 which came into effect on 1 July 2007. The emphasis of the Act is on responsible credit provision. It has been put in place to slow down the rate of lending by making it more difficult for consumers to gain access to credit (Planting & Radebe, 2008: 32). Furlonger (2008: 38) states that there can be no dispute that the National Credit Act was introduced for the right reasons and that consumers in the credit market needed protection from reckless lending and over-indebtedness.

Consumer credit recently increased substantially before the National Credit Act 34 of 2005 was enacted. Figures published by Planting & Radebe (2008: 33) show that the consumer credit market grew from R340 billion in 2002 to R640 billion in 2006 and to R1, 1 trillion at the end of 2007. There was also little sign of the consumer credit market slowing down despite four successive interest rate hikes during 2007 (Planting & Radebe, 2008: 33). Otto (2006: 5) states that it is an unfortunate fact that many South Africans entered into credit agreements which they as consumers could not afford and that the National Credit Act 34 of 2005 “goes a long way” to protect the consumer from becoming over-indebted. Prominent property economist Erwin Rode (Planting & Radebe, 2008: 32), agrees with Otto (2006: 5) and adds that, “the National Credit Act will save South Africans from themselves”.

Before 1 July 2007, the credit market was regulated by the Usury Act, 73 of 1968; the Usury Act Exemption Notice 1407 of 2005 (exemption notice); the Credit Agreements Act 75 of 1980; the Alienation Of Land Act, 68 of 1981 and the Lay-by regulations promulgated under the Sale and Services Matters Act 25 of 1964. The laws previously used were incapable of addressing modern-day issues in the credit market. The National Credit Act 34 of 2005 was designed to comprehensively regulate the credit industry. Previous legislation did not adequately address issues such as
reckless lending, over-indebtedness and access to credit (Khanye, Sekati & Kunene, [s.a.]: 12). Otto (2006: 2) posited that the National Credit Act 34 of 2005 will replace the Usury Act 73 of 1968 and the Credit Agreements Act 75 of 1980. Khanye et al. ([s.a.]: 17) concurs with Otto’s statement by asserting that the National Credit Act 34 of 2005 will also replace the exemption notice 1407 of 2005 which deals with the micro-lending credit industry.

The National Credit Act 34 of 2005 is more “user-friendly” than previous acts which regulated the credit industry in that it is more accurately worded. The Act is also clear on which regulations apply to a commodity in question within the South African context (Otto, 2006: 4). Furthermore, Otto (2006: 3) suggests that a definite improvement has been made by instituting a single Act instead of multiple acts which were used in previous legislation governing the South African credit industry.

The aim of this research was to determine the impact of the National Credit Act 34 of 2005 on the South African residential housing industry. More specifically it aimed at identifying the issues faced by home loan applicants relative to previous as well as current legislation.

2. BACKGROUND

2.1 National Credit Act 34 of 2005

Some of the important sections of the National Credit Act 34 of 2005 are as follows:

Chapter 1 Part B of the National Credit Act 34 of 2005: 30

This part summarises the purposes of this Act. These are to promote and advance the social and economic welfare of South Africans, promote a fair, transparent, competitive, sustainable, responsible, efficient, effective and accessible credit market and industry, and to protect consumers, by promoting the development of a credit market that is accessible to all South Africans, and in particular to those who have historically been unable to access credit under sustainable market conditions;

Chapter 1 part C of the National Credit Act 34 of 2005: 40 Section 9: provides the “Categories of credit agreements”. These include small agreements, intermediate agreements, and/or large agreements,

Otto (2006: 69) states that credit providers are in business to make a profit, whereas Govindjee et al. (2006: 5) claim that the general public does not have a fair understanding of the effects of interest on debt. For this reason, the law has made an attempt to regulate the credit market in order to protect consumers from exploitation by the credit providers (Govindjee et al., 2006: 5). Maximum fees and interest rates which can be
charged by a credit provider are considered to be one of the most important sections of the National Credit Act.

The National Credit Act 34 of 2005 provides additional security to the credit provider in cases of debtor default. For instance if a property acquired on credit has been sold to repay the credit obligations, there could still be monetary obligations in arrears by the debtor. In such cases, section 127 of the National Credit Act 34 of 2005 states that the creditor may apply for a court order to enforce the remaining obligations due. However, this rule is restricted to credit agreements such as instalment agreements, leases or secured loans (Otto, 2006: 96). Otto (2006: 96) points out that it is peculiar that mortgage agreements are not included in instances such as those mentioned above. Therefore, the only property of the debtor which the credit provider can claim and sell is the mortgaged property and the proceeds will have to settle the amounts owing by the debtor. Therefore the legislation protects the consumer while the credit providers are expected to look after their own affairs (Otto, 2006: 97).

2.2 The National Credit Regulator

The office of the National Credit Regulator was established by the National Credit Act 34 of 2005. This organizational body was established to effectively and comprehensively regulate the credit market in South Africa. (Khanye et al., [s.a.]: 12). Otto (2006: 3) stated that about 40% of the National Credit Act’s printed text deals with the sections on the establishment and powers of the National Credit Regulator and National Consumer Tribunal (Khanye et al., [s.a.]: 3).

The predecessor of the National Credit Regulator is the Micro Finance Regulatory Council (MFRC) which regulated the micro-loans credit industry. The following traits are similar between the MFRC and The National Credit Regulator (Khanye et al., [s.a.]: 14):

- There is a registration process of lenders;
- The current credit market also has a regulatory body that can investigate non-compliant conduct of lenders in terms of the Act and prosecute the lenders by means of a disciplinary committee;
- Over-indebtedness and reckless lending was introduced by the exception notice which governed the MFRC and similar legislation is currently used by the National Credit Regulator to control over-indebtedness and reckless lending;
- The current legislation on control of the National Credit Regulator has a requirement for lenders to do an affordability check on consumers to prevent over-indebtedness which corresponds to the legislation governing the MFRC; and
• The conduct of lenders in the micro-finance industry previously was also regulated as the lenders are currently.

Khanye et al., ([s.a.]: 66) state that in previous credit law systems, common law always favoured the rights of the creditor. The National Credit Act 34 of 2005 gives more attention to the problems of the consumer and attempts to balance the scale between the debtor and the creditor.

The concept of reckless lending and over indebtedness was first introduced in the MFRC to regulate the micro-lending industry and was seen to work exceptionally well in the circumstances; which was the reason why these concepts were implemented in the National Credit Act 34 of 2005 (Khanye et al., [s.a.]: 69).

Over indebtedness occurs when a consumer does not have the financial capability to finance all their credit obligations. Reckless lending by financial institutions is seen as being one of the main problems which lead to consumers being over-indebted (Khanye et al., [s.a.]: 75)

When consumers have over-extended themselves financially, they may apply for a debt review at a debt counsellor. Section 86 of the National Credit Act 34 of 2005 sets out the procedure to be followed. The debt counsellor will then assess the consumers’ financial situation and determine whether the consumer is over indebted or not (Khanye et al., [s.a.]: 84).

2.3 The role of commercial banks in the residential industry.

Consumers often use the option of mortgage bond finance in the acquisition of Real Estate. It is unusual for a property investor to purchase property without the use of a mortgage bond (Fish, 2005: 76). A mortgage bond is a credit transaction between a consumer and a credit provider where the consumer borrows money from the credit provider and the credit provider holds a mortgage bond over the immovable property being purchased by the consumer. In the event of the consumer defaulting on repayment of debt, the credit provider has first right to claim the mortgaged property (Khanye et al., [s.a.]: 4). Mortgage bonds are used by consumers who do not have sufficient cash at hand to purchase property or for strategic investment reasons. Thus mortgage bonds propel commercial banks to the centre role in the residential property industry. In cases such as these, the consumer has to put down a deposit of normally 10% of the purchase price unless they qualify for a 100% housing loan (Delport, 2009: 15).

Before the National Credit Act 34 of 2005 was implemented, banks would require a statement of the applicants’ provable dependable income. Repayments of the mortgage were restricted to no more than 30% of the applicants’ dependable income (www.wizardmidrad.com).
After the promulgation of the National Credit Act 34 of 2005, commercial banks require on application for a bond, a declaration of the applicants' incomes and expenditures (www.wizardmidrand.com). Incomes and expenditures have to be checked to determine the applicant's level of indebtedness as well as whether the applicant can successfully bear more debt. The disposable income of the applicant is utilized under the legislation of the National Credit Act 34 of 2005. Disposable income is determined monthly by deducting all expenses from the applicants’ incomes. The method explained will protect the applicant so that he/she cannot secure a mortgage bond that exceeds his/her disposable incomes which, in effect, is the monthly net income after expenditures (The National Credit Act 34 of 2005, 2005). Before the promulgation of the NCA, the rule of thumb employed in the lending criteria for Real Estate, was 30% of gross income.

The National Credit Act 34 of 2005 protects both the debtor and the creditor to a contract. If the debtor is found to be over-indebted after the disclosure of all financial statements to the creditor, the creditor can be sued by the debtor as well as pay a fine for contravention of the act. If the debtor does not issue accurate financial statements, the property which was purchased on loan can be repossessed by the credit provider and the debtor can be blacklisted.

It is, thus, obvious and evident that the implementation of the NCA had a direct influence on the reduction in mortgage bond approvals for Real Estate acquisition...

3. RESEARCH METHODOLOGY

3.1 Data collection instrument

The information collecting technique took the form of an interview with the members of the residential property population. All interviews were conducted separately from one another to attain individual perceptions instead of a collective opinion.

3.2 Questionnaire development

The interviews conducted with the members of the residential property population had two sections. The first section was a structured interview where the same questions were asked to all members of the population. These questions were closed ended questions based on facts pertaining to the promulgation of the National Credit Act 34 of 2005 on the South African residential industry.
The second section was an unstructured interview. In this section an open ended question was initially asked to obtain a better understanding of the members’ perception of the Act. After the first question was asked, the researcher followed the conversation by asking further unstructured questions to obtain a better understanding of each member of the populations’ perception of the implementation of the National Credit Act 34 of 2005. All interviews were recorded for the purpose of analysis when all information was gathered from all members of the population.

3.3 Sampling

The target population consisted of accredited members of the residential industry such as mortgage originators, prominent Real Estate firms which are based countrywide as well as all four commercial banks in South Africa. All members of the mortgage origination firms and real estate agencies which were interviewed, were branch managers. Branch managers were specifically targeted because of their trusted insight into the residential industry as well as legislation governing implications of the National Credit Act 34 of 2005. All members from commercial retail banks who were interviewed were involved with the home loans departments of their respective banks and dealt with mortgage loan applications daily. A homogeneous representative sampling technique was used for this study because the National Credit Act 34 of 2005 applies to the population in the same way. Hence the outcomes will be the same for all members of the population. Leedy & Ormrod (2010) describes a representative sample to be used in studies where one wishes to learn more about a particular category.

3.4 The population spectrum.

The population consisted of 4 national commercial retail bank managers, 3 national bond originators and 3 national real estate agencies

3.5 Secondary data

The secondary data which was used in this study was obtained from newspaper articles, accredited journals, organizational data bases and internet sources which contributed to the findings of this treatise. Consultants in the field of the National Credit Act 34 of 2005 as well as the residential industry which stretched beyond the scope of data collection for this treatise have been interviewed previously. This information was utilized and contributed to the findings.
3.6 Interview administration

The members of the population were contacted by telephone to enquire about willingness to participate in the survey and to make appointments for when the interviews would take place. A total of 10 interviews were conducted with the professionals who were identified in the section above. Each interview took between twenty, (20) and forty, (40) minutes to complete.

3.7 Data analysis

The Data which was obtained from the population interviewed was analyzed using Excel and interpreted. The first set of questions were asked to determine whether there was in actual fact still a market for residential property even though few applicants got approved mortgage loans. The second set of questions were designed to interpret the extent to which the National Credit Act 34 of 2005 reduced the number of home loans which were approved.

The third set of questions were asked to determine whether there were any negative outcomes from the implementation of the National Credit Act 34 of 2005 and to establish a brief list of factual outcomes of the implementation of the Act.

Section two of the Interview was included in the study to gain the population’s views of the implementation on the National Credit Act 34 2005. All information which was collected during the interviews was then reported as follows:

- If there was general consensus by the interviewed population and the feedback was more or less in the same wording and perception, the information was presented in such a way.
- If there was general consensus by the interviewed population and one member of the population stated their opinion in a unique manor which encapsulated all the other members’ opinions, then it would be stated in their wording and reference was made to them in the findings.
- If one or more members of the interviewed population moved away from the general opinion, their opinions were set out separately.
4. FINDINGS

The outcomes of the implementation of the National Credit Act 34 of 2005 are positive in the sense that the credit market is being controlled by a system which protects the credit applicant/consumer from being over committed in debts. This is done by the National Credit Regulator. However, the effect of the NCA has been that fewer mortgage loans are being approved by banks and that has an adverse effect on the incomes of residential market as well as on the key role players in the credit and residential industries.

A bankers view was that one must look at an applicants’ affordability of a home loan before any decision of a mortgage loan can be made and that the bank can only lend as much as what the applicant can afford. An affordability check is the calculation which determines an applicants’ disposable income. After this discipline is incorporated, the magnitude of the applicants’ loan can be determined. The banks also have to conduct research on every credit applicant in terms of a background check whether the applicant has an acceptable credit record. Deductions can be made from the above findings that the lending criteria used by banks has become more stringent. This is to ensure that the credit applicants which are approved home loans can afford home loans beyond doubt.

From the data which was collected, it can be deduced that more mortgage applications are declined than approved. The large number of declined applications was due to the level of rigorousness applied by the institutions during the pre-loan approval screening process.

An interesting observation made was that a banker thought that even though the quantum of loans which were approved decreased the National Credit Act 34 of 2005 did not have a major affect on this. They stated that the reason why the quantum of loans decreased is because of the global recession which was taking place during the time.

4.1 The centralized credit system.

The centralized credit system allowed the banks to evaluate and gain access to the applicants’ credit profile. This meant that when an applicants’ profile was drawn up, all credit agreements could be found with all banks as well as how regularly they service their credit agreements. From here one could determine whether the applicant was over indebted or not and whether the applicant has a bad credit record or not.

4.2 Disposable income vs. dependable income.

Before the implementation of the National Credit Act 34 of 2005, the banks used to look at a credit applicants’ dependable income found on the
payslips and base the loan extended to them on 30% of that monthly income. After implementation of the National Credit Act, the banks look at the applicants’ disposable income. This means that the applicants’ net income what is considered. This drastically reduced the affordable borrowing powers of the applicants.

4.3 The office of the National Credit Regulator

The office of the National Credit Regulator incorporated a control system to regulate the credit industry. This means that the financial institutions which lend money to consumers have to consider the implications of reckless lending before extending loans. This has an effect on the market in the sense that banks have to conduct an affordability check on all applicants before approving loans. If a bank is found to have recklessly lent to a consumer they would face prosecution by the National Credit Regulator and be liable to fines, lose their licence or forfeit the amount leant to the consumer.

A total of 80% of the population which was interviewed suggested that there were no negative outcomes from the implementation of the National Credit Act 34 of 2005 and that all outcomes were positive in terms of long term goals for South Africa. In essence therefore the banks have become the custodians of positive conduct and responsibility.

Absa stated that most of the outcomes of the implementation of the National Credit Act were positive but there is only one negative outcome. This problem is in the form of loss of a personal relationship with their long term clients. First National Bank also stated that that the outcomes from the implementation of the National Credit Act were positive except for one aspect, that is, financial institutions such as banks had to retrench personnel because of the decrease in work load. Even though there is still a large quantity of credit applicants there was definitely a decrease in the number of loans which were applied for.

The system which was enacted to govern the credit industry is highly effective in controlling the credit industry. This forces the financial institutions such as banks and other credit providing organizations to ensure that the credit consumer is protected from becoming over indebted. The pre-screening system protects the banks from consumers who cannot afford loans or consumers who have bad credit records and would otherwise not repay their debts.

The Act also provides for the amounts which can be added to the loan amount and these have to be presented to the loan applicant. No concealed costs or added costs are allowed beyond the amounts specified by the framework in the Act. This is another method of protecting the credit applicant.

The general population of South Africa were made more aware of the implications of credit and that other credit facilities such as credit cards
and clothing accounts could determine whether their mortgage loan will be approved or not. The general public who live with low levels of credit were not affected as adversely as those who lived with high levels of credit when it comes to applications for home loans.

The Implementation of the National Credit Act 34 of 2005 could only have positive long term effects on the South African property market. The legislation is governing the credit industry in a fair and orderly fashion and all parties involved with credit agreements are protected. In addition, the National Credit Act has informed the general population about the implications of credit and makes them more credit aware.

The Act could possibly have been implemented in a more informative fashion than it was. Key role players such as the banks and the National Credit Regulator were not aware of the complete extent of their functions and powers in the industry. These key role players had to rely on themselves to determine the extent of these.

5. INTERPRETATION OF THE FINDINGS

The demand for residential property is based on:
- The basic need for shelter
- Investment
- Strategy
- Opportunity

Statistical data form the 16th Century in South Africa and beyond indicated that the criteria for residence will not be completely governed by specific legislation. It is however evident that legislation governing Credit in market that is predominantly financed, will play a significant role. The credit application rate for the whole mortgage agreement sector in South Africa is more than double the number of loans which are approved.

From the information which was gathered, it can be deduced that the National Credit Act has reduced the number of loans being approved in South Africa because of the higher level of scrutiny of mortgage loan applicant. Moreover the National Credit Regulator office which was created by the National Credit Act 34 of 2005 ensures that reckless lending does not occur.

It can be concluded that the negative effects on the residential and credit industries are short term issues and that the positive aspects from the implementation of the National Credit Act 34 of 2005 far outweigh the negative aspects. When the effects of the Act are considered in retrospect, the effects are positive in terms of long term visions for the future prosperity of South Africa.
6. CONCLUSIONS

The National Credit Act 34 of 2005 has a positive influence on the responsible disbursement of Credit especially in the residential homeloan market.

Although a decrease of approvals of mortgage bonds has been experienced, the consequence on the credit market should be understood in the light of the international recessionary trends as well as the decline in over-indebtness.

The credit industry is now self regulating and protects all South Africans from reckless lending and over-indebtedness. The National Credit Act 34 of 2005 has educated South Africans on the implications and consequences of credit and has resulted in a more conservative population as well as more realistic terms of borrowing money. In the opinion of many consultants in the residential and credit industries, the National Credit Act 34 of 2005 will be part of South Africa’s legislation for decades to come, hence the research conducted on the Act is timely.

7. RECOMMENDATIONS

- The recommendation for the industry is that key role players need to gain a more in-depth understanding of their functions and powers within the industry.
- The consumer should also take responsibility in providing correct information in when applying for credit.

8. REFERENCES

An integrated bid/no bid decision process for construction contractors based on lessons learned

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ABSTRACT AND KEYWORDS

Purpose

This study provides a framework to enable construction contractors to bid more efficiently for future projects. A new bid/no bid decision process is suggested, which is based on the application of lessons learned from contractors’ previous projects. The “Integrated bid/no bid decision process” is explained in four phases and the advantages associated with this model are discussed.

Design/methodology/approach

The paper, which is the summary of the first phase of a thorough research study in Australia, is based on a review of current literature about contractors’ bid/no bid decision process and the construction lessons learned. Crucial bid/no bid criteria that construction contractors must consider when choosing a new project to bid for are introduced.

Findings

The findings indicate that the lessons learned from previous projects are important sources of information and should be considered as part of the bid/no bid decision process. The importance of lessons learned by construction contractors is emphasized and the method of application in the contractors’ decision making process is discussed.
Originality/value

The study enables contractors to choose more feasible projects thereby minimizing both the financial and technical risk exposure of projects whilst maximizing the efficiency of contractors’ project execution. The study also suggests that contractors can select more feasible projects with a higher likelihood of success by integrating these lessons learned into their bid/no bid decision process.

Keywords

Bid/No bid, decision, Lessons learned, Integrated bidding

1. INTRODUCTION

1.1 Contractors' Bid/No bid Decision

Considering the openness of the construction market and the potential opportunities, construction contractors often find themselves bidding for a number of concurrent projects. As a result, construction organizations are required to be selective when choosing work that they should tender for (Smith 1995 and Wanous et al. 2003). The underlying fact is that contractors need to choose a potentially profitable project to bid for. Egemen & Mohamed (2007) agree and suggest that the only possible way for a contractor firm to survive and achieve its aims is by winning tenders and making a profit. On the other hand, Johnston & Mansfield (2001) suggest that contractors need to determine if the project that they are hoping to bid for is the kind of work that they have been successful in completing in the past. This is in addition to whether the contractors can make a reasonable profit.

Accordingly, the decision is not only about considering the probability of winning the tender but also considering if they can finish the job as planned with the expected profit margin (Egemen & Mohamed 2007). All of the ideas mentioned above suggest that one of the critical decisions for a construction contractor to make is whether to bid or not to bid for a project when an invitation is received.

1.2 Problem Statement

The bid/no bid decision is clearly becoming crucial for construction contractors. However as Wanous et al (2003) noted, despite the crucial importance of the bid/no bid decision in the construction industry, it has received little attention from researchers. It is important to keep in mind that not bidding for a project could result in losing an opportunity to make a profit; whilst bidding for unsuitable projects...
could result in a significant loss or consume time and resources that could be invested in more profitable projects. Thus, improvements in how the contractors select projects could provide significant benefits to the construction industry and consequently to the clients (Lowe & Parvar 2004). As mentioned by Ahmad & Minkarah (1988), Fellows and Langford (1980) and Shash (1998), the bid/no bid decision is, in practice, often made in a largely subjective manner rather than by the use of objective information.

2. RESEARCH METHODOLOGY

In this ongoing research study the exploratory approach has been applied. The exploratory stage, as demonstrated by Chileshe (2004), is an extensive literature review in the context of management. For the purpose of this research, the aim was to identify the common prevailing construction bid/no bid decision criteria and to apply the lessons learned (by exploring the benefits) in future bidding decisions. Another objective was to review the existing modes of implementation and to identify their inadequacies in terms of integration into the contractors’ decision making process. There are three distinct phases namely literature review, pilot study and the main study identified in this research process. In achieving the aims and objectives of this research study, a robust methodology is being developed as part of an on-going process.
Figure 1.1 presents this methodology. The findings reported in the paper are drawn mainly from an extensive literature review in phase one.

![Figure 1.1 Figure Process Diagram for Phase 1, Source: Adopted from Egbu and Renukappa (2005)]

3. LITERATURE REVIEW

3.1 Previous Studies on Bid/no bid Decision

Numerous researchers have striven to establish a systematic bid/no bid decision process based on critical criteria that influence construction bid/no bid decisions. Table 3.1 presents a list of research studies on critical bid/no bid decision criteria. These research studies were undertaken in different geographical and cultural regions of the world (e.g. the UK, Turkey, USA, Syria, and Cyprus). Nevertheless, many of the criteria, which were identified by the researchers, are the same.

Some researchers (e.g. Egemen & Mohamed 2007) attempted to divide a criterion into some sub-criteria and that is why they discovered a larger number of influencing criteria. Moreover, some researchers such as Ahmad & Minkarah (1988) discovered 17 new bid/no bid decision criteria as a result of their research participants’ feedback to the survey.
### Table 3.1 Previous research studies on bid/no bid decision criteria

<table>
<thead>
<tr>
<th>Researchers</th>
<th>Year</th>
<th>Number of identified criteria</th>
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<tbody>
<tr>
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<td>19</td>
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<tr>
<td>Boughton</td>
<td>1987</td>
<td>13</td>
</tr>
<tr>
<td>Ahmad &amp; Minkarah</td>
<td>1988</td>
<td>31</td>
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<tr>
<td>Odusote and Fellows</td>
<td>1992</td>
<td>42</td>
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<tr>
<td>Shash</td>
<td>1993</td>
<td>55</td>
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<tr>
<td>Dozzi &amp; AbouRizk</td>
<td>1996</td>
<td>21</td>
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<td>Wanous et al.</td>
<td>1998</td>
<td>35</td>
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<tr>
<td>Chua &amp; Li</td>
<td>2000</td>
<td>51</td>
</tr>
<tr>
<td>Lowe &amp; Parvar</td>
<td>2004</td>
<td>21</td>
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<tr>
<td>Egemen &amp; Mohamed</td>
<td>2007</td>
<td>83</td>
</tr>
</tbody>
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### 3.2 The Bid/no bid Decision Criteria

In this research study the most important bid/no bid influencing criteria have been identified through studying a range of literature on construction bid/no bid decisions. These criteria can be classified into 5 different categories namely “Project”, “Market”, “Contractor”, “Client” and “Contract” related criteria. Table 3.2 presents 26 criteria in the 5 categories, as identified from the literature review.

Different researchers attributed unequal importance to the identified bid/no bid criteria. Nevertheless, regardless of the importance of bid/no bid criteria there is a degree of uniformity amongst the researchers in identifying the criteria mentioned in Table 3.2 as the most influencing criteria.
Table 3.2 Generic bid/no bid decision criteria

<table>
<thead>
<tr>
<th>Categories</th>
<th>Number</th>
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<tr>
<td>Project</td>
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<td>Project Size</td>
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<td>Project location</td>
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<td>Project Type</td>
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<td>Complexity of the project</td>
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<td>Future Benefits/Profitability</td>
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<td>Project risk</td>
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<td>7</td>
<td>Project Duration</td>
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<td></td>
<td>8</td>
<td>Historic profit &amp; Failure</td>
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<td>Market Condition</td>
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<tr>
<td></td>
<td>10</td>
<td>Competition</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Number of competitors</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Bidding Condition</td>
</tr>
<tr>
<td>Contractor</td>
<td>13</td>
<td>Current Workload</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Contractor Size</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Financial availability</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Staff availability</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>Material availability</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>Strengths/weaknesses</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>Need to work</td>
</tr>
<tr>
<td>Client</td>
<td>20</td>
<td>Client Reputation</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>Relationship with contractor</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>Client financial capability</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>Client design team</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>Clarity of Documents</td>
</tr>
<tr>
<td>Contract</td>
<td>25</td>
<td>Contract type</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>Contract payment terms</td>
</tr>
</tbody>
</table>
3.3 The Importance of Lessons Learned for Organizations

Most, if not all organizations try to increase their benefits and decrease their losses. One of the main characteristics of such companies is to collect the lessons they learned from their previous experience through a project review process and subsequently apply them in future projects. According to APM (2006), there are five types of project reviews namely “Evaluation Review”, “Gate Review”, “Audit”, “Post-project review” and “Benefits realization review”. The Post-project review is one of the most important project reviews which, as mentioned by Von Zedtwitz (2003) is a review of the project that examines the lessons that may be learned and used to benefit future projects. Oakes (2008, p. 34) adds that a post-project review happens once a project closes down and the review assesses the overall project success and identifies what did or didn’t work during the project time. Basically, a post-project evaluation is primarily used for the assessment of the success and efficacy of a completed project and Von Zedtwitz (2003) states that post-project reviews should capture learning from failed projects as well as from successful projects.

Reviews help organizations to clarify what is going on, disseminate this information and hence to learn from experience (Oakes 2008, p. 32). The results from the post-project review can be very useful for the future projects of an organization and as reported by Von Zedtwitz (2003) improve performance in future projects. Ladika (2008) advises that organizations must integrate past experiences into their current and future projects. This process is very necessary for an organization and Kerzner (2006) recognized it as “continuous learning and improvement” and placed it as the highest level of Project Management maturity. Nevertheless, in real life, despite its dramatic influence on the performance of companies and their future projects, post-project reviews are not being prioritized (Anbari et al, 2008; Chanet al. 2005; Huysman 2000; Kotnour & Vergopis 2005; Oakes 2008; Newell et al. 2006; Von Zedtwitz 2002 and Williams 2004) and this fact surprised some researchers (Von Zedtwitz 2003).

4. THE INTEGRATED BID/NO BID DECISION MODEL

The bid/no bid decision model can be considered as a project selection process. The difference is that there is no need to choose a project from among different projects to bid for and instead, a project is evaluated for its feasibility and hence its suitability for tender. In the bid/no bid decision making process, in a similar way to multi-criteria project selection, a list of important prevailing criteria is prepared to evaluate a project. The Integrated Bid/No bid decision, which is introduced in this paper, is a creative way of project selection involving collecting and evaluating post-project reviews and applying the results in future bidding decisions so as to consolidate the maturity of bidding strategy in a specific construction
contractor. Shokri-Ghasabeh et al. (2009) suggest a success-based feedback project selection process, which can also be generalized and applied in the bid/no bid decision process. In their 2009 paper, Shokri-Ghasabeh et al. introduced four phases for their model. That modified version of the four-phase project selection process was designed so that it could be applied in the construction bid/no bid decision process. Table 4.1 also demonstrates an overview of the integrated bid/no bid decision model.

4.1 Phase 1: Setting the bid/no bid criteria list

In order to start the process, it is recommended that a number of generic bid/no bid decision criteria be collected. For example, the twenty-six generic bid/no bid criteria, which were introduced in the literature review, can be incorporated into this list. The list is produced by a group of experts, who are responsible for the decision to bid. The group might include the directors, senior managers, project managers or estimators of the organization. The list is the deliverable of phase 1.

4.2 Phase 2: Lessons learned from previous similar projects

The second step of the process is to evaluate the contractor’s previous similar projects against the bid/no bid criteria. These projects can be evaluated and rated against criteria such as the project client, size, location and so forth. A group, that might be different from the group who made the bid/no bid criteria list, can be assigned to determine how well the previous projects satisfied the criteria. This evaluation can be undertaken against the criteria either in a descriptive format (words) or a numerical (rating). The deliverable of phase 2 is the structured feedback from previous similar projects.

4.3. Phase 3: Bid/no bid decision process

Phase 3 includes the actual process of the bid/no bid decision. In this phase, in a similar manner to the contractors’ well-structured bid/no bid process, the decision making team, that undertook phase 1 of this process, decides whether or not it is advantageous to bid for a particular project. For this phase it is recommended that an evaluation be made of the offered/prospective project against the list of bid/no bid criteria (phase 1) as well as considering the lessons that the contractor learned from its previous similar projects (phase 2). Phase 3 results in having a project accepted or rejected against bid/no bid criteria. It is the decision making group’s decision how to grade the project and what grade should be used as the acceptance threshold.
4.4. Phase 4: Recording lessons learned

The last phase might be the most worthwhile phase in this model; that is to document the lessons learned by the contractor about the project that was tendered for and subsequently undertaken by that contractor. To record the lessons learned the contractor might assign a group (the same group that undertook phase 2 or the group that undertook phase 1 and 3) to record the lessons resulting from the executed project. The assigned group might register the lessons learned from their perspective or might be assisted by other people who were involved in the project. It is recommended that the information collected should come from a variety of sources i.e. different people in different positions from different levels of seniority. The lessons learned file can be produced by the team as a result of their investigation. This file should be archived so that it can be used to assist the future contractor’s bid/no bid decisions. Phase 4 comprises the collection of feedback on the selected project and this phase makes the entire Integrated bid/no bid decision model a dynamic process.
Table 4.1 Integrated Bid/no bid decision model

<table>
<thead>
<tr>
<th>Phases</th>
<th>Precedent(s)</th>
<th>Process</th>
<th>Deliverable – Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>---- or Phase 4 (if available)</td>
<td>Corporate brainstorming to find bid/no bid decision criteria</td>
<td>List – of bid/no bid criteria</td>
</tr>
<tr>
<td>2</td>
<td>---- or Phase 4 (if available)</td>
<td>Study on contractor’s previous similar projects</td>
<td>Feedback - against the criteria</td>
</tr>
<tr>
<td>3</td>
<td>Phase 1 and Phase 2</td>
<td>Bid/no bid decision</td>
<td>Decision - to/not to choose a project to bid for</td>
</tr>
<tr>
<td>4</td>
<td>Phases 1 and Phase 2 and Phase 3 (if the project was undertaken)</td>
<td>Post-project review</td>
<td>Lessons learned – will be used for the next bid/no bid decision process as an input to phase 2</td>
</tr>
</tbody>
</table>

According to Table 4.1 the first and second phase can be undertaken concurrently. The results from phase 1 and 2 can be incorporated into phase 3 to assist in deciding whether or not to bid for a new project. Phase 4 might start some time after the third phase i.e. once the selected project, which was won by the contractor, is undertaken. Accordingly, the results from phase 4 can be archived for future Phases 1 and 2. In fact, the information from phase 4 might convince the decision makers to add some bid/no bid decision criteria, which were deemed important or delete criteria that were found to be of little influence. The application of this bid/no bid process will benefit construction contractors by reducing project cost, minimizing project risk and increasing the efficiency of the contractor-client relationship. Eventually, the model enables the contractors to achieve a higher degree of project success.
5. CONCLUSIONS

The four phase integrated bid/no bid decision process, which is based on the application of earlier lessons learned collected by construction contractors, was introduced and recommended in this paper. The bid/no bid decision is crucial for assisting construction contractors to choose the project that is most beneficial projects to them from the range of new project offerings and opportunities. In this paper, as the first phase of a thorough research study, based on an extensive literature review, a number of research studies on bid/no bid decisions were identified and discussed and an authentic list of generic bid/no bid decision criteria, which can be very useful for contractors, was derived. The study also explained the integrated bid/no bid decision process in four phases in which the contractors need to list the important criteria and evaluate the projects while they are assisted by the lessons they have learned from their previous experience. As the last phase, the contractors are encouraged to make the bid/no bid decision dynamic by collecting the lessons they learned from previous similar projects that they had bid for and delivered. The paper’s findings indicated that the lessons learned files, which are collected from previous projects through a post-project review, are very valuable sources of information and should be considered as part of the bid/no bid decision process. As a result, the contractors can select more feasible projects with a higher likelihood of success by integrating these lessons learned into their bid/no bid decision process.

6. RECOMMENDATIONS AND FURTHER STUDIES

There are some points that require further research in order to assist contractors to consolidate their bid/no bid process:

- Construction contractors should formalize their bid/no bid decision by conducting a structured evaluation of their prospective bidding projects.
- The lessons learned files should be produced at the completion of each project by the contractor. These files can help the contractor to be alert when they bid for their next project. The files will allow them to make more objective decisions against the selection criteria.
- It is recommended that a contractor establishes a data-storage system to accommodate lessons learned files that they collect from different post-project reviews.
- The contractors can benefit from the lessons learned files when there is a change within their organization. As a result, the new people may learn from the lessons that the previous generation learned.

Moreover, the authors of the paper aim to continue their research study
on investigating the importance of the bid/no bid decision criteria based on Australian contractors' experience and to extend the research by validating the integrated bid/no bid decision theory in real life case studies in Australia.

7. ACKNOWLEDGEMENTS

The authors of this paper wish to acknowledge the extensive support and guidance provided by Ms. Kristy Hansen.

8. REFERENCES

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Leadership in Construction Project Management: Ignorance and Challenges

Mart-Mari Archer, Jacobus J.P. Verster & Benita G. Zulch

ABSTRACT AND KEYWORDS

Purpose of this paper

The purpose of the study is to determine and to illustrate the importance of leadership and people skills in the industry. The importance of people and leadership skills in respect of project management in the building industry is suspect and is perhaps not seen as vital and therefore receives less attention than technical skills. The perceived ignorance thereof may lead to consequences such as losses and insufficiency. The project manager’s role in utilising positive people skills and leadership ability is important, and the development of these skills is significant in respect of improved management performance.

Design/methodology/approach

A structured questionnaire on skills was sent to a convenient group of Architects, Quantity Surveyors, Engineers, Construction/Project Managers, Contractors and Clients. A literature review was done prior to requesting people involved in the building industry to respond to questionnaires on project management leadership.

Findings

The results showed the current situation, related to leadership skills. The perceived lack of leadership and the lack of effective people skills that may lead to losses, problems and insufficiency in the industry are the project manager’s responsibility to address during project management.
Value

The value of this provisional study, in respect of understanding elements of the current leadership status in the construction industry, may form the basis of a comprehensive study on leadership ability and skills. It may also show development areas reflected as people skills inadequacies. It may also be seen that project managers should place emphasis on leadership skills to ensure improvement in communication towards successful outcomes of projects. Leadership should be seen as an important skill of the project manager.

Keywords

Leadership, Project Management, Effectiveness

1. INTRODUCTION

Present day project management has evolved from its engineering scientific management origin into a horizontal, cross-disciplinary approach as it takes a wider operational role for better overall control, improved customer relations and increased returns (Lee-Kelly & Loong, 2003: 584).

According to Burke and Barron (2007), leadership and management are two distinctive and complementary systems of action. In reality this means that to be an effective manager of projects one will actually need both project leadership skills and project management skills. The real challenge is to combine these two skills and use each one to reinforce and balance the other.

What does ‘management’ mean? Usually it is associated with words like organising, planning, controlling and monitoring. In contrast, the term leadership brings to mind ideas of motivating people, influencing people and working with them. These distinctions might illuminate the difference between a manager and a leader (Burke & Barron, 2007: 260).

Since leadership concerns the ability to influence the behaviour of others to closely accord with the desires of the leader it is inevitable that leadership concerns interpersonal relationship in the pursuit of organisational and individual goals and therefore involves power exercising by the leaders (Liu & Fang, 2006: 497).

This study will contribute to the fact the leadership and people skills are important, not only the successful application but also the development thereof.
2. PROJECT MANAGEMENT LEADERSHIP

2.1 The Project Manager as Leader

Leaders can be defined as persons who recognise the need for and implement change, establish direction, align people, motivate and inspire, communicate a vision of where the organisation is headed, build teams and share decision making, mentor and coach subordinates, and demonstrate a high degree of integrity in their professional interactions (Zenger & Folkman, 2002; Bass, 1990; Tichy & Devanna, 1990; Kouzes & Posner, 2002 as cited in Skipper & Bell, 2006b: 68).

Gharehbaghi and McManus (2003) emphasised the fact that leaders must know themselves and seek self-improvement. Seeking self-improvement means continually strengthening one’s attributes. They suggested that this can be accomplished through such activities as reading, self-study, and program classes. Good leaders develop through a never-ending process of self analysis and the utilisation of education, training and experience to improve. The best leaders are continually working and studying to improve their leadership skills (Gharehbaghi & McManus, 2003: 56).

According to Culp & Smith (cited in Burger & Verster, 2009) leaders need to be competent. Leaders need technical knowledge, interpersonal skills and project management skills.

A leader can make a difference in terms of the end-result factors such as performance and goal attainment (Ivancevich, 1996 cited in Burger & Verster, 2009).

It seems clear that a person would lead people in accordance with his or her personality characteristics (Lewis, 2003: 3). Lee-Kelly and Loong, (2003) indicated that the leader’s personality and motivation are affected by the degree of perceived control and the degree of uncertainty surrounding the situation.

Posner (cited in Burger and Verster, 2009) indicated the importance for project managers to improve their ability to communicate, organise, build teams and provide leadership they also need to have a unique and authentic leadership style that is coherent with their personality and is consistent with their personal values and motivations (Toor & Ofori, 2008a: 624).

Ideal project leaders are able to engage the team members at a personal level and encourage them, empower them and inspire them to participate in the project (Burke & Barron, 2007: 263). Leaders are able to gain commitment from people (Lewis, 2003: 3).

A leader should influence people toward the attainment of organisational goals and should be able to manage conflicts whenever disputes or crises arise (Mintzberg, 1980 cited in Sunindijo, Hadikusumo & Ogunlana, 2007).
Toor and Ofori (2008 a), identified the need for a shift in the way project manager’s function and lead projects. The construction industry is in a new period of a challenging socio-economic, cultural, political, and business environment. They stressed the urgency for:

- A fresh perspective of implicit leadership drives;
- Suitable leadership behaviours for construction projects;
- Practical and authentic performance standards;
- Effective leadership interventions that can help to accelerate leadership development;
- Influence of leadership on project outcomes, and
- Influence of leadership on followers and organisational outcomes in the long-term.

They also suggested that project managers need to develop as authentic leaders to successfully operate in the increasingly complex working environment. Moreover there is a need to promote a positive culture in the construction industry and to develop leaders who possess positive values and practice high levels of moral and ethical standards. These leaders should be capable of changing the conventional paradigm of management in the industry and set exemplary standards for others to follow (Toor & Ofori, 2008a: 621).

According to Toor and Ofori (2008a: 621), authentic project leaders are not only good managers of projects, but they are also leaders of people and visionaries of the future by demonstrating commitment, devotion and dedication they become the role models.

Authentic leaders are confident, hopeful, optimistic, resilient, transparent, ethical and future oriented (Garden et al., 2005 & May et al., 2003 cited in Toor & Ofori, 2008a: 625).

Leaders have good comprehension of cultural sensitivities and are highly motivated and self-aware. They possess high levels of integrity, deep sense of purpose, courage to move forward, passion and skill of leadership (George, 2003 cited in Toor & Ofori, 2008a: 625).

Authentic leaders are influential in enhancing others’ ability to perform better by providing support and creating conditions that stimulate the individuals to work hard even extraordinarily hard to perform at one’s very best (Gardner, 2004 cited in Toor & Ofori, 2008a: 625).

According to Lewis (2003: 171), no one will follow a person who is not trusted, and to be trusted the leader must be credible in the eyes of a follower. When the designated leader lacks credibility, people may turn for guidance to someone else in the group whom they trust and respect.

To sum up Lewis’s point of view, the leader must be viewed as having the right to lead, the qualification to lead and to be going in a direction that followers want to move in themselves.

According to Gharehbaghi and McManus (2003: 56-57) a good leader must:

- Know and understand his/her people and look out for their well-being;
2.2 Leadership of the Project Manager

According to Burke and Barron (2007), trust and respect are the foundation of leadership. To this can be added honesty, integrity, moral courage, justice, fairness, ethics and dependability.

Lewis (2003: 133), argued that leadership is essentially an influence process, so the more the manager knows about how to persuade people to do something, the more likely he will be to get results. Furthermore since good communication skills are required to be able to influence effectively, all communication methods can be thought of as a way of influencing others.

According to Toor and Ofori (2008a: 628), the people side of project management or what many would call leadership, is paramount to the successful delivery of desired results.

According to Gharehbaghi & McManus (2003) leadership is vision, motivation, organisation and action. Leadership is a complex process by which a person influences others to accomplish a mission, task, or objective and directs the organisation in a way that makes it more cohesive and coherent. Effective leadership is based on inference experience and instinct. Fellows, Lui and Fong (2003:56), indicate that leadership concerns the ability to influence the behaviour of others to accord with the desires of the leader.

Toor and Ofori (2006), stated that the construction industry has been facing an undersupply of project leaders (cited in Toor & Ofori, 2008b: 280). The construction industry faces major leadership challenges such as those relating to the workforce (Toor & Ofori, 2008a: 622). Since construction work requires team efforts, leadership should have great impact on the performance of construction work (Odusami, Iyagba & Omirin, 2003: 519).

According to Kotter (1990), leadership is about establishing direction, aligning people, and motivating and inspiring others (cited in Skipper & Bell, 2006a: 75).

The Five Basic Leadership Practices include:

- Modelling the way;
- Keep her/his people informed and know how to communicate with them;
- Help others exert their influence and must share leadership;
- Have good communication skills;
- Have good judgement;
- Be persuasive, patient and persistent;
- Be a professional who possesses good character traits such as honesty, trustworthiness, competence, commitment, integrity, courage, straightforwardness, imagination, and
- Be loyal to the organisation, perform selfless service and take personal responsibility.
o Inspiring a shared vision;
o Challenging the process;
o Enabling others to act, and
o Encouraging the heart.


Many projects fail to reach their optimum level of performance, not because of any lack of resources, equipment or systems, but purely because the human factors were not adequately addressed (Burke & Barron, 2007: 223).

The main weakness in leadership has been found to be failing to focus the team on the project’s objectives. If the goals are unclear, chaos will follow, because who wants to follow a leader who does not know where he/she is going. People will perform better if they are inspired, motivated, directed and supported by good leadership (Burke & Barron, 2007: 229).

3. SKILLS

3.1 Leadership and People Skills

“Construction is a people business. In this business you are hired for your technical skills, fired for your lack of people skills, and promoted for management skills” (Skipper & Bell, 2006a: 75).

The changing nature of modern organisations has required leaders to develop a different set of leadership skills in order to achieve maximum effectiveness (Burke & Barron, 2007: 223).

Management is the ‘hard’ skills – planning, directing, organising, and keeping score. Leadership is the ‘soft’ skills – vision, working together, motivation, building trust among the players, ethics (Skipper & Bell, 2006a: 75).

According to Ingason and Jonasson (2009), the project management profession has in the past strongly emphasised technically supported methods of planning and execution as a core competence, and continues to do so today. However, while project management today remains firmly focused on this traditional objective or hard perspective, there now seems to be an increasing focus on the more subjective and soft factors – leadership, motivation, group dynamics, interpersonal communication, culture and ethics – that could be regarded as essential to all professional endeavours.

With increased emphasis on project management systems, construction firms are now seeking professionals with better management skills rather than technical skills (Dulaimi, 2005 cited in Toor & Ofori, 2008a:260).

Most employers today expect workers to demonstrate and excel in many softer skills such as teamwork and group development (Rothwell, 1998 cited in Pant & Baroudi, 2008: 124).
Managing projects successfully therefore requires a mixture of skills including interpersonal ability, technical competencies and cognitive aptitude, along with the capability to understand the situation and people and then dynamically integrate appropriate leadership behaviours (Strang, 2003a cited in Pant & Baroudi, 2008: 124).

El-Sabaa (2001, cited in Pant & Baroudi, 2008: 125) stated that the human skills of project managers have the greatest influence on project management practices and technical skills the least.

Burke and Barron (2007) adds that it is essential that project managers are competent in all four areas which include technical skills, project management skills, project leadership skills and project entrepreneurial skills to make the project a success. Right from the start it should be recognised that project management skills and project leadership skills go hand in hand – you can not have one without the other – they are like links in a chain. It may be argued that one skill is more important than another at certain times during the project, but for a project to be successfully managed from start to finish, the project manager must be proficient in all these skills.

Project manager’s leadership skills are inter-related with all the other management skills. This has shown that project management is not an end in itself, but rather its whole purpose is to make other managerial skills happen (Burke & Barron, 2007: 222).

The need for improved leadership skills in the building industry is gaining recognition as an important issue and has attracted much recent attention (Skipper & Bell, 2006b: 68).

4. RESEARCH METHODOLOGY

A literature review was done prior to a survey with convenient group of architects, quantity surveyors, engineers, contractors and clients. The literature review included both international and local authors on project management skills, especially people skills, and leadership of the project manager in the building industry.

The content of these sources was thoroughly processed. After the literature review was done, a structured questionnaire was sent to a convenient group of respondents. The questionnaire included questions on leadership of a project manager in the building industry, as well as various skills of the project manager.

4.1 Questionnaire Construction

The first part of the questionnaire consists of biographical questions to which the respondent is requested to respond. In the second part, the respondents are requested to rate the importance of project management.
leadership in the building industry and rate the problem areas related to current project management leadership functions.

They were requested to rate the importance of certain qualities of a project manager to successfully manage a project. An indication of the rate of which these qualities were actually implemented by the project manager, on projects where the respondents were in a close relationship with a project manager, was also requested. These rating were indicated on a five point Lickert scale, where one is the least appropriate and five is the most appropriate. (To get a clearer indication of the result four and five on the Lickert scale where combined).

4.2 Sample

The sample does not represent all consultants, clients or contractors in the Free State area. Only a selected group of 45 consultants, contractors and clients in the Free State area were identified to participate in the research.

4.3 Data Collection

Questionnaires were emailed or personally delivered to a conveniently selected group in the Free State.

4.4 Data Analysis

The data were analysed and compared by using Excel spreadsheets, tables and figures.

5. RESEARCH FINDINGS

A total of 45 questionnaires were sent out which 34 questionnaires were completed en returned, thus a response rate of 75.5% was achieved. The majority (73.5%) of the respondents are consultants in the building industry in the Free State area and more than half (52.9%) of these consultants are in a close working relationship with a project manager. Sixty seven percent of the respondents hold a degree or an honours degree in relevant areas of the building industry.

The responses indicated an even spread of years (ranging from ten years to twelve years) experience in the building industry.

6. DISCUSSION

The questionnaire consists of biographical questions and questions on the importance of leadership qualities of the project manager, problem areas related to the current project manager’s leadership functions, importance of
success related qualities of the project manager and the success rate of the implementation of these qualities.

Table 1 indicates the response of the selected group in terms of the importance of leadership qualities as part of a project manager’s portfolio. Fifty two percent of the respondents rated leadership as a very important trait of a project manager. Thirty eight percent claimed that leadership traits are important and only 2.9% indicated that leadership does not form part of the important traits of a project manager.

This is an indication that the industry regards leadership as an important trait of a project manager for building projects to be completed successfully. It is important for the project manager to have leadership qualities and to develop continuously as a leader.

### Table 1: The importance of leadership qualities as part of the project manager’s portfolio

<table>
<thead>
<tr>
<th>LEADERSHIP</th>
<th>Question unanswered</th>
<th>AVERAGE RATING OF IMPORTANCE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESPONSE IMPORTANCE OF</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>NUMBER OF RESPONDENTS</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>PERCENTAGE OF TOTAL</td>
<td>2.9%</td>
<td>2.9%</td>
<td>2.9%</td>
</tr>
<tr>
<td>AVERAGE RATING</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results illustrates that the lack of experience (82.4%) and the lack of skills (82.4%) in the industry are significant problem areas related to the project manager’s leadership functions. The second biggest problem is personality difficulties of the project manager (64.7%).

These areas might hinder successful management by the project manager. Culture indifferences (29.4%) of the project manager don’t seem to be a big problem but areas such as insufficient education (52.9%) and the lack of training (58.8%) need some attention to develop project manager’s leadership functions/skills.

Furthermore the results of the respondent’s responses showed the following rank list can be established in terms of important qualities.

1. Communication (97.05%)
2. People skills and decision making skills (91.17%)
3. Self discipline (85.29%)
4. Influence, integrity and reputation (82.35%)
5. Attitude (76.47%)
6. Self belief (67.64%)
7. Personality (32.35%)
8. Ego (5.88%)

The respondents rated communication skills as the most important quality of a successful project manager. People skills and decision making
skills are ranked second according to the responses. Self discipline skills are ranked third. Influence, reputation and integrity are also important qualities of a project manager. Attitude and self belief are of intermediate importance to a project manager’s set of skills. Personality and ego does not seem to be as important as the previously mentioned qualities.

According to the respondents, decision making skills seem to be the most successfully applied skill of project managers. People skills of project managers seem to be a problem with only a 32% success rate. The following rank list is a result of the respondent’s responses in terms of successful application of required qualities by a project manager:

1. Decision making skills (52%)
2. Integrity and self belief (50%)
3. Communication and reputation (44%)
4. Self discipline (35%)
5. Attitude, influence and people skills (32%)
6. Ego (20%)
7. Personality (17%)

7. CONCLUSION

Leadership is an important skill of a project manager. It is the project manager’s responsibility to develop leadership and people skills. The two biggest problems in the industry in terms of leadership seem to be the lack of skills and the lack of experience by the project manager. Communication and people skills are seen as important skills to be applied by a project manager, yet it is not very successfully applied or developed.

Project management in the building industry needs to be successful. The impact of losses and damages can be substantial; therefore it is primarily the project manager’s responsibility to ensure effective and efficient management of the project.

Certainly two of the important traits of a project manager are managerial and leadership skills. When these two project management traits are successfully combined and applied, the success rate of the project will most probably increase.

8. RECOMMENDATIONS

Project manager’s should realise their responsibility towards leadership in the building industry.

They should develop continuously as leaders and constantly improve their skills, especially people skills. The importance of leadership and people skill development and the successful application thereof answers
the problem of ignorance and the challenges faced by construction firms and the construction industry as a whole.

9. REFERENCE LIST


ABSTRACT AND KEYWORDS

Purpose

Construction health and safety (H&S) culture within demolition enterprises has received little attention in South Africa, in terms of either research or support for preventive initiatives. This sector has serious problems exacerbated by limited access to human, economic and technological resources, hence the need to investigate the H&S culture in demolition enterprises.

Methodology

This exploratory study is based on a descriptive survey using semi-structured and structured questionnaires, and non-probability sampling to give an overview of the characteristics of H&S culture and practices in demolition firms in the South African construction industry.

Findings

The findings indicate that leadership in H&S is not comprehensive as is the enhancement of a positive H&S culture within demolition contractors. Internal and external communication is sometimes used to address health and safety matters.
Value

The results will be used to make an initial evaluation of demolition enterprises H&S culture and practices to design and evaluate future interventions and research.

Keyword

Construction Industry; Health and Safety Culture; Demolition Enterprises

1. INTRODUCTION

The construction sector in developing countries plays a significant role as a major employer of the employable labour force. There are challenges to increase the productivity of the sector in developing countries. These challenges include low levels of macroeconomic performance, limited resources, reliance on institutional structures and procedures largely inherited from developed countries which once ruled them and poor infrastructural development (Gibb & Bust 2006). In the wake of these challenges, it is not surprising that construction in developing countries contributes majorly to occupational accident statistics. In comparison with developed countries, construction sites in developing countries are ten times more dangerous (Hämäläinen et al. 2006). The construction industry in South Africa has the third highest rate of fatalities per 100,000 workers and ninth highest number of permanent disabilities per 100,000 workers (Construction Industry Development Board (CIDB, 2009)). Given the manner in which statistics are captured and produced in South Africa, it is unclear how many of these fatalities and injuries occur on demolition sites. The demolition process requires a great amount of skill, knowledge and safety. These processes are often hazardous, dangerous and harmful to workers involved (Anumba, Marino, Gottfried, Egbu, 2004). In South Africa, near Stellenbosch in Onder Pappegaaiberg the bodies of three workers were trapped beneath a large slab of concrete which fell from the first floor of a two-storey building that was being renovated (Cape Argus, 2008). The building accidentally collapsed while workers were operating on the ground floor. Sections of the building which did not collapse were supported by props (De Vries, Williams and Sapa, 2008). According to the employer he was unsure about why the slab had collapsed as it had been propped up. Apparently, the slab had been propped up by almost four times the amount necessary (Sokopo, 2008). Accidents like these provide the motivation for this study.
2. BACKGROUND TO OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT IN DEVELOPING COUNTRIES

According to Kheni, et al. (2007) the rate of industrialization in developing countries require effective Occupational Health and Safety (OHS) administrative systems to control hazards and to provide decent working environments that meet international standards. High rates of occupational accidents, particularly in construction in developing countries suggest that they might be poor at managing the risks of hazards at workplaces. Studies by Peckitt et al. (2004) and Gibb and Bust (2006) confirm that in developing countries this is the case. Their findings revealed weaknesses in occupational health and safety administration, economic conditions, climatic conditions and the characteristics of the construction industry of developing countries influence H&S at construction sites. Also, the effective implementation of H&S programs is absent in most construction businesses. Haupt and Smallwood, (1999) indicated that the construction industry in South Africa shares in many of these problems of H&S management.

2.1 Occupational health and safety culture derived from literature review

The term safety culture first made its appearance in the International Atomic Energy Agency’s (IAEA) initial report following the Chernobyl disaster (IAEA, 1986). Since then inquires into major accidents such as the King’s Cross Fire (Fennell, 1988) and Piper Alpha (Cullen, 1990) have found faults in organizational structures and H&S management systems, bringing the importance of H&S culture into the spotlight. The Human Engineering Research Report (2005) found a wealth of information, articles and reports relating to H&S culture. However, there is still no universally recognized and respected definition or model.

In many cases the term H&S culture has emerged with a meaning that appears to be very similar to that for H&S climate (Human and Safety Commission (HSC, 1993) and, as noted by Cox & Flin (1998), the terms are often used interchangeably in many areas of literature.

The H&S culture of an organization is the product of the individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, the health and safety management of an organization (HSC, 1993).

In the other hand, Zohar (1980) and Gonzalez-Roma et al. (1999), describe [health and] safety climate as a construct that captures the perceptions of employees of the role that [health and] safety play within the organization. It is a descriptive measure reflecting the perceptions and attitudes of the workforce towards health and safety within the organizational atmosphere at a given point in time.
A review of literature identified elements associated with successful health and safety management, namely commitment by management, effective management systems, risk management and control of hazards, auditing of both management systems and physical hazards, training and education, communications and consultation (National Occupation Health and Safety Commission (NOSHC, (1999).

2.2 Health and safety culture within South African construction industry

The Occupational Health and Safety Act (OHSA) 1993 and the Construction Regulations of 2003 set out a legal framework for South African workplace H&S. Specific sections of the Act apply to the development of policies and procedures, and employers’ general duty of care, namely to: “… provide and maintain so far as is practicable for employees a working environment that is safe and without risks to health” (OHSA, 1993 8(1) pp12). Occupational health and safety should be seen as a value and not driven by a legal framework.

Despite isolated reports of improvement, there is very limited commitment to comply with basic requirements, let alone promote a culture of H&S. Employers view, H&S as a cost in the system. Small contractors can barely maintain tools and regard safety equipment as luxury items. Even where protective clothing and equipment are provided, workers often avoid their use, including the use of safety goggles and masks when working with grinders and asbestos. Aside from the direct compensation and medical costs associated with accidents the costs to the economy are immense and include rework, lost time, damage to plant and equipment, disruption, productivity loss and loss of skills to the economy (CIDB, 2004).

Compliance with construction legislation, codes and standards such as the Construction Regulations (2003) in South Africa, presents significant challenges involving cost, compliance, design and implementation capacity. Clients such as the Department of Public Works (DPW) and consultants agree that implementation would require better understanding on the implications and importance of H&S (CIDB, 2004). These views highlight the importance of determining the leadership of H&S and H&S culture in the construction industry among the demolition contractors.

3. PROBLEM STATEMENT

Employees of small demolition contractors are exposed to hazards which cannot be ignored, as international funding bodies and some clients of the construction industry demand that demolition contractors demonstrate
corporate social responsibility in respect of a decent working environment and physical environment. The South African government needs to address these issues to increase productivity and safe working environment. To address these problems and concerns this study aims to:

- Establish the sample composition of the respondents;
- To determine leadership in health and safety of demolition enterprises; and
- To determine the health and safety culture of demolition enterprises in the construction industry.

This paper reports on the findings of an exploratory survey of health and safety culture conducted among the upper and middle management personnel of demolition contractors’ in-charge of H&S.

4. RESEARCH METHODOLOGY

A review of the literature led to the identification of eight (8) elements of health and safety culture. A descriptive survey method was adopted, which involved the use of a semi-structured and structured questionnaire to explore the constructs underlying the research topic.

Systemic random sampling was used where the researchers selected sample members to conform to some or other criterion in this case demolition contractors. The respondents were involved in construction activities of demolition. Since 14 usable completed questionnaires were received out of 20 distributed, the response rate was 70%. This sample size was sufficient to meet the statistical test requirements for group statistical testing of an exploratory study.

The structured questions were analyzed using statistical formulæ to calculate the mean values of the statements as shown in Tables 2 to 9. This means were used to rank the responses to statements.

5. RESULTS AND DISCUSSION

5.1 The sample composition of the respondents

<table>
<thead>
<tr>
<th>Type of position</th>
<th>Respondents</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director</td>
<td>4</td>
<td>28.57%</td>
</tr>
<tr>
<td>General Manager</td>
<td>1</td>
<td>7.14%</td>
</tr>
<tr>
<td>Senior Supervisor</td>
<td>3</td>
<td>21.43%</td>
</tr>
<tr>
<td>Supervisor</td>
<td>3</td>
<td>21.43%</td>
</tr>
<tr>
<td>General Worker</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Other (Specify)</td>
<td>3</td>
<td>21.43%</td>
</tr>
</tbody>
</table>
### Table 1 Profile of sample

<table>
<thead>
<tr>
<th>Education qualification</th>
<th>Respondents</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 11 and below</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Grade 12 (Matric) Senior Certificate</td>
<td>2</td>
<td>14.29%</td>
</tr>
<tr>
<td>Post Matric Diploma or Certificate</td>
<td>7</td>
<td>50.00%</td>
</tr>
<tr>
<td>University Degree Qualification</td>
<td>2</td>
<td>14.29%</td>
</tr>
<tr>
<td>Post Graduate Degree</td>
<td>3</td>
<td>21.43%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td><strong>100.01%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Respondents</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>14</td>
<td>100.00%</td>
</tr>
<tr>
<td>Female</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

### Table 2 Health and safety leadership

<table>
<thead>
<tr>
<th>Action</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influence the perceived importance of H&amp;S among staff and other management</td>
<td>3.71</td>
<td>1</td>
</tr>
<tr>
<td>Demonstrate commitment to H&amp;S</td>
<td>3.64</td>
<td>2</td>
</tr>
<tr>
<td>Informs workers on how best to respond to unsafe behavior</td>
<td>3.36</td>
<td>3</td>
</tr>
<tr>
<td>Actively listen to employees on issues of H&amp;S</td>
<td>3.29</td>
<td>4</td>
</tr>
<tr>
<td>Influence the perceived importance of H&amp;S among people</td>
<td>3.29</td>
<td></td>
</tr>
</tbody>
</table>

As evidenced from Table 1, of the 14 respondents, 35.71% were involved at top management level, 42.86% were at middle management as senior supervisors and supervisors. Males dominated employment in these demolition enterprises. The type of infrastructure and buildings demolished by these enterprises ranged from commercial (57.14%), domestic i.e. housing (35.71%), industrial (42.86%) and civil projects (35.71%), respondents had been involved in the construction industry for mean of 6.75 years and 85.72% had a post-matric qualification.

### 5.2 Health and safety leadership in demolition enterprises in the construction industry.
The findings in Table 2 relate to the roles of management relative to H&S in their organizations. The mean scores suggest management do not demonstrate leadership in H&S. The range of mean scores, namely 3.00 to 3.71 suggest that respondents were not fully convinced that there was H&S leadership in their enterprises.

5.3 Health and safety culture in demolition enterprises in the construction industry.

<table>
<thead>
<tr>
<th>Action</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involved directly in the review of serious incidents</td>
<td>4.00</td>
<td>1</td>
</tr>
<tr>
<td>Involved directly in decisions to remedy the causes of serious incidents</td>
<td>3.86</td>
<td>2</td>
</tr>
<tr>
<td>Take proactive steps to plan and organize work to maximize health and safety, minimize production health and safety conflicts, rather than only intervening when conflicts arise</td>
<td>3.57</td>
<td>3</td>
</tr>
<tr>
<td>Accept responsibility for H&amp;S on equal basis as any other area of management responsibility</td>
<td>3.57</td>
<td>3</td>
</tr>
<tr>
<td>Demonstrate visible and positive commitment to H&amp;S throughout the management style.</td>
<td>3.57</td>
<td>3</td>
</tr>
<tr>
<td>Actively involved in formal safety deliberations such as safety policy formulation.</td>
<td>3.50</td>
<td>6</td>
</tr>
<tr>
<td>Take explicit and continuing steps to ensure that their interest in, and commitment to health and safety is known to all personnel.</td>
<td>3.36</td>
<td>7</td>
</tr>
<tr>
<td>Receive reports and publicly comment upon them</td>
<td>3.00</td>
<td>8</td>
</tr>
</tbody>
</table>

The results in Table 3 suggest that respondents agreed that management was committed to health and safety. The results further indicate that reports on health and safety were not received and were not publicly commented upon.
Table 4 Support given by leadership

<table>
<thead>
<tr>
<th>Action</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide a safe working environment that suits the activity and tasks of their workers</td>
<td>3.57</td>
<td>1</td>
</tr>
<tr>
<td>Ensure that staff are adequately trained, instructed and motivated to follow H&amp;S procedures</td>
<td>3.43</td>
<td>2</td>
</tr>
<tr>
<td>Provide their staff with technology suitable for their activities and tasks</td>
<td>3.43</td>
<td>3</td>
</tr>
<tr>
<td>Ensure staff are released from their commitments and participate in H&amp;S training</td>
<td>3.21</td>
<td>4</td>
</tr>
<tr>
<td>Assess the quality of training and general usefulness, relevance and applicability of H&amp;S training</td>
<td>3.14</td>
<td>5</td>
</tr>
<tr>
<td>Provide training and operating instructions on H&amp;S taking into account non-literate workers</td>
<td>3.00</td>
<td>6</td>
</tr>
</tbody>
</table>

The findings in Table 4 suggest no adequate support for health and safety by leadership. Training is not comprehensively provided on H&S including taking into consideration non-literate workers. There might be resistance to releasing workers to participate in H&S training.

Table 5 Goal setting and review of leadership H&S

<table>
<thead>
<tr>
<th>Action</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have clear goals and objectives for their H&amp;S performance</td>
<td>3.50</td>
<td>1</td>
</tr>
<tr>
<td>Regularly review compatibility of their safety performance goals</td>
<td>2.71</td>
<td>2</td>
</tr>
</tbody>
</table>

The results in Table 5 suggest disagreement about leadership regularly reviewing compatibility of their H&S performance, despite setting goals and objectives to achieve their H&S performance, hinting that goals are set to improve health and safety performance but they were not regularly reviewed.

Table 6 Creating structure and process that promote H&S

<table>
<thead>
<tr>
<th>Action</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure feedback on the safety performance of the organization and its management</td>
<td>3.21</td>
<td>1</td>
</tr>
<tr>
<td>Remove excessive layers of management and empower people to make decisions within their area of authority</td>
<td>2.86</td>
<td>2</td>
</tr>
</tbody>
</table>
Management agreed that they did not promote H&S culture by creating structures and processes that were friendly and reachable among their employees as indicated in Table 6. Management did not ensure feedback on the safety performance of the organization. They had excessive layers of management and did not empower people to make decisions within their areas of authority.

Table 7 Reviewing leaders' performance/self improvement

<table>
<thead>
<tr>
<th>Action</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incident investigation are used as opportunities to review and learn constructively about leadership issues</td>
<td>3.29</td>
<td>1</td>
</tr>
<tr>
<td>Leaders received feedback on how others, including their staff, perceive their commitment to H&amp;S</td>
<td>2.79</td>
<td>2</td>
</tr>
</tbody>
</table>

The results in Table 7 indicate that respondents disagreed that management received feedback on their H&S performance (mean=2.79). Further, incident investigation was not necessarily used as a feedback process to enable them to improve their performance.

5.4 Health and safety communication

The results in Table 8 suggest that internal communication was not comprehensively used to address H&S issues. Management often responded swiftly to concerns and queries raised by the workforce and/or other managers and communicated with managers from other sites on H&S (means > 3.50).

Table 8 Internal communication

<table>
<thead>
<tr>
<th>Action</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respond swiftly to concerns and queries raised by the workforce and/or other managers</td>
<td>3.64</td>
<td>1</td>
</tr>
<tr>
<td>Communicate formally with managers and workforce</td>
<td>3.50</td>
<td>2</td>
</tr>
<tr>
<td>Communicate informally with managers and workforce</td>
<td>3.29</td>
<td>3</td>
</tr>
<tr>
<td>Discuss health and safety matters with the workforce, listening concerns and queries</td>
<td>3.21</td>
<td>4</td>
</tr>
<tr>
<td>Keep staff informed about outcomes of any meetings regarding H&amp;S matters</td>
<td>3.21</td>
<td>4</td>
</tr>
<tr>
<td>Provide quick and effective action to complaints from their workforce regarding their working environment, health and safety</td>
<td>3.14</td>
<td>6</td>
</tr>
<tr>
<td>Explain clearly H&amp;S goals and objectives to staff</td>
<td>3.07</td>
<td>7</td>
</tr>
<tr>
<td>Participate in setting H&amp;S targets and explaining this to staff</td>
<td>3.00</td>
<td>8</td>
</tr>
<tr>
<td>Communicate directly with health and safety practitioners</td>
<td>3.00</td>
<td>8</td>
</tr>
<tr>
<td>Communicate with managers from other sites on H&amp;S matters</td>
<td>2.71</td>
<td>10</td>
</tr>
</tbody>
</table>
The results in Table 9 indicate that external communication was sometimes done. Management tended to respond to any queries pertaining to poor performance on H&S and sometimes participated in dialogue with regulators on health and safety matters. Similarly, management seldom imposed inappropriate control over who may communicate with inspectors due to fear of what might be revealed to them.

Table 9 External communication

<table>
<thead>
<tr>
<th>Action</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respond to queries or complaints about the health and safety performance of the organization</td>
<td>3.14</td>
<td>1</td>
</tr>
<tr>
<td>Participate in dialogue with regulators on health and safety matters</td>
<td>2.86</td>
<td>2</td>
</tr>
<tr>
<td>Develop a constructive and open relationship with external organizations on H&amp;S</td>
<td>2.64</td>
<td>3</td>
</tr>
<tr>
<td>Communicate effectively the approach and commitment to safety of the organization to external organizations by means of publications and applying for awards</td>
<td>2.50</td>
<td>4</td>
</tr>
<tr>
<td>Impose inappropriate control over who may communicate with inspectors due to fear of what might be revealed to them</td>
<td>2.07</td>
<td>5</td>
</tr>
</tbody>
</table>

6. CONCLUSION

This study confirmed that majority of the respondents had a tertiary qualification. Leadership in H&S was not comprehensive resulting in poor H&S culture within demolition contractors. Leadership in H&S was compromised. Measured against the elements identified in literature suggests no outright commitment to H&S, support of H&S, goal setting and review of H&S, creating structure and process that promote H&S and reviewing leaders’ performance/self improvement are undertaken in most of the organizations. Internal and external communication elements were sometimes used to address H&S issues. Internally management responded swiftly to concerns and queries raised by the workforce and/or other managers, often communicated with managers in different sites, whereas externally management imposed inappropriate control over who may communicate with inspectors due to fear of what might be revealed to them.
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Impact of workplace HIV and AIDS policies on stigma and discrimination

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ABSTRACT AND KEYWORDS

Purpose
This study aimed to determine whether any HIV and AIDS policies have been specifically designed and implemented and whether the implementation of these in those construction workplaces where they exist, led to a reduction in stigma and discrimination against HIV and AIDS.

Design/methodology/approach
An extensive review of the literature was done to define and explain the phenomena of stigma and discrimination in the workplace, as well as workplace HIV and AIDS policies. One hundred and twenty three contractors in Durban registered with the Master Builders Association were contacted of which only 12 companies have a HIV and AIDS policy in place.

Findings
HIV and AIDS policies, stigma and discrimination were catered for in 10% of construction firms in Durban. It was found that employees did not disclose their HIV status due to fear of discrimination by their colleagues and not due to fear of losing their jobs. This finding is indicative that policies have not been able to ally the fears of employees with regards to the effect of stigma and discrimination.
Research limitations/implications

The survey was limited to contractors registered with the Master Builders Association in KwaZulu-Natal.

Practical implications

The reduction of stigma and discrimination in the workplace can improve the health and wellbeing of affected employees, as well as encourage them to access HIV-related treatment.

Originality/value

By reducing stigma and discrimination in the workplace and improving the health of employees, firms are supporting the sustainability of the workforce.

Keywords

HIV and AIDS, Stigma and Discrimination, HIV and AIDS policies

1. INTRODUCTION

HIV and AIDS is perhaps the most stigmatised medical condition in the world. Together, stigma and discrimination constitute one of the greatest barriers in HIV testing and prevention and care (Kalichman and Simbayi, 2004; Mahajan et al., 2008; Parker & Aggleton, 2003). Employees fear disclosing their status as they do not want to be fired. Although stigma is considered a major barrier to effective responses to the HIV and AIDS epidemic, stigma reduction efforts are relegated to the bottom of AIDS programme priorities (Mahajan et al., 2008).

HIV and AIDS is a pandemic with serious implications for South Africa in general, and the South African construction industry in particular (Meintjes, 2006). According to the Department of Public Works (2004) the construction industry has the third highest incidence rate of HIV and AIDS per sector in South Africa. The construction industry has a predominant migratory labour force, making it the prime contributor to the spread of HIV and AIDS as workers are prone to visit prostitutes or have multiple sexual partners when they are separated from their families for long periods of time. Due to the high percentage (approximately 60%) of informal labour engaged in construction (Haupt et al., 2005), they are less likely to protect
themselves against HIV transmission (Meintjes, 2006) due to their lack of knowledge of their risky sexual behaviour.

The aim of this study was to determine whether any HIV and AIDS policies had been specifically designed and implemented and whether the implementation of these where they exist, had led to a reduction in stigma and discrimination against HIV and AIDS.

2. LITERATURE REVIEW

The KwaZulu-Natal AIDS Action Unit was established by the South African government in 2000 to drive the province-wide response to HIV and AIDS by developing the HIV and AIDS Strategy for the Province of KwaZulu-Natal. The vision of this unit is an “AIDS-free KwaZulu-Natal by 2020” (Office of the Premier, 2006).

One of the most effective ways of reducing and managing the impact of HIV and AIDS in the workplace (Department of Labour, 2000) is through the implementation of an HIV and AIDS policy and programme. An HIV and AIDS workplace policy provides guidelines on employer and employee rights and responsibilities in the context of HIV and AIDS (International Labour Organization, 2001).

The South African government’s response to protect those infected and affected by HIV and AIDS was through the legal framework of various Acts of Parliament, namely:

- The Constitution of South Africa (No. 108 of 1996) which prohibits unfair discrimination, including an individual’s right to privacy (South Africa, 1996);
- The Employment Equity Act (No. 55 of 1998) that provides that no person may unfairly discriminate against employees in any employment policy or practice, on the basis of their HIV status. (Department of Labour, 2000);
- In accordance with section 187 of the Labour Relations Act (No. 66 of 1995), employees may not be dismissed because of their HIV status or illness due to AIDS, unless their capacity to continue working was severely limited (Department of Labour, 2010a);
- The Medical Schemes Act (No. 131 of 1998) that stipulates that a medical scheme may not unfairly discriminate, directly or indirectly, against any person on the basis of their HIV status (Department of Labour, 2000);
- According to the Occupational Health and Safety Act (No. 85 of 1993), an employer should ensure that the risk of occupational exposure to HIV is minimised (Department of Labour, 2000); and
• Section 22 of the Basic Conditions of Employment Act (No. 75 of 1997) that states that every employee is entitled to a minimum number of sick days leave. With the increasing number of employees taking sick leave due to HIV and AIDS, compliance with this Act is likely to have a major cost impact on companies (Department of Labour, 2010b).

In order to guide the private sector in dealing with those infected and affected by HIV and AIDS, various government departments and organisations have written up policies, but unlike the various previously mentioned Acts, these policies and codes are voluntary frameworks for action.


The *HIV and AIDS and STI Strategic Plan for South Africa, 2007-2011* (NSP) flows from the National Strategic Plan of 2000-2005 and the Operational Plan for Comprehensive HIV and AIDS Care, Management, and Treatment (SANAC, 2007). The aim of the NSP is to reduce the number of new infections by 50% and increasing access to treatment and support and care by 80% to all people diagnosed with HIV (*ibid*). In order to meet these targets, the South African government on the 25 April 2010 launched the National HIV Counselling and Testing (HCT) Campaign, which runs until June 2011. The aim of the HCT is to mobilise 15 million South Africans to know their status.

The international guidelines include the UNAIDS HIV/AIDS and Human Rights International Guidelines – Consolidated version, The ILO Code of Practice on HIV/AIDS and the World of Work and The South African Development Community-Code on HIV/AIDS and Employment. The existence of these laws and guidelines protecting human rights do not however prevent or even seriously reduce the frequency of stigma and discrimination.
Efforts to tackle HIV and AIDS related stigma and discrimination have been constrained by the complexity and deep-rooted nature of the problem (Parker and Aggleton, 2003). HIV and AIDS-related stigma and discrimination arise because HIV and AIDS is a life-threatening illness that people are afraid of contracting and the early AIDS metaphors such as death, horror, punishment, guilt, shame and otherness have exacerbated these fears, reinforcing and legitimising stigmatisation and discrimination (Dickinson, 2004; Parker and Aggleton, 2003).

One of the consequences of the problem of stigma and discrimination of people living with HIV and AIDS is that they force infected people to hide their condition and to continue engaging in high-risk behaviours. Another consequence is denial. Both silence and denial about HIV and AIDS are lethal because they prevent people from accurately assessing their own personal infection risk (SANAC, 2007). A climate of discrimination and lack of respect for human rights leaves workers more vulnerable to infection and less able to cope with AIDS because it makes it difficult for them to seek voluntary testing, counselling, treatment and support (UNAIDS, 2007).

Stigma has been described by Aggleton, et al. (2005) and UNAIDS (2003 and 2007) as a dynamic process of devaluation that ‘significantly discredits’ an individual in the eyes of others. HIV-related stigma builds upon and reinforces negative connotations through the association of HIV and AIDS. Discrimination is said to occur when people are singled out in a way that results in them being treated unfairly and unjustly on the basis of their belonging, or being perceived to belong, to a particular group (Kohi, et al., 2003). Stigmatisation associated with AIDS is underpinned by many factors, including lack of understanding of the illness, misconceptions about how HIV is transmitted, lack of access to treatment, irresponsible media reporting on the epidemic, the incurability of AIDS, and prejudice and fears relating to a number of socially sensitive issues including sexuality, disease and death, and drug use (Aggleton, et al., 2005). In the workplace, employees experience discrimination when they are treated unfairly and unjustly on the basis of their actual or perceived HIV status. HIV positive employees bare the brunt of stigma and discrimination from co-workers, supervisors and managers in the form of being dismissed from work, being relocated to another position or having their job benefits limited (Dickinson, 2003). Stigma is so powerful that certain peer educators have been suspected of been HIV positive by their co-workers because of their involvement in HIV and AIDS programmes in the workplace (ibid). According to Dickinson (2003), HIV and AIDS stigma impacts on the workplace by lowering the morale of the workforce, creating a working environment in which people living with HIV and AIDS are afraid of gossip or of being suspected of being HIV positive and by undermining the overall effectiveness of the company’s workplace programme.
3. RESEARCH DESIGN

This study sought to determine whether any HIV and AIDS policies had been specifically designed and implemented in the construction industry and whether the implementation of these policies where they exist, had led to a reduction in stigma and discrimination against HIV and AIDS.

A list of 123 contractors was obtained from the Master Builders Association (MBA) website. All 123 contractors were telephonically contacted to determine if they had a HIV and AIDS policy in place. Of these contractors only 10% had an HIV and AIDS policy in place. Of the twelve contracting companies in KZN that had HIV and AIDS polices 67% agreed to be interviewed. Four companies, of which one company was a member of South African Business Coalition on HIV and AIDS SABCOHA declined the interview due to time constraints and work commitments.

For the purposes of this study, the size of a company is based on the company size breakdown of the South African Business Coalition on HIV and AIDS (SABCOHA, 2005). Accordingly for the purposes of this study, large companies are those that employ more than 500 employees, medium companies those that employ between 100 and 500 employees and small companies have a workforce of less than 100 employees.

The questionnaire designed for the study contained three sections. Section 1 contained general questions about the company and the company’s HIV and AIDS policy, section 2 focused on stigma and discrimination aspects while section 3 included general questions on HIV and AIDS.

Ninety percent of contractors in KZN reported that HIV and AIDS affected them and their employees. They also reported that employees had died from AIDS and that some of their current workforce were HIV-positive. They did not foresee themselves implementing a specific HIV and AIDS policy. Reasons stated by the majority of contractors for not implementing a HIV and AIDS policy included:

• “they are a small company (average numbers of employees were less than 25)”;  
• “they do not have the resources to research, draft and implement an HIV and AIDS policy”; and  
• “they think it would be too expensive and time consuming.”

The average number of people employed in the participating organisations was 333, with employment ranging from 600 employees to 98 employees. All the respondents reported that the recent downturn in the construction industry had forced them to reduce their labour force. One company had retrenched as many as 220 employees in the past three months.

The sample reported employing 77% males and 23% females.
The demographic profile of the sample is depicted in Figure 1.

![Demographic Profile of companies that have HIV and AIDS policies]

**Figure 1.** Demographic profile of sample

Figures 2 and 3 depict the level of skill within these companies and the impact of HIV and AIDS respectively.

![Level of skill within companies]

**Figure 2.** The level of skills in the Durban construction companies that have HIV and AIDS policies.

![Impact of HIV and AIDS]

**Figure 3.** Impact of HIV and AIDS.

Figure 4 indicates how long the companies had a HIV and AIDS policy in
All the firms interviewed reported, *inter alia*, that:
- They audited adherence to HIV and AIDS legislation as part of their policy;
- They employed a specific person to ensure compliance with legislation;
- None of them conducted pre-employment testing or job-screening;
- Their policies prohibited compulsory testing during or pre-employment;
- None of them had a policy of reasonable accommodation such as, for example, rearrangement of working times and modification of duties for employees who had declared their HIV status;
- Notice boards at their offices and sites were the most common means for employees to access the HIV and AIDS policy.

Further, 20% of the firms reported having copies in their company health and safety files. It was interesting to note that none of the firms had their policies uploaded on their company websites.

Most firms (75%) reported that they had a no work-no pay rule. However, these firms would still be willing to try to accommodate their employees.

HIV and AIDS information and education was communicated to all employees by 75% of the firms. The Aids Law Project (2007) found that large companies often adopted a policy at a national office level, and failed to ensure that information on the content of the policy or even its existence was disseminated at branch or department levels. This study confirmed this finding with 25% of the firms referring the researchers to their head office in Johannesburg as they were unable to answer the questions.

Most (75%) of the firms conducted an internal audit to review their policies while 12.5% hired an external consultant to assist them with auditing. One firm had not as yet conducted any policy review.

Figure 5 depicts responses to whether respondents kept track of or monitored the effects of HIV and AIDS.
Stigma and discrimination were catered for in all the policies of the firms interviewed. HIV and AIDS were discussed regularly in toolbox talks and safety inductions. According to the management of all the firms, workers did not disclose their HIV status due to fear of discrimination and not due to fear of losing their jobs or them not being productive. This finding suggests that the polices had allayed the fears of employees with regards to them losing their jobs due to their status. However, it does not seem to have had much effect in terms of stigma and discrimination. Employees still seemed to fear the reactions of their fellow workers.

Questions directly related to stigma and discrimination resulted in the following responses, namely:

- HIV positive employees were not treated differently from their co-workers;
- They were not excluded from company functions;
- There was no need to replace the workplace with machinery, etc.;
- There was no evidence of any acts of stigma and discrimination;
- The average percentage of employees that had declared their status was low, namely 3%;
- Employers had considered the cultural beliefs of their employees when they drafted and implemented their respective policies, with 12.5% of the firms stating it was a difficult process when “in certain cultures employees expected time off to communicate with their ancestors”; and
- All the policies contained grievance and disciplinary procedures for workers who discriminated against other workers on the grounds of real or perceived HIV status or violated the company HIV and AIDS policy.

The final part of the interview questioned the participants on general HIV
General HIV and AIDS Questions

- Assisted and aim to continue to assist the communities in which they work.
- Embarked on a greater employee health and wellness programmes, which incorporates other illness such as tuberculosis and diabetes.
- Voluntary counselling and testing (VCT) programme
- Provision of Anti-Retroviral therapy (ART) to their employees
- Peer educators, but did not actively involve people living with HIV in the delivery of the programmes
- Treatment referral systems to assist employees
- Condom distribution programmes
- Education and support programmes that included information booklets and brochures, posters, peer educators, counsellors and workshops.
- Workplace that maintained an environment that is respectful of human and legal rights.
- Workplace related HIV and AIDS programmes which involved the Unions were possible
- Expected future increase in HIV and AIDS prevalence and incidence rates
- Conducted any prevalence testing or studies
- Contingency planning in light of the expected impact of HIV and AIDS
- Overall strategy for managing HIV and AIDS
- Managers were unsure of what percentage of the company budget was spent on the implementation of HIV and AIDS
- Set up a steering committee
- Conduct research related to the impact of HIV and AIDS
- Funded or are involved in funding research related to the disease
- Monitor and report on the cost of HIV and AIDS

Company Response

Figure 6. HIV and AIDS related activities of participating construction companies
and AIDS activities that they engaged in as depicted in figure 6. The mean rating of their policies was 3. One firm stated that because they had only introduced their HIV and AIDS policy 10 months ago it was too soon to comment on its merits or effectiveness. The general consensus was that more work had to be done in terms of monitoring and evaluation and that there needed to be more involvement from senior management.

In 2005, the South African Business Coalition on HIV and AIDS (SABCOHA) identified a general lack of leadership relative to policy development and related programme implementation. It seems that in 2010 this problem still persists despite the commitment from government and non-governmental organisations.

4. CONCLUSION

Effective treatment of HIV infections and AIDS have been hampered by stigma and discrimination. As a result the rates of infection with and transmission of HIV have continued unabated. The negative impact associated with the epidemic has continued to increase. One of the effective means for businesses to respond to this threat is to develop HIV and AIDS policies that create an environment in which workers feel free to communicate their HIV status and participate in care and support programs. This environment needs to be characterised by fair employment practices devoid of any harassment and victimisation of infected workers.

This exploratory study found that the most small construction companies in the Durban area had a long way to go in terms of policy development and implementation. Although small firms perceived the development of a policy to be costly and time consuming, the fact that they are doing something, even in a small way, shows commitment and can assist in creating a working environment of trust and confidence. It was also found that in medium to large construction firms the major impact of policies was the reassurance of workers that they would not be retrenched. The policies failed to create an environment in which workers felt safe and secure to disclose their status as they still feared rejection from their co-workers.

In order to reduce the stigma attached to HIV and AIDS, the following are suggested, namely

- HIV and AIDS education and training which is communicated to all staff repetitively using multiple mediums and the construction vernacular;
- Workplace policies that reassure workers and reduce stigma and discrimination;
- Training of peer educators;
- Formation of strategic partnerships to reduce the costs of HIV and AIDS programmes; and
Visible involvement and commitment of the senior management of firms.

The development of an HIV and AIDS policy and provision of education and training by firms will assist in decreasing stigma and discrimination. Only by confronting stigma and discrimination head-on will the fight against HIV and AIDS be won.

5. REFERENCES


Health and Safety in South African construction: Status Quo

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ABSTRACT AND KEYWORDS

Purpose

The primary objective of this study is to determine the status quo of occupational health and safety in the construction industry in South Africa and to emphasise the importance of achieving high standards in occupational health and safety.

Design/methodology/approach

The study is based on a literature review investigating health and safety in the construction industry in South Africa. A questionnaire pertaining to health and safety was distributed amongst contractors, consultants and clients in the construction industry. The results were analysed and compared against the literature review.

Findings

The results of this survey may indicate that legislation is not the answer to improve the health and safety status of the construction industry and that built environment practitioners should concentrate on improving training and education. The Department of Labour should strive toward publishing accurate health and safety statistics on a regular basis and become more rigid in their approach to inspection and enforcement.

Value

The findings may assist all built environment practitioners to get a better understanding of the current status of Occupational Health and Safety on
construction sites throughout South Africa, and may inspire them to help change attitudes toward a healthier and safer construction industry.

**Keywords**

Health and Safety; Construction; South Africa

1. **INTRODUCTION**

Over the past decades, attention to occupational health and safety in the construction industry has increased dramatically (Geminiani & Smallwood, 2008). In addition to this, the promulgation of the construction regulations in 2003 created a renewed general awareness of health and safety on construction sites (Markram, 2005:30).

The primary objective of this study is to determine the status quo of occupational health and safety in the construction industry in South Africa and to emphasise the importance of achieving high standards in occupational health and safety.

According to Hinze (cited in Geminiani & Smallwood, 2008), occupational health and safety is not a luxury, but a necessity and the time for increased awareness has arrived. Geminiani & Smallwood (2008) further state that occupational health and safety has reached a high priority level on the agendas of many organisations.

However, despite reports of improvement, research indicates that commitment to comply with basic requirements is limited, and the promotion of health and safety as a culture still has a long way to go (Agumba & Haupt, 2009).

Geminiani & Smallwood (2008) observe that the construction industry does not have a good occupational health and safety record. It is vital for occupational health and safety to be adopted as a moral and value, and not to regard it merely as an optional extra where and when time allows. A positive change in attitude among all players in the industry is crucial.

Smallwood & Haupt (2005) noted that the adoption of health and safety as a value, is likely to be influenced by the perceived importance of health and safety. As the priorities of the role players in the industry change, the adoption of health and safety as a value is important, and hence the importance of the current status (Status Quo) of health and safety.
2. OCCUPATIONAL HEALTH AND SAFETY

2.1 Legislation

The Construction Industry Development Board (cidb) Report on Construction Health and Safety in South Africa: Status and Recommendations (2009) shows that, at a legislative level, South Africa is not lacking in terms of health and safety legislation. It concludes that while the 2003 construction regulations have had a positive impact on the industry, there is a need for amendments to promote optimum health and safety throughout all phases of a project, in particular during the concept, initiation and detailed design phases.

The cidb report (2009) further shows that in general, the manifestations of the impact of the construction regulations are wide spread and it can be inferred that the construction regulations have had a positive impact on reducing health and safety accidents. In particular, it can be concluded that there is an increased health and safety awareness and consideration for health and safety amongst project managers and general contractors. However, research results, done by Smallwood & Haupt (2006) also indicate that there has not been an increase in consideration for health and safety amongst designers and quantity surveyors and only a marginal increase amongst subcontractors.

Occupational health and safety however, should not be driven by a legal framework, but seen as a value (Agumba & Haupt, 2009:463). According to Fryer (1997), it will need more than legislation to make construction safer - attitudes toward safety have to change!

The intention of the construction regulations is good, despite various practical problems that have been pointed out. The regulations created renewed general awareness of the health and safety of all persons involved in construction work, and form a good basis for refining and developing health and safety requirements in the construction industry (Markram, 2005:31).

According to Nortje (cited in Further, 2004), legislation is a handy guide in prescribing the minimum obligations, however, management skills are required to bring a healthy and safe workplace to realisation. Health and safety is not just a programme that calls for integration at various phases and stages of a project, but a process which requires continual improvement.

2.2 Statistics

Based on the Occupational Health and Safety statistics presented by Geminiani & Smallwood (2008), it was determined that the injury and fatality rate in the construction industry is very high in comparison to other sectors of industry in the majority of countries. It was also established that,
in general, statistics in South Africa tend to be higher than those of other countries globally. This remains a concern for all industries, especially the construction industry, in South Africa.

Statistics for blitzes conducted by the South African Department of Labour Inspectorate (cited in cidb report, 2009) across the country in August 2007, further illustrates the state of construction health and safety in South Africa. From the reported findings it is clear that 52.5% of the construction employers were non-compliant with the Occupational Health and Safety Act and the Construction Regulations (cidb report, 2009:7).

According to Jackson (2007), reliable data and statistics, which are necessary to form the basis of any enforcement, monitoring, and intervention strategies applied by role players in occupational health and safety, are currently lacking in South Africa. The cidb report (2009) shows that a lack of available statistics, in particular that from the Compensation Commissioner, hampers a thorough understanding of construction Health and Safety.

The cidb report (2009) highlights the importance of understanding the status of construction health and safety in South Africa through timeous information and statistics. It further recommends that the Compensation Commission urgently attend to making statistics for the previous year available at the end of the first quarter of the following year.

Jackson (2007) notes that the following problems are currently experienced in South Africa:

- The lack of a national reporting system for occupational accidents and ill-health.
- Important information is neglected by Government statistics which could generate frequency, incidence, morbidity and mortality rates.
- An absence of information regarding the number of workers at risk in each sector and a lack of co-ordinated research within the country.

Jackson (2007) concludes that the assessment of the adequacy and effectiveness of current and future measures, the prioritising of interventions and the calculation of the burden placed on the country by occupational accidents are all influenced by this situation.

2.3 Education and Training

Turning specifically to health and safety training, it was determined through recent studies reported on in the cidb report, 2009, that 34% of top management and 18% of site supervisors had no health and safety training of any kind. It was also established that 33% of site workers had received no health and safety training at all (cidb report, 2009:22).

The level of non-compliance with the Occupational Health and Safety Act and the Construction Regulations in South Africa is very high. According to Cassiem (2009) it is clear that at the organisational and site level, this poor health and safety performance level is due to a lack of
commitment from management, inadequate supervision as well as inadequate or non-existent health and safety training.

The cidb report (2009) shows that health and safety education and training (or lack thereof) at all levels, have a major influence on construction health and safety. According to Bomel (cited in Musonda, Haupt & Smallwood, 2009:70) health and safety risks increase with a low level of awareness and a lack of training. Geminiani & Smallwood (2008) state that occupational health and safety education and a lack of education have an influence on both culture and management systems and can have an effect on peoples’ behaviour.

In order to achieve an improvement in construction health and safety, it is important that more attention is given to improve on-site supervision as well as education and training in health and safety (cidb report, 2009:37).

According to Benjamin & Thompson (1998), it is important for employers to provide information, instructions, training and supervision as may be necessary to ensure their employees’ health and safety at work. It is also important that employees know how to utilise this knowledge while working. Hughes & Ferret (2005) state that all employees, irrespective of their level or the stage of their careers, should receive health and safety training. Training should be given on recruitment, at induction or on being exposed to new or increased risks on site. Fellows, Langford, Newcombe & Urry (2002) highlight that all employees should receive health and safety training, regardless of previous experience.

Turning to tertiary education, the cidb report (2009) shows that health and safety in construction is not adequately addressed in tertiary built environment education. The result of this is that built environment practitioners are not aware of their role in health and safety and are neither empowered to contribute thereto. Hinze & Gambatese (cited in Smallwood, 1995) recommend that built environment practitioners can become more responsive to health and safety in construction through education.

2.4 Department of Labour Inspectorate

Enforcement of the Occupational Health and Safety Act is the responsibility of the Occupational Health and Safety Inspectorate which is positioned within the Department of Labour. Currently the Department of Labour Inspectorate plays a reactive rather than a proactive role in the industry and the influence they have is primarily downstream. A recent study by Geminiani & Smallwood (2008) which investigated the effectiveness of the Department of Labour Inspectorate, highlighted that the Inspectorate is more ineffective than effective (cidb report, 2009:14).

According to Geminiani & Smallwood (2008) the significant proportion of fatal and major injuries throughout the industry is the result of various Occupational Health and Safety activities. However, the officials conducting inspections of these activities are not knowledgeable of the construction industry and its activities.
Jackson (2007) states that effective enforcement of the Occupational Health and Safety Act is important, since legislation that is not enforced, seldom fulfils its social goals. In order to ensure the optimum regulatory strategy, the challenge is to implement different approaches of enforcing current legislation. The cidb report (2009) advises that in order to enhance the impact of the construction regulations, the Department of Labour Inspectorate will be required to undergo significant change with regards to monitoring, inspection and enforcement.

Geminiani & Smallwood (2008) concluded that there is a definite need for the South African Department of Labour Inspectorate to change their approach and methodology with regard to occupational health and safety in construction, since the South African Department of Labour Inspectorate is ineffective in doing their job.

3. RESEARCH

A selected group of 109 built environment practitioners in the Free State were requested to complete a structured questionnaire. This questionnaire was distributed by email and/or delivered by hand. 39 Responses were received from the selected group reflecting a 35.8% response rate.

Most of the respondents hold tertiary education qualifications in relevant fields of the building industry and the responses indicated an even spread of years experience by the various built environment practitioners.

The questionnaire included remarks on the importance of health and safety in general, health and safety legislation, training and education, statistics and the Department of Labour Inspectorate. Rating scales based on the five-point Likert scale were used for respondents to rate the level of importance of each remark. (Five = strongly agree and one = strongly disagree).

The responses received were analysed and compared against the literature review. This data was used to determine the degree of importance of each of the various remarks and to draw conclusions with regards to the respondents’ opinions, attitudes and commitments toward occupational health and safety in the construction industry.

4. DISCUSSION

The following findings emanated from the analysis of the completed questionnaires.

Table 1 indicates the response in terms of the importance of health and safety on construction sites. It is determined that 66.7% strongly agrees and 28.2% agrees that health and safety on construction sites is very important. This shows that most built environment practitioners regard health and safety on construction sites as a high priority.
Table 1: Importance of health and safety

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<th>Responses</th>
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<td>Percentage of total</td>
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Table 2 shows that 71.8% of the respondents agreed and strongly agreed that health and safety on construction sites has improved since the promulgation of the construction regulations in 2003. This could be an indication that many built environment practitioners have a misconception of the true state of health and safety in construction, possibly due to a lack of proper statistics being publicly available.

Table 2: Improvement of health and safety since 2003

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<th>Responses</th>
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Table 3 shows that 61.5% of respondents are neutral about amendments to the current construction regulations. This serves as confirmation of the various remarks in the literature review, stating that the answer to the health and safety problems in South Africa lies beyond legislation.
Table 3: Amendment of current construction regulations

<table>
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<th>Responses</th>
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<tr>
<td></td>
<td>1=strongly disagree</td>
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<td>Number of respondents</td>
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<td>Percentage of total</td>
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<td>10.3</td>
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<tr>
<td>Average rating</td>
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Table 4 indicates that 35.9% of respondents agreed that more legislation is required to improve health and safety on construction sites and 35.9% disagreed that more legislation is required to improve the current status of health and safety. 28.2% remained neutral with regards to additional legislation being promulgated. The finding being that on average, built environment practitioners do not regard changes in legislation as a solution to health and safety problems.

Table 4: Health and safety on construction sites if more legislation is promulgated

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<th>Responses</th>
<th>Neutral rating</th>
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<tbody>
<tr>
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Table 5 indicates that 74.3% of respondents feel that health and safety statistics should be made available more frequently. This indicates that built environment practitioners have the need to learn more of the status of health and safety in construction and that the Department of Labour is seriously lacking in distributing accurate statistics on a regular basis.

Table 5: Regular publishing of health and safety statistics

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<th>Responses</th>
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<td>1=strongly disagree</td>
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<td>Number of respondents</td>
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<tr>
<td>Average rating</td>
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</table>
Table 6 is an indication that the majority (61.5%) of practitioners in the construction industry feels neutral about construction health and safety statistics. The conclusion could be drawn that the respondents do not know whether recent health and safety statistics are representative of the current status on construction sites, since the Department of Labour has not published any statistics for a number of years.

**Table 6: Recent health and safety statistics**

<table>
<thead>
<tr>
<th>Responses</th>
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<th>3</th>
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Table 7 shows that 41% of the respondents disagreed and strongly disagreed that Health and Safety is adequately inspected and enforced by the Department of Labour. 28.2% felt neutral about the remark and 30.8% agreed and strongly agreed. It could be argued that according to the respondents, there is room for improvement when it comes to the inspection and enforcement of health and safety by the Department of Labour.

**Table 7: Inspection and enforcement of health and safety by the Department of Labour**

<table>
<thead>
<tr>
<th>Responses</th>
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<th>2</th>
<th>3</th>
<th>4</th>
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<th>Total</th>
</tr>
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<tbody>
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</tr>
<tr>
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<td>7.7</td>
<td>33.3</td>
<td>28.2</td>
<td>28.2</td>
<td>2.6</td>
<td>100</td>
</tr>
<tr>
<td>Average rating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.8</td>
<td></td>
</tr>
</tbody>
</table>

Table 8 shows that 41% of the respondents felt neutral about the level of health and safety training and risk assessment on construction sites. This could be an indication that built environment practitioners do not really know whether training and risk assessment on construction sites are adequate, since there are no statistics to emphasise the problem.
Table 8: Health and safety training and risk assessment on construction sites

<table>
<thead>
<tr>
<th>Responses</th>
<th>1=strongly disagree</th>
<th>Neutral rating</th>
<th>5=strongly agree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of respondents</td>
<td>2</td>
<td>9</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>Percentage of total</td>
<td>5.1</td>
<td>23.1</td>
<td>41.0</td>
<td>23.1</td>
</tr>
<tr>
<td>Average rating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9 indicates that the majority (76.9%) of respondents agreed that home language training for the workforce will improve the current status of health and safety on construction sites. This shows that built environment professionals recognise the need for training and education in the construction industry.

Table 9: Home language training for the work force

<table>
<thead>
<tr>
<th>Responses</th>
<th>1=strongly disagree</th>
<th>Neutral rating</th>
<th>5=strongly agree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of respondents</td>
<td>0</td>
<td>2</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>Percentage of total</td>
<td>0</td>
<td>5.1</td>
<td>17.9</td>
<td>61.5</td>
</tr>
<tr>
<td>Average rating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 10 shows that a large percentage (89.7%) of respondents confirms that health and safety education on a tertiary level will have a positive impact on the health and safety status on construction sites. This is again an indication that practitioners in the industry recognise the need for health and safety education at all levels.

Table 10: Health and safety education on a tertiary level

<table>
<thead>
<tr>
<th>Responses</th>
<th>1=strongly disagree</th>
<th>Neutral rating</th>
<th>5=strongly agree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of respondents</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Percentage of total</td>
<td>5.1</td>
<td>0</td>
<td>5.1</td>
<td>64.1</td>
</tr>
<tr>
<td>Average rating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. CONCLUSION

In general, health and safety on South African construction sites is regarded as a high priority and built environment practitioners are of the opinion that health and safety has improved since the promulgation of the construction regulations in 2003.

It is clear that additional legislation and amendments to the current legislation is not the solution to the current health and safety problems, but that a positive health and safety culture needs to be developed throughout all levels of organisations in the industry.

There is a need to learn more about the status of health and safety in construction, and the Department of Labour is seriously lacking in distributing accurate statistics on a regular basis. It was also clearly indicated that there is room for improvement when it comes to the inspection and enforcement of health and safety by the Department of Labour.

It was determined that there is a need for health and safety training and education in the construction industry at all levels. Home language training for the work force will improve the current status of health and safety on construction sites and health and safety education on a tertiary level will also have a positive impact on the health and safety status on construction sites.

6. RECOMMENDATIONS

Occupational health and safety on construction sites should be foremost in the minds of all construction related personnel, beginning at top management and proceeding all the way to worker level (Hinze cited in Geminiani & Smallwood, 2008:10).

Building a health and safety culture is important in order to reach a high level of compliance amongst construction practitioners and personnel. More and revised legislation is not necessarily the answer to an improved health and safety environment on construction sites.

It is recommended that the Department of Labour should get their act together and adopt a more innovative approach towards enforcement, inspections and penalties. It is also important to get statistics published on a regular basis which are representative of the current status of occupational health and safety on construction sites.

Training and education are crucial in developing a safer and healthier environment on construction sites. This should start at management level and continue through to all workers on site. Home language training could be an important tool toward making health and safety a priority for workers on construction sites.

It is also recommended that health and safety education should start at a tertiary education level to ensure that young built environment
professionals understand the responsibility they will have to carry throughout their professional careers.

7. REFERENCES


Preliminary examination of construction methodologies on South African construction sites: Impact on bricklayers

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ABSTRACT AND KEYWORDS

Purpose

Traditional in-situ construction methods that involve labour intensive onsite production activities expose workers to ergonomic challenges. This study examines prefabrication and pre-assembly as means to reducing these challenges.

Design/methodology/approach

The methodology includes a review of relevant literature on ergonomic challenges in the construction sector focusing on jobsite activities of construction workers. Similarly, literature on the use of prefabrication and pre-assembly is reviewed. From the review of literature a series of research survey instruments was developed which include structured interview questions. Several interviews with bricklayers and general workers were held in the Western Cape Province. Bricklaying and prefabrication activities were observed over several days and the frequency of various body movements and postures were recorded.
Findings

The study confirmed that construction workers were more likely to experience ergonomic problems when involved with traditional in-situ construction methods. In particular, lengthy exposures to physically demanding activities were reported. The use of prefabrication and pre-assembly were identified as technological approaches that potentially would reduce exposure to these physical demanding activities and related hazards. Further, reduction of manual material handling would lead to overall improvement of the wellbeing of workers.

Research limitations/implications

For this particular paper, the findings of the interviews of a sample of bricklayers and general workers as well as the observation of bricklaying activities and prefabrication activities are presented.

Practical implications

The study increases the awareness of the benefits of prefabrication in South African construction with particular reference to overall improvement of health and safety.

Originality/value

This study builds on previous work done in the Western Cape and the findings will both validate those studies while providing additional opportunities to address the ergonomic and health problems of bricklayers.

Keywords

Ergonomics, material handling, prefabrication, bricklaying, posture

1. INTRODUCTION

Construction sites are dynamic workplaces due to the working environment involving large amounts of tools, equipment, materials and workers. These workers are typically exposed to many health and safety risks during the construction process. Since materials are frequently heavy and inconveniently sized or shaped, manual material handling processes are likely to result in ergonomic problems (Smallwood, 2007). These ergonomic problems have been found to be due to the involvement of workers working in awkward positions, lifting of heavy materials, manual handling of heavy and irregular sized loads, frequent bending and twisting of the body,
working above shoulder height, working below knee level, and pushing and pulling of loads (Ajayi and Smallwood, 2008). Smallwood and Haupt (2007) in their study also found that, while workers were performing construction work related to lifting an average weight of 20kg or more about 90.9% were injured. Despite traditional construction activities by their very nature presenting challenges that are more likely to result in ergonomic problems or work-related musculoskeletal disorders, in developing countries like South Africa they remain a source of job creation. These jobs are hazardous in nature and impact negatively on the health and safety of workers on construction sites. Consequently, while workers were engaged in work activities such as concreting, reinforcing, formwork, structural steelwork, masonry, roofing, building fabric, plumbing and drainage/pipework, suspended ceilings, painting and decorating, paving and other external work, ergonomic problems were highly possible (Smallwood and Haupt, 2007). Studies by Smallwood, (2004 and 2006), Rwamamara, (2007) and Samuels (2005) confirmed the probability of construction workers experiencing ergonomic challenges. These studies suggested that designers contributed to construction ergonomic problems during the design stage already. This particular study reports on the potential of prefabrication in easing the ergonomic challenges on construction site.

2. CONSTRUCTION ERGONOMICS

According to Dul and Weerdmeester (2008: 1) ‘Ergonomics (or human factors) is the scientific discipline concerned with understanding of the interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design, in order to optimize human well-being and overall system performance’.

Samuels (2005) indicated that ergonomics was the study of human capabilities relating to work demands. Smallwood (2003) maintained that the ergonomics was an applied science concerned with the characteristics of people that need to be considered while designing and arranging things that they use in order that people and things will interact most effectively and safely. Ergonomics, therefore, involves the exploration of the impact of work activities on the health of workers.

In the context of construction ergonomics, different authors have studied the impact of the construction site working environment and material on the bodies of workers (Deacon et al., 2005; Abdelhamid et al., 2000). Samuels (2005) confirmed the nature of construction generally, as a very physically demanding process which is heavily reliant on manual labour. Deacon et al., (2005), found that workers were constantly being exposed to ergonomic risks during their daily tasks on sites. Recent studies, however, argue that workers experience ergonomic problems
which challenge their overall health status (Smallwood, 2007; Ajayi and Smallwood, 2008). The prevalence of these ergonomic challenges despite the recommendations of so many studies suggests a reluctance to reduce ergonomic problems in the industry.

3. ERGONOMIC CHALLENGES

Construction trades by their very nature are energy demanding and involves workers to various unhealthy body movements during the construction process. Consequently, Smallwood and Haupt, (2007) found that among bricklayers, plasterers, painters, bending and twisting of the body; reaching away from the body and reaching overhead; working in awkward positions; lifting and manually handling heavy and irregularly sized and shaped materials and components; working below knee level, and working while kneeling were the most apprehension factors affecting workers health in South Africa. Moreover, Smallwood (2003) found that excavating, formwork, concreting, and roofing presented the most construction ergonomic challenges, followed by steel erecting, screeding, bricklaying, and ceiling erection. However, the adoption of prefabricated components such as, for example, precast slabs could potentially eliminate the need for steel erection, concreting and formwork on site. Smallwood and Haupt (2007) advocated that prefabrication would potentially reduce ergonomic problems. Lou et al., (2008) further suggested that prefabrication would improve construction site working conditions by reducing significantly work to be done on site.

For a long time, it has been noted that construction activities and labour intensive methods were fraught with various hazards and risks to workers (Baradan et al., 2006). Even then construction workers are expected to produce a specific amount of work per day and perform work tasks with varying levels of risk exposure (Bruttene, 2005) which increase the probability of ergonomic problems. Table1 lists examples of the body movements of bricklaying artisans which constituted to ergonomic problems in construction during 30 minute long on-site observations (Samuels, 2005).
Table 1: Bricklaying Artisan: Body movements/activities

<table>
<thead>
<tr>
<th>Body movements</th>
<th>Min</th>
<th>Max</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bending of the body</td>
<td>34.00</td>
<td>130.00</td>
<td>68.00</td>
<td>69.00</td>
</tr>
<tr>
<td>Twisting of the body</td>
<td>19.00</td>
<td>146.00</td>
<td>68.00</td>
<td>127.00</td>
</tr>
<tr>
<td>Handling heavy materials or equipments</td>
<td>14.00</td>
<td>106.00</td>
<td>60.00</td>
<td>92.00</td>
</tr>
<tr>
<td>Working below knee level</td>
<td>4.00</td>
<td>104.00</td>
<td>45.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Working above shoulder level/overhead</td>
<td>2.00</td>
<td>76.00</td>
<td>14.00</td>
<td>74.00</td>
</tr>
<tr>
<td>Kneeling while</td>
<td>2.00</td>
<td>45.00</td>
<td>12.00</td>
<td>48.00</td>
</tr>
</tbody>
</table>

Source: (Samuels, 2005)

From Table 1, it is evident that bending and twisting the body while working occurred for sixty eight times and it was considered the most dominant body movement encountered workers. Samuels (2005) also found workers complained about working in the same position for long periods of time, using vibrating tools and equipments, working while injured, and being exposed to noise caused by construction tools, plants and equipments. Moreover, Deacon et al., (2005) in their study found that all the workers in the sample of 142 workers used their upper bodies for a period of 5 to 8 hours per day. Further, 60% of the workers were general workers or labourers. Clearly, where large volumes of labour are employed doing construction work, health and safety remains a significant factor that requires consideration during the construction process.

4. MERITS OF PREFABRICATION

Rwamamara (2007:34) defined prefabrication as the manufacturing of structural components which takes place at a specialized facility or factory followed by their permanent installation in place on site. Prefabrication has been used for over a century with reference to improvement on project performance, schedule and cost implications (Toole and Gambatese, 2008).

Due to construction project activities and material handling techniques exposing workers to high risk of hazards and generally involving complex operations, the construction industry is obliged to select strategic construction methods that will not threaten the health and safety of workers.
Unfortunately, manually lifting, pulling, pushing or carrying large and heavy material are the most common material handling methods performed by construction workers on site (Lipscomb, 2005). For the period 2005 to 2006, it was found that about 577 major injuries in construction were associated with handling, lifting or carrying of construction material in the United Kingdom (Wright, 2006), confirming that the construction site environment is unfriendly to the health and safety of workers in terms of ergonomic challenges. Therefore, executing large amounts of work offsite would lead to the reduction of exposure to ergonomic hazards on site. Prefabrication was found to reduce the exposure of workers to physically demanding work related to manual material handling processes (Mckay et al., 2005). When construction process takes place in factory working environments, they reduce large amounts of manual material handling on site as a result of using cranes and other forms of mechanical lifting. As a result, Gibb, (2003) argued that the use of prefabrication and preassembly was six times safer than the traditional insitu construction in terms of fatalities and accidents in the United Kingdom.

Although workers would still be handling material, bending and working in different environmental conditions during the installation of prefabricated components, workers will perform smaller amounts of work onsite. Consequently, prefabricated or pre-cast operations transfer work hazards on site which includes high level of lifting, pulling, pushing and handling heavy to medium equipment, to factory mechanized equipment where work-related MSDs including the ergonomic challenges are likely to be reduced (Rwamamara and Holzmann, 2007).

5. METHODOLOGY

The construction activities of bricklayers, bricklaying assistants and prefabricated board fixers were considered for this paper. Five construction sites were selected and individual body movements were carefully observed and recorded on an observation sheet in five minute intervals. A team of five observers watched and recorded each activity for a total of two hours per activity. Structured interviews were also conducted with a sample of workers on the sites where the observations were made.

Data was collected and carefully analysed. Structured interviews data were captured and analyzed on SPSS, while observational data were recorded and calculated on Microsoft Excel.
6. FINDINGS

The aim of this study was to compare and measure the impact of construction methods on ergonomic challenges on site. Observational approach and interviews were adopted to measure the merits of prefabrication against the traditional construction methods.

6.1 Interviews

From Table 2, the sample comprised mostly general workers (58%). The median years of experience in the construction industry was 6.0 years ranging from 1 to 30 years.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>General workers</td>
<td>14</td>
<td>58.3</td>
</tr>
<tr>
<td>Bricklayers</td>
<td>10</td>
<td>41.7</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>100</td>
</tr>
</tbody>
</table>

6.2 Involvement in ergonomic problem activities

Table 3 indicates the frequency at which ergonomics problem activities were encountered by workers on a 5-point Likert scale where 1= Never; 2=Seldom; 3=Sometimes; 4=Often; and 5=Always. It was possible to rank the ergonomic problem activities by comparing their means scores.
From Table 3, it is evident by ranking the means that workers sometimes had to do work involving awkward postures (mean=3.3) and experienced manual handling of heavy material (mean=3.0). Lastly, respondents were seldom to sometimes exposed to other situations (means=2.0 to 2.8). These findings indicate that workers are involved in working situations that threaten their health due to exposure to ergonomic challenges. However, arguably, the use of prefabrication and preassembly would reduce these activities and consequently reduce ergonomic problems on site during the construction process.

### 6.5 Involvement on project where prefabricated components were utilized

Table 4: Involvement on projects where prefabricated components were utilized

<table>
<thead>
<tr>
<th>Respondents %</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>54.0</td>
</tr>
<tr>
<td>No</td>
<td>46.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From Table 4 it is evident that slightly more than half (54%) of workers had been involved in projects where prefabricated components had been used. Consequently, they will have recognized the health and safety benefits associated with its use.
6.2 Ergonomic problems encountered while involved traditional methods and prefabrication erection

Respondents were asked whether they had experienced any physical health hazards while they were involved in traditional construction activities and prefabricated components erection.

Table 5 Ergonomic problems associated with various construction methods

<table>
<thead>
<tr>
<th>Traditional construction</th>
<th>Prefabrication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes%</td>
</tr>
<tr>
<td>Waist pains</td>
<td>96.0</td>
</tr>
<tr>
<td>Backaches</td>
<td>88.0</td>
</tr>
<tr>
<td>Shoulder pains</td>
<td>79.0</td>
</tr>
<tr>
<td>Wrist pains</td>
<td>75.0</td>
</tr>
<tr>
<td>Lung problems</td>
<td>33.0</td>
</tr>
<tr>
<td>Bone problems</td>
<td>25.0</td>
</tr>
<tr>
<td>Muscle and joint pains</td>
<td>21.0</td>
</tr>
<tr>
<td>Headaches</td>
<td>21.0</td>
</tr>
</tbody>
</table>

From Table 5, it is evident that almost all respondents (96%) had experienced pain in their waist area and (88%) experienced backache pains while they were involved in traditional construction activities. However, noticeably less respondents (54%) reported that they experienced pain in their waist areas and (54%) felt backache pains when involved in the erection of prefabricated or preassembled components.

While (79%) of respondents experienced shoulder pains and ailments and (75%) experienced wrist pains when involved in traditional construction activities, only (46%) reported that they experienced pain in their shoulders when involved in the erection of prefabricated components. Further (85%) and (61%) of the workers reported that they did not experience any muscular pains and any wrist pain respectively when involved in the erection of prefabricated components.

These results suggest that prefabrication significantly reduces ergonomic hazards to workers when compared with traditional construction methods.
6.6 Impact of prefabrication and preassembly on health and safety of workers

Table 6: Impact of prefabrication and preassembly on health and safety of workers

<table>
<thead>
<tr>
<th>Statement</th>
<th>N</th>
<th>Yes%</th>
<th>No%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefabrication / pre-assembly or precast reduces hazards related to material handling activities on site</td>
<td>13</td>
<td>92.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Reducing a need for scaffolding by prefabricated /pre-assembly or precast components would lead to less falls on sites</td>
<td>13</td>
<td>92.0</td>
<td>8.0</td>
</tr>
<tr>
<td>When work is done offsite large amount of noise is reduced on site</td>
<td>13</td>
<td>85.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Doing more work offsite would lead to reduction of many health and safety risks on site</td>
<td>13</td>
<td>85.0</td>
<td>15.0</td>
</tr>
</tbody>
</table>

From Table 6, it is evident that the majority of respondents (92%) reported that the use of prefabrication/preassembly and precast would reduce hazards related to material handling on site and that the reduction of scaffolding through the use of prefabricated/pre-assembly or precast components would lead to less falls on sites. Slightly less respondents (85%) reported that doing more work offsite would lead to the reduction of many health and safety risks and would reduce noise levels on site.

7. OBSERVATIONS

A team of five graduate research assistants directly observed, counted and recorded body movements associated with bricklaying, bricklaying general workers and prefabrication wall fixing activities on site. The research group observed workers simultaneously over periods of five minutes. Body movements namely, bending and twisting the body while working, lifting heavy material manual, working below knee level, kneeling, working above shoulder and reaching away from the body were carefully counted, recorded and reported.

7.1 Bricklaying observation

Fifteen bricklayers were observed during the construction process. It was noted that bricklayers bent their bodies when preparing mortar, scooping mortar and while picking up bricks and often twisted their body on their way to stand up and place mortar and a brick. While they bent their bodies to scoop mortar, they had to take one step to reach the wall and place the
brick. It was also observed that they seldom knelt while laying bricks from the seventh brick course and above. However, bricklayers had to kneel when laying bricks on the second course from the floor or ground level and sometimes twisted their body in the process.

Table 7: Bricklaying body movements

<table>
<thead>
<tr>
<th>Body Movements</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bending the body</td>
<td>15</td>
<td>89.0</td>
<td>182.0</td>
<td>145.0</td>
</tr>
<tr>
<td>Twisting the body</td>
<td>15</td>
<td>60.0</td>
<td>149.0</td>
<td>103.0</td>
</tr>
<tr>
<td>Working below knee level</td>
<td>15</td>
<td>19.0</td>
<td>149.0</td>
<td>77.0</td>
</tr>
<tr>
<td>Reaching away from the body</td>
<td>15</td>
<td>19.0</td>
<td>120.0</td>
<td>53.0</td>
</tr>
<tr>
<td>Lifting heavy material manual</td>
<td>15</td>
<td>0.0</td>
<td>94.0</td>
<td>48.0</td>
</tr>
<tr>
<td>Working above shoulder</td>
<td>15</td>
<td>0.0</td>
<td>79.0</td>
<td>33.0</td>
</tr>
<tr>
<td>Kneeling</td>
<td>15</td>
<td>0.0</td>
<td>84.0</td>
<td>29.0</td>
</tr>
</tbody>
</table>

From Table 7, it is evident that bricklayers bent their bodies a mean of 145 times per hour while working. It was noted that every time they moved their body to execute work, they had to bend as shown in Figure 1. They twisted their body a mean of 103 and worked below knee level a mean of 77 times per hour during bricklaying work progress. Bricklayers reached away from their bodies a mean of 53 and lifted heavy material manually a mean of 48 times while working. They worked above shoulder height a mean of 33 and knelt for a mean of 29 times.

Figure 1: Bricklaying; Bending and twisting while working
7.2 Bricklayer assistants

7.2.1 Manual mixing and supply of concrete

Fifteen bricklaying assistant were observed while they were working. However, bricklaying assistance were divided into two categories, namely manual mixing and supply of concrete (10 workers) and supply of bricks to bricklayer (5 workers). During the work process, bricklayer assistants performed repetitive bending, twisted their bodies when loading wheelbarrows with bricks, preparing concrete and, sorting bricks for a bricklayer. They bent and twisted their bodies when mixing concrete manually and also reached away from body when tossing concrete for bricklayer on the first floor. Bricklayer assistants performed repetitive bending, twisting and forceful body movements when mixing the concrete. This was followed by working above shoulder height when tossing the concrete on the scaffolding or first floor.

Table 8: Bricklayer assistants body movements (Manual mixing and supply of concrete)

<table>
<thead>
<tr>
<th>Body Movements</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bending the body</td>
<td>10</td>
<td>151.0</td>
<td>305.0</td>
<td>248.0</td>
</tr>
<tr>
<td>Twisting the body</td>
<td>10</td>
<td>148.0</td>
<td>278.0</td>
<td>208.0</td>
</tr>
<tr>
<td>Working below knee level</td>
<td>10</td>
<td>31.0</td>
<td>190.0</td>
<td>117.0</td>
</tr>
<tr>
<td>Reaching away from the body</td>
<td>10</td>
<td>0.0</td>
<td>153.0</td>
<td>71.0</td>
</tr>
<tr>
<td>Working above shoulder</td>
<td>10</td>
<td>0.0</td>
<td>117.0</td>
<td>27.0</td>
</tr>
<tr>
<td>Lifting heavy material manual</td>
<td>10</td>
<td>0.0</td>
<td>38.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Kneeling</td>
<td>10</td>
<td>0.0</td>
<td>92.0</td>
<td>11.0</td>
</tr>
</tbody>
</table>

From Table 8, it is evident that bricklayer assistants bent their bodies a mean of 248 times in one hour while mixing cement and supplying concrete. They twisted of their bodies a mean of 208, worked below knee a mean of 117 and reached away from the body a mean of 71 times per hour. It was noted they worked above shoulder level occurred a mean of 27 and lifted heavy material manual for a mean of 17 times.

7.2.2 Supply of bricks to bricklayer

Bricklayer assistants performed repetitive bending, twisting and forceful body movements when tossing bricks to different levels where they were caught by another general worker and stacked. This exercise occurred until there were sufficient bricks for the brick bricklayer.
Table 9: Bricklayer assistants body movements (supply of bricks to bricklayer)

<table>
<thead>
<tr>
<th>Body Movements</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bending the body</td>
<td>5</td>
<td>300.0</td>
<td>619.0</td>
<td>429.0</td>
</tr>
<tr>
<td>Twisting the body</td>
<td>5</td>
<td>163.0</td>
<td>562.0</td>
<td>373.0</td>
</tr>
<tr>
<td>Reaching away from the body</td>
<td>5</td>
<td>0.0</td>
<td>439.0</td>
<td>135.0</td>
</tr>
<tr>
<td>Working above shoulder</td>
<td>5</td>
<td>0.0</td>
<td>321.0</td>
<td>117.0</td>
</tr>
<tr>
<td>Working below knee level</td>
<td>5</td>
<td>8.0</td>
<td>189.0</td>
<td>62.0</td>
</tr>
<tr>
<td>Lifting heavy material manual</td>
<td>5</td>
<td>3.0</td>
<td>67.0</td>
<td>23.0</td>
</tr>
<tr>
<td>Kneeling</td>
<td>5</td>
<td>0.0</td>
<td>16.0</td>
<td>6.0</td>
</tr>
</tbody>
</table>

From Table 9, it is evident that bricklayer assistants bent their bodies a mean of 429 per hour. Twisting of body had to occur for a mean of 373 while tossing bricks to the upper floor. It was noted that they reached away from their bodies a mean of 135 times and also worked above shoulder height for 117 times when tossing the bricks to the floor above.

7.3 Prefabricated insulation wall fixers observation

Fifteen prefabricated insulation wall fixers were observed using five minutes intervals while they were erecting walls. Five construction workers were involved in the erection of each prefabricated insulation board. Each board was 4m x 1.5m x 200mm in size. Body movements namely, bending the body, twisting the body, working below knee level, kneeling, reaching away from the body, working above shoulder and lifting heavy material manual were carefully counted and recorded on the observation sheet.

Table 10: Prefabricated insulation wall fixers observation

<table>
<thead>
<tr>
<th>Body Movements</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bending the body</td>
<td>15</td>
<td>43.0</td>
<td>103.0</td>
<td>67.0</td>
</tr>
<tr>
<td>Twisting the body</td>
<td>15</td>
<td>24.0</td>
<td>84.0</td>
<td>58.0</td>
</tr>
<tr>
<td>Working below knee level</td>
<td>15</td>
<td>3.0</td>
<td>79.0</td>
<td>53.0</td>
</tr>
<tr>
<td>Working above shoulder</td>
<td>15</td>
<td>0.0</td>
<td>110.0</td>
<td>49.0</td>
</tr>
<tr>
<td>Reaching away from the body</td>
<td>15</td>
<td>5.0</td>
<td>84.0</td>
<td>45.0</td>
</tr>
<tr>
<td>Kneeling</td>
<td>15</td>
<td>0.0</td>
<td>74.0</td>
<td>35.0</td>
</tr>
<tr>
<td>Lifting heavy material manual</td>
<td>15</td>
<td>0.0</td>
<td>52.0</td>
<td>18.0</td>
</tr>
</tbody>
</table>

From Table 10, it is evident that workers bent their bodies a mean of 67 times per hour. Twisting the body occurred for a mean of 58 and working below their knee level a mean of 53 times per hour. Working above shoulder height occurred for a mean of 49 and reaching away from body occurred for a mean of 45 times while workers were fixing prefabricated insulated walling. Kneeling while working occurred at a mean of 35 and lifting of heavy material manually occurred for a mean of 18 times only.
8. CONCLUSION

Ergonomics challenges are one of the silent but long term health problems facing construction workers. Despite its invisibility to public, it threatens the health of workers who are involved in repetitive body movements while working. Evidently, the findings suggest that almost all workers experienced pain in their waist areas, shoulders and wrist and back areas while engaged in traditional construction methods. Less workers reported pain in the same area while constructing prefabricated insulation walls. It is likely that prefabrication could reduce exposure to the ergonomic problems associated with the traditional construction methods.

Despite the construction environment typically involving working conditions that present ergonomic challenges, a major concern is the lack of consideration for the impact of these on the health of workers on site. The study suggests that allowing more work to be done offsite would lead to major health and safety benefits to workers. Offsite construction significantly reduces onsite construction processes and consequently leads to elimination of ergonomic problems to workers. This choice would lead to healthier and safer working environments and better ways to control and improve health and safety performance on site.

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Impact of Health and Safety (H&S) Culture on Construction Site Performance in South Africa

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ABSTRACT AND KEYWORDS

Purpose of the study

The purpose of this paper is to examine the impact of health and safety (H&S) culture on construction site performance in South Africa.

Methodology / Scope

This paper is a part of a PhD (Construction Management) study and it presents a literature review relative to the impact of H&S culture on construction site performance in South African. The paper addresses the background to H&S issues and H&S culture in construction.

Findings

Findings from the literature survey include that where the top management and employees were committed, involved and participated in site H&S, construction firms have reduced: injuries; absenteeism; property and equipment damage, and compensation paid to the families of deceased workers. Furthermore, they have realised quality, enhanced productivity, improved morale among managers and employees, and have been able to attract sufficient work from construction clients. The loss of human lives,
injuries, damage to property and equipment, decreased productivity and loss of time has both a financial and social impact on the construction firms.

**Practical implications**

The management of construction firms should include H&S as a value by being more committed, involved, and participating in all site H&S matters. The Government of South Africa at all levels should strictly enforce H&S laws, and take a proactive stance with respect to firms that violate H&S legislation. Employees have to adhere and conform to H&S rules on sites, wear the required personal protective equipment (PPE), work in a healthy and safe manner, and report any unhealthy and unsafe conditions and acts to management. A culture of prevention must be established within the construction industry as it is a pre-requisite for realising any sustainable improvement in H&S and to realise the potential impact of optimum H&S performance on overall site performance.

**Value**

Although H&S management, and causes of construction accidents have been well researched, little attention has been paid to the impact of H&S culture on construction site performance in the South African construction industry. This work provides a contribution to the related body of knowledge by presenting conclusions and recommendations for Government, construction firms and employees.

**Keywords**

construction, H&S culture, performance

1. **INTRODUCTION**

Worldwide construction contributes a disproportionate number of accidents (Hopkins, 2006). Many recent accidents involving loss of lives have occurred on construction sites around South Africa (Haupt, 2003). However, available research findings seem to suggest that construction in developing countries such as South Africa is less committed to H&S in comparison to developed countries. Furthermore, there is a high level of non-compliance with H&S regulations in South Africa. Various research findings, *inter alia*, Smallwood (2000; 2004), Smallwood and Haupt (2005), Haupt (2003), and Mthalene *et al.* (2008), agree that at organisational and
At the site level, poor construction H&S performance is attributable to a lack of management commitment, inadequate supervision, and a lack of H&S training. It is well documented that construction has one of the highest injury/accident rates among industrial sectors of the South African economy (Smallwood, 2002). Of all reported injury incidents per 1,000 full-time workers in South Africa during 2000-2005, construction ranked second behind mining (Smallwood and Haupt, 2005). In terms of lost workday cases, construction is one of the highest of all industries, with over 60% of new claims emanating through musculoskeletal injuries (ILO, 2005). In addition, falls from height, slips, machinery and transport accidents, and electrocution are the main causes of site accidents (Nichols, 1997; Smallwood and Haupt, 2005; Trench et al., 2000), and stepping or striking against small objects, falls, and sprains and strains are common on construction sites (Mthalane et al., 2008). Universally, construction H&S is a major concern. Relying on global statistics, the International Labour Organisation (ILO, 2005) reports that:

- Each year there are at least 60,000 fatal accidents on construction sites;
- One in every six fatal accidents at work occurs on a construction site;
- In industrialised countries, as many as 25 to 40% of work-related deaths occur on construction sites, even though the sector employs only 6 to 10% of the workforce, and
- In some countries, it is estimated that 30% of the construction workers suffer from back pain or musculoskeletal disorders.

Documented research findings indicate that in order to improve construction H&S, a strong H&S culture is needed in the industry. Such an H&S culture entails commitment, involvement, and participation of all employees in an organisation, that is, it must permeate all levels, starting from top management in the organisation. Specifically, H&S culture is an avenue for encouraging participation at all levels in order to reduce the number of accidents, fatalities, and injuries that affect workers and property (Williams, 2006; Choudy, 2007; Nichol, 2001; Misnan et al., 2008). Further, it has been well argued that with H&S culture in place, site accidents could be substantially reduced (Ali, 2006; Kheni, 2008).
2. REVIEW OF THE LITERATURE

2.1 H&S Culture

The concept of culture was first developed by the British anthropologist Edward Burnt Taylor, who defined it as “that complex whole which includes knowledge, beliefs, art, law, morals, custom and any other capabilities and habits acquired by man as a member of society.” (Hofstede, 2001) Similarly, Schein (1992) defines culture as learned and shared behaviour, norms, values and material objects that also encompass what people create to express values, attitudes and norms. Therefore, organisational culture, which is characterised by the values, norms, and behaviour in an organisation, is a culture inherent in most organisations. This implies that H&S culture is a sub-set of organisational culture. According to Zahor (2000), H&S culture was first introduced to the nuclear debate by the International Advisory Group of the International Atomic Energy Agency (IAEA) in the analysis of the Chernobyl disaster. The IAEA (1986) defines H&S culture as “the product of individual and group values, attitudes, competencies and patterns of behaviour that determines the commitment, and the style and proficiency of an organisation’s H&S performance.” Overall H&S culture can be described as a set of beliefs, norms, attitudes, social, and technical practice that are concerned with minimising the exposure of individuals within and beyond an organisation to conditions considered dangerous or injurious (Misnan et al., 2008). H&S culture is a subset of organisational culture that affects members’ attitude and behaviour in relation to an organisation’s ongoing H&S performance. The outcome of these attitudes and behaviours could be measured and assessed to see the degree the organisation may or may not possess a ‘good’ H&S culture. It is instructive to note that this outcome has been lacking in the construction industry. With respect to definitions of H&S culture, the definition that is generally accepted by many H&S researchers states that “H&S culture is the product of individual and group values, attitudes, perceptions, competencies and pattern of behaviour that determine the commitment to H&S and the life style and proficiency of an organisation’s H&S.” (ACSNI, 1993 cited by Zohar, 2000). Therefore, H&S culture is important because it forms the context within which individual H&S attitudes develop and persist, and H&S behaviour is promoted.

2.2 Accidents and Health and Safety Culture

Quality and H&S culture are key issues in the construction industry (Smallwood, 2000). The promotion of ISO 9000 is to address quality issues
in construction and related industries. Ali (2006) contends that in any industry, optimum H&S conditions not only constitute good business practice, but also good H&S practices. In addition, a healthy and safe work environment is necessary to erase the high risk image that is closely associated with construction (Misnan et al., 2008). The growth and development of construction operations demands that a proactive management of H&S should be in place to ensure compliance with H&S relative to construction workers and properties. Developed countries such as the UK, the USA, and Australia have evolved H&S regulations that are enforced on construction sites. The construction industry is unique in all respect when compared with other industries. A range of factors, of which H&S is inclusive, contribute to the non-achievement of quality due to the workers’ lack of expertise and training; while at the same time exposing them to accidents (Smallwood, 2000). Accident theory indicates that there is a chain of events, which is caused by human error. In this theory, there are three general factors that lead to human error, namely: overload, irrelevant response, and irrelevant activities (Zohar, 2000; Heinrich et al., 1980). According to them, accidents are caused by factors such as human error, unsafe conditions, or unsafe acts. Research relative to the causes of industrial accidents (Rowlinson, 1997; O'Toole, 2002; Huang and Hinze, 2006) attributes the causes of accidents to human error. However, construction related accidents can be avoided or eliminated through the implementation of an H&S culture that demonstrates optimum commitment to H&S that permeates all levels in an organisation (Hinze 2006; Smallwood and Haupt, 2006).

2.3 Health, Safety and Organisational Culture

The cited definitions indicate that culture is those practices common to a group of people. According to Hofstede (2001), organisational culture can be referred to as “how we do things around here.” It is what is typical of an organisation; the habit, the prevailing attitudes, the group pattern of accepted and expected behaviour. In this context, H&S can be expressed in simple direct terms as behaviours that are affected by organisational culture. Krause (1993 cited by Smallwood, 2002) illustrates the relationships between H&S culture and H&S performance. According to him, H&S culture is at the upstream end of an organisation, and influences management system, which influences exposure, which may or may not result in incidents at the end point of the sequence.
The influence of H&S culture on H&S performance (adapted from Smallwood, 2002)
Smallwood (2004) suggests that culture is collectively made up of values, vision, goals, mission, assumptions, and purpose. Furthermore, he says H&S performance must be accepted as an achievable goal to realise an optimum H&S culture. H&S goals must be set at a high level with vision and mission. Handy (1993) defines organisational or corporate culture as a pervasive way of life or set of norms and values that evolve in an organisation over a period of time. Norms are unwritten, but accepted rules which tell people in an organisation how they are expected to behave. Norms may be concerned with such things as how managers deal with their staff, how people work together, how hard people should work or the extent to which relationships should be formal or informal, and values are beliefs on how people should behave with regard to such matters as care and consideration for colleagues, customer service, the achievement of optimum performance relative to quality and innovation. Naoum (2001) identifies the characteristics of the people employed by the organisation; the level of qualifications required; level of past experience required; the recruitment process; rewards and promotion of employees; training of employees; the system used for career development; social activities available; decision making level; the type of power exercised within the organisation; how much risk the organisation takes; line managers' involvement in strategic decisions; subordinates' awareness of organisation objectives; subordinates' awareness of organisation problems; the system
of communication and co-ordination used, and information systems used, as cultural issues that influence H&S in organisations. The combination of the above factors leads to a conceptual model for the three major dimensions of organisational culture (Figure 2).

![Figure 2: The three dimensions of organisational culture (adopted from Naoum, 2001)](image)

### 2.4 Social-Cultural Influences

Organisations are situated within a given institutional and social setting, thus making them susceptible to the influence of national culture. The influence of national culture on H&S management in the construction industry has been emphasised by many researchers (Coble and Haupt, 1999; Zohar, 2002). A study that investigated the link between religion and H&S culture in South Africa construction firms revealed that religion puts emphasis on the need for conservation of life and the environment (Smallwood, 2002). Religion is a facet that characterises the national culture of countries, *inter alia*, Buddhism, Christianity, and Islam, which
seem to be the dominant religions in most countries. Ali’s (2006) study of the influence of national culture on the Pakistan construction industry suggests that national culture has a significant impact upon industrial H&S, and also helps to understand the different approaches to accident prevention and H&S management. Coble and Haupt (1999) emphasise that cultural influences on H&S management in developing countries is stronger than that in developed countries, and they advocate integrating cultural aspects that are advantageous to H&S management, in developing countries.

2.5 Influence of Culture on Organisation Practice

There is a link between organisational culture and the external environment. Schein (1992) ascertains that societal cultural values, norms and practices affect organisational cultural practices. Hofstede (2001) maintains that culture is the interactive aggregate of common characteristics that influence a human group’s response to its environment. Studies conducted by Dorfman (2004) support the view that the national culture and industry are integral parts of the environment in which organisations function, and by implication organisational culture should influence both the broader societal culture and the industry in which they operate. Hofstede (2001) points out that societies are differentiated by values, while organisations are differentiated by practice. The work of Schein (1992) on organisational culture and leadership affirmed that organisational culture and practices also affect leaders’ behaviour. However, over time, founders and subsequent leaders in organisations response to the organisational culture alters their behaviours, which influences the organisational culture in terms of H&S policies and procedures. Therefore, organisational culture reflects the societies in which they are embedded, that is, organisations with high performance orientations are found in societies with high orientations. Thus, it is believed that integration of H&S culture within the construction industry will contribute to the reduction of construction accidents that have resulted in countless loss of lives, damage to property and equipment, poor quality of work, absenteeism, high compensation insurance premiums, poor productivity, loss of time, disputes and litigation, and a tarnished image.

2.6 Construction Site H&S Culture

Many construction workers are killed or injured every year as a result of construction operations, and some suffer ill-health (Smallwood, 2002). Construction related hazards are not restricted to those working on site
alone; children and members of the public are also killed or injured due to inadequate control of construction activities on site (Zohar, 2000). H&S culture has been recognised as one of the ingredients that realise improvement of H&S on construction sites. The International Labour Organisation (ILo) (2005) reports that in spite of the effort of governments, unions, employers, and clients, incidents or accidents will continue to occur on construction site unless construction workers embrace an optimum H&S culture (Hinze, 2006). Employees should share common beliefs, values, attitudes, opinion, and motivation relative to H&S. Riley (2001) and Chinda and Mohamed (2008) suggest that H&S culture is aimed at changing the culture of the construction industry from one in which risks are regarded as an inherent part of the job, to one in which employees’ attitudes actually care about not only their own H&S, but also the H&S of others. Riley (2001) points out that organisations with a good H&S culture have employees with positive patterns of attitudes toward H&S practices. Further, these organisations have mechanisms in place to gather H&S related information, measure H&S performance and bring people together to learn how to work in a healthy and safe manner. According to Ostrom et al. (1993), the perceptions of employees relative to culture include:

- Management attitudes towards H&S;
- Perceived level of risk;
- Effects of the workplace;
- Management actions towards H&S;
- Status of H&S adviser and H&S committee;
- Importance of H&S training, and
- Social status of H&S and promotion.

It follows that creating an H&S culture means that employees are constantly aware of hazards in the workplace. It becomes second nature to employees to take steps to improve H&S. H&S culture within an organisation is closely linked to the workforce’s attitudes in respect to H&S. They share the organisational risks, accidents, and incidents. The role of management and the involvement of all employees as important key players in H&S culture are vital to cultivate the positive beliefs, values, practices, norms and attitudes in organisations. Four critical indicators of H&S culture include (Glendon and McKenna, 1998):

- Effective communication, which leads to commonly understood goals and means to achieve them at all levels;
- Good organisational learning, whereby organisations are able to identify and respond appropriately to changes;
- Organisational focus upon H&S, that is, how much time and attention is essentially paid to H&S, and
External factors, including the health of the organisation, the prevailing economic climate and impacts of regulations and how well these are managed.

2.7 Benefits of H&S Culture

Healthy and safe work practices not only reduce construction fatalities, injuries and disease and plant and equipment damage, but also result in a substantial reduction in the cost of workers’ compensation. Hinze (2006) asserts that contractors that developed excellent construction H&S management approaches which include an H&S culture management system, gain a substantial reduction in their cost of workers’ compensation and liability insurance premiums, and also a reduction in the indirect or hidden costs of accidents. In addition, they also gain very important positive benefits from an excellent H&S record. Perhaps the most important gain is the upswing in the morale of construction supervisors and workers. Another obvious benefit is that H&S compliant organisations are more attractive to owners of construction mainly because of lower organisational fixed costs and improve quality of construction output. In fact the Business Roundtable (1991 cited by Smallwood, 2000) suggests that a contractor’s H&S performance is an indicator of that contractor’s dedication to the principles of quality. And Hinze (2006) rightly opines that “working on a project without establishing a strong H&S culture is tantamount to holding a dead man’s hand.”

2.8 Influence of Management Commitment on H&S Performance

The link between management practices and H&S performance has been extensively investigated. Documented research findings indicate that management actions are an important determinant of construction site H&S. Since the 70’s, researchers and H&S experts have attempted to identify the features that are associated with above-average site H&S performance. Simonds and Shafari-shari (1977) explore the relationship between injury frequency rates and factors believed to influence injury rates. They found that on construction sites with active top management involvement in H&S, injury rates were lower. Cohen (1977) conducted similar studies, and reports that in organisations with lower injury frequency rates, there exists a strong management commitment to H&S. This confirms the management belief that high H&S standards are attainable since management is aware of organisational H&S problems, and can deploy visible efforts to attain high H&S goals. A follow-up study conducted by Smith et al. (1978) provides further support to the argument with their
findings, which reiterates that on plants with low injury rates, management commitment to H&S policies and procedures is very high. In addition, Vredenburgh (2002) reports that proactive practices such as the provision of training, and the implementation of initiatives to support the transfer of knowledge, skill and abilities during training and workshops are characteristics of low injury case organisations.

3. CONCLUSIONS AND RECOMMENDATIONS

Having reviewed literature on construction accidents generally, and the definition of culture, organisational culture, H&S culture on construction sites, social-cultural influence on organisational practices, influence of culture, benefits of H&S culture, and influence of management commitment to H&S performance, the preliminary research conclusions and recommendations include:

- The construction industry has one of the highest accident rates when compared with other industries;
- Although, there are many causes of construction accidents, about 80% of the causes of site accidents are due to unhealthy and unsafe behaviours. These can be traced back to lack of management commitment and improper acts of employees, and violation of site H&S rules;
- Construction accidents have a negative impact on the families of the deceased workers and construction firms' profitability through the direct and indirect costs of accidents;
- Construction accidents not only impact negatively on families of the deceased workers and construction firms, but also the society at large, such as the national healthcare system;
- The government should enforce H&S legislation and take proactive measures to ensure that all construction firms adhere thereto;
- Construction firms have to adhere to H&S legislation as well as educate and train their employees regarding H&S. Employers need to discipline individuals who violate H&S rules. Construction firms should appoint H&S Officers in order to engender H&S being viewed as a value on site. Subcontractors who do not have good H&S records should not be considered during the procurement process, and
- Employees have to adhere and conform to all H&S rules on site. All employees should follow safe work procedures (SWPs) by wearing the appropriate personal protective equipment on site, and being conscious of their work surroundings. In addition, they have to report all violations relative to H&S to management.
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Assessment of H & S Knowledge among Students Majoring in Construction Careers in Tanzania

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ABSTRACT AND KEYWORDS

Purpose of this paper

This paper presents the findings of an assessment made to establish the Health and Safety (H&S) knowledge acquired by students majoring in construction careers during their period of study.

Design/methodology/approach

Questionnaires were administered to all students studying four programmes namely: BSc. Building Economics, BSc. Construction Management, B. A. Architecture and BSc. Engineering. The first three programmes are offered at Ardhi University and the later at University of Dar es Salaam.

Findings

The study reveals that majority of students acquire H & S knowledge through lectures followed by industrial training and project sessions. Furthermore, respondents have good knowledge on safety gears, first aid kit, H & S precautions on site, welfare facilities, H&S Plan and pollution mitigation and a fair knowledge on H & S induction courses, OSHA - Tanzania and H & S Courses by OSHA.

Research limitations/implications

This research was carried out by using questionnaire method only; if interviews were to be conducted perhaps more details on their H & S knowledge could be explored. Likewise, the results are influenced by
students from BSc. Building Economics programme due to the higher response rate.

**Practical implications**

The findings in this paper provide an insight on the H & S knowledge acquired by students during their period of study. It also presents the proposition that it is about time a separate subject in construction H & S to be introduced.

**Keywords**

H&S knowledge, students, construction careers

**1. INTRODUCTION**

It has been a practice in Tanzania that construction health and safety education is acquired through either short courses or experience. Most of the construction related field syllabuses contain little or no coverage on construction health and safety. Williams and Anderson (2005) confirm that it has been long suspected that construction related courses in building, architecture and civil engineering do not contain suitable or sufficient contents on the subject particularly in a risk management context. A study by Smallwood (2005) underscores the need for inclusion of construction health and safety in architectural education. Misnan at el. (2008) who identified ten elements that influence development of safety culture explain that training has always been a high priority and the effectiveness of safety training has proven to increase knowledge and awareness of workers on safe workers culture. Furthermore, the findings of the study conclude that construction firms and safety experts agree that leadership, training and education are of great influence to development of safety culture (Misnan at el.; 2008).

Health and safety performance in the construction industry has been a main concern to researchers and practitioners. A number of researches (Musonda, 2005; Farooqui et al., 2008; and Gambatese et al., 2008) have shown that previously efforts to improve health and safety performance were directed to construction sites and contractors were responsible for any consequences of poor performance. This places all project H & S matters to the construction team. Lately, various regulations have been introduced to get every project team member involved and this is evident in United Kingdom (Construction Design and Management Regulations, 1994) and South Africa construction regulation of 2003 (Deeks, 2005) construction regulations.
The project is executed by the team which comprises of the design team and the construction team. For the design team, the concepts of prevention through design (PtD) and design for construction H & S (DFCS) advocated in a number of studies (Farooqi et al., 2008; Gambatese et al., 2008; and Saurin and Formoso, 2008; Smallwood, 2005) provide a means for incorporating H & S in designs.

2. HEALTH AND SAFETY RESPONSIBILITY

In certain countries H&S issues were expected to be effected by the contractor on site. Likewise, a number of Acts and regulations in some countries were designed to ensure contractors comply. This is evident in the Occupation Health and Safety Act of 2003 (Tanzania) and Workplace H&S Regulations 1997 (Queensland) (www.dir.qld.gov.au) which all place H&S obligations on the contractor. One of the findings of the research done by Musonda (2005) reveals that clients and designers do not participate in the implementation of H & S. In a study done by Farooqui et al. (2008) explain that most designers stated that the responsibility of safety rest with contractors and their subcontractors and over 70% of responses from architects, engineers and construction management staff viewed the contractor as having the greatest influence over the project safety.

UK introduced CDM (Construction Design and Management Regulations in 1994 which was last revised in 2007 to CDM Regulations 2007. The CDM Regulations 2007 places extra responsibilities on clients to ensure that: construction risk can be carried out without risk to H & S, welfare arrangements are in place before work starts, any structure designed for use as a workplace complies with the regulations, sufficient time and resources are allocated to achieve these duties, and to indicate to contractors and designers how much time is available for planning and preparation before work starts. The recent changes in construction regulations to get other project team members involved in improving H & S in construction indicate the need for the members to possess the appropriate knowledge on the subject.

3. PROJECT TEAM MEMBERS AND H & S

The composition of the project team depends on the complexity of the project, form of contract selected and the project delivery method adopted (Kikwasi, 2009. According to Kikwasi (2009) a project team comprises of design team and construction team. The design team consists of site representative (resident engineer), architect, structural engineer, quantity surveyor, structural engineer, mechanical and electrical engineers. The construction team comprises of the main contractor, contracts manager,
Proceedings 5th Built Environment Conference                                                  18-20 July 2010
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site manager / agent and foreman. It is utmost important that each project team member takes up H&S matters in their capacity. The design team should ensure that the design prepared responds positively to addressing H & S issues. According to Farooqui et al. (2008) design practice does not incorporate safety knowledge which results into own initiatives in addressing workers safety through design. Moreover, a study by Smallwood (2005) reveals that a low level of awareness exist among departments / schools in terms of the extent to which various design and procurement related aspects impact on construction H & S.

Kikwasi (2008) identifies client's responsibilities that have a direct bearing with the obligation of the design team as: employ competent professionals conversant with H&S hazards who can design and incorporate H&S matters in design, demand that design and specifications clearly address aspects of H&S and ensure production of risk free design that tally with the method of construction and site involvement. Smallwood (2005) states that designers should integrate the H & S of construction workers into design and planning process, not include anything in a design which would necessitate the use of dangerous procedures or hazardous materials which could be avoided by the design and take into account the H & S of workers during subsequent maintenance.

Likewise the construction team needs to possess appropriate skills to be able to implement measures to mitigate or eliminate H & S hazards in a project. A study by Kikwasi (2008) lists client's responsibilities that influence the construction H & S process which in turn become the obligation of the construction team as: to ensure compliance to H&S plan and other requirements; ensure H&S matters is always among the site meeting agenda items, ensure the contractor prepare and update a checklist of possible H&S hazards; and provision and use of safety gears. Smallwood (2005) puts forward recommendations by ILO (1992) that clients should coordinate or nominate a competent person to coordinate all activities relating to H & S, inform all contractors of special risks to H & S, require contractors submitting tenders to make provision for H & S, and consider H & S requirements when estimating dates for stage and overall completion. The improvement of H & S performance in the design and construction processes depends largely on project team members' basic knowledge and experience on H&S aspects.

4. H & S EDUCATION AND TRAINING

The concepts of PtD and DFCS appreciate the need to have qualified graduates who can incorporate construction H & S aspects into every design. A study by Gambatese et al (2008) discloses that for proper implementation of PtD and DFCS education efforts should cover continuing education and university education.
One of the barriers listed by Gambatese et al. (2008) to implement PtD concept in construction that exist outside the jobsite as lack of education, training, and resources to assist architects and engineers to design for construction safety. One of the challenges identified by Kikwasi (2008) as facing the Tanzanian construction industry in implementing of H&S measures was lack of formal H&S training programmes in schools, colleges and universities. Another barrier disclosed by Saurin and Formoso (2008) for integrating safety into design is the limited education architects and engineering designers receive on construction safety. Among the recommendations made by Williams and Anderson (2005) which have direct bearing on education and training are:

• health and safety should be repackaged and promoted in universities as an element of larger subject of risk management;
• government agencies funding academic courses should require inclusion of health and safety risk management in the curriculum as a condition of risk receipt of funding;
• accreditation bodies should make it clear that learning outcomes in H&S risk management should be explicitly examined;
• professional institutions should use their influence and the vast membership skills and knowledge base to actively support academia; and
• subject leaders in H & S risk management should be appointed in each centre to form a focus to actively initiate, coordinate, monitor and review academic standards and the exchange of information.

5. RESEARCH METHODS

5.1 Sample and stratum

The purpose of this study is to evaluate H&S knowledge among students majoring in construction careers in third year and fourth year for four year programmes and forth and fifth year for five year programmes. The programmes involved were architecture, engineering, building economic and construction management. Data for engineering programmes were from the College of engineering and Technology (CoET) of the University of Dar es Salaam (UDSM). Data for architecture, building economic and construction management were from School of Architecture and Design (SADE) and School of Construction Economic and Management (SCEM) of Ardhi University. The only five year programme is Architecture the rest are four year programmes.

Initially, 102 fourth year students majoring in engineering fields were earmarked, this is a group of students from various engineering programs namely: transportation and geotechnical, civil and structural, and...
civil and water resources engineering who in addition to other subjects, are studying construction management subject. 102 questionnaires were prepared and sent to them through the Dean and their subject master. Similarly 60 and 38 students in building economics and architecture programmes were identified respectively. At a later stage 14 construction management students were included in the survey.

5.2 Data collection methods

271 questionnaires were prepared and sent to the students through the deans and their subject masters. The questionnaires comprised of closed and open-ended questions to test the students’ knowledge on health and safety in construction works. The responses are as shown in Table 5.1 below

<table>
<thead>
<tr>
<th>S/No</th>
<th>Programme</th>
<th>Year of Study</th>
<th>Questionnaire sent</th>
<th>Questionnaire Returned</th>
<th>%age successes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Architecture</td>
<td>5th</td>
<td>38</td>
<td>16</td>
<td>42%</td>
</tr>
<tr>
<td>2</td>
<td>Building Economics</td>
<td>4th &amp; 3rd</td>
<td>117</td>
<td>80</td>
<td>68%</td>
</tr>
<tr>
<td>3</td>
<td>Construction Management Engineering</td>
<td>3rd</td>
<td>14</td>
<td>13</td>
<td>93%</td>
</tr>
<tr>
<td>4</td>
<td>Engineering</td>
<td>4th</td>
<td>102</td>
<td>40</td>
<td>39%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>271</td>
<td>149</td>
<td>55%</td>
</tr>
</tbody>
</table>

6. RESULTS AND DISCUSSIONS

6.1 Involvement in a construction project

Majority (47%) of students involved in the survey were engaged in 3 to 4 project followed by 5 to 6 (19.3%) and 1 to 2 (18.6%). About 8.6% were engaged in 7 to 8 projects and 5.6% in 9-10 projects. The reasons for such disparity are that some students have started their careers as technicians and later join degree programmes, and others maintain working relationship with firms they are assign during industrial training. The type of projects involved include residential houses, office blocks, industrial buildings, hospitals, institutional buildings (university and schools) and civil engineering works (bridges, dams and roads). Figure 6.1 below summarizes the extent of respondents’ engagement in various types of projects.
While the general picture reveals that majority (40%) of students were engaged in residential houses followed by office blocks (18%). It was also disclosed that majority of engineering students were engaged in civil engineering works equivalent to 83% of 29 respondents.

6.2 Acquisition of H & S knowledge

Most curricula for construction careers in Tanzania lack adequate coverage or do not cover H & S aspects at all. Consequently, students gather knowledge as they study their specializations in various ways. Figure 6.2 below summarizes various sources from which students acquire H & S knowledge.

The results indicate the disparity in gaining H & S knowledge. Building Economics students gain their knowledge during industrial training (n= 55).
followed by lectures (n=48) and project sessions (n=30). Construction Management students gain their knowledge through lectures (n=13) followed by project sessions and IT (n=7). Architecture students gain H & S knowledge through IT (n=12) followed by lectures (n=11) and engineering students gain H & S knowledge through lectures (n=26) followed by IT (n=21). The reason for such disparity might be the coverage of H & S matters in construction related courses in their programmes, knowledge and interest of the subject master in H & S aspects, and the interest of the student on the topic. Other sources of H & S knowledge indicated by respondents include: television programs, courses offered by OSHA, seminars and workshops.

6.3 Students H & S knowledge on various aspects

Nine aspects were selected to test students H & S knowledge. The selected aspects are considered to save as basic knowledge for anyone involved in a construction project as a project team member. The students were to rank their knowledge basing on four point ranking scale: 1 = very good; 2 = good; 3 = fair; and 4 = poor.

Table 6.1 Ranking of H & S knowledge on various aspects

<table>
<thead>
<tr>
<th>H &amp; S Aspect</th>
<th>N</th>
<th>1(%)</th>
<th>2(%)</th>
<th>3(%)</th>
<th>4(%)</th>
<th>M</th>
<th>SD</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety gears / (PPE)</td>
<td>149</td>
<td>28</td>
<td>48</td>
<td>19</td>
<td>5</td>
<td>2.01</td>
<td>0.83</td>
<td>1</td>
</tr>
<tr>
<td>First Aid kit</td>
<td>149</td>
<td>34</td>
<td>32</td>
<td>25</td>
<td>9</td>
<td>2.08</td>
<td>0.97</td>
<td>2</td>
</tr>
<tr>
<td>H &amp; S precautions on site</td>
<td>149</td>
<td>23</td>
<td>41</td>
<td>25</td>
<td>11</td>
<td>2.24</td>
<td>0.93</td>
<td>3</td>
</tr>
<tr>
<td>Welfare facilities</td>
<td>149</td>
<td>19</td>
<td>35</td>
<td>31</td>
<td>15</td>
<td>2.41</td>
<td>0.96</td>
<td>4</td>
</tr>
<tr>
<td>Health and Safety Plan</td>
<td>149</td>
<td>11</td>
<td>49</td>
<td>25</td>
<td>15</td>
<td>2.44</td>
<td>0.87</td>
<td>5</td>
</tr>
<tr>
<td>Pollution mitigation / protection</td>
<td>149</td>
<td>20</td>
<td>34</td>
<td>27</td>
<td>19</td>
<td>2.45</td>
<td>1.02</td>
<td>6</td>
</tr>
<tr>
<td>H &amp; S induction courses</td>
<td>149</td>
<td>15</td>
<td>31</td>
<td>28</td>
<td>26</td>
<td>2.66</td>
<td>1.03</td>
<td>7</td>
</tr>
<tr>
<td>OSHA - Tanzania</td>
<td>149</td>
<td>7</td>
<td>22</td>
<td>37</td>
<td>34</td>
<td>2.99</td>
<td>0.92</td>
<td>8</td>
</tr>
<tr>
<td>H &amp; S Courses by OSHA</td>
<td>149</td>
<td>7</td>
<td>8</td>
<td>33</td>
<td>52</td>
<td>3.30</td>
<td>0.88</td>
<td>9</td>
</tr>
</tbody>
</table>

SD= Standard Deviation  M= Mean  R= Rank

The results in Table 6.1 indicate that more than one-third (34%) of the respondents have a very good knowledge on first aid kit. Similarly about half (48% and 49%) of the respondents have a good knowledge on safety gears and H & S plan respectively. However, more than half (52%) and more than one-third (34%) of the respondents have indicated that they
have poor knowledge on H & S courses offered by OSHA and the existence of OSHA in Tanzania respectively. Basing on the ranking, respondents have good knowledge on safety gears, first aid kit, H & S precautions on site, welfare facilities, H&S Plan and pollution mitigation (m= 2 – 2.45) and a fair knowledge H & S induction courses, OSHA - Tanzania and H & S Courses by OSHA (m= 2.66-3.3)

6.4 H & S Responsibility

Project team members H & S responsibility in construction is not well known to the industry stakeholders. In Tanzania for instance, the Occupation Safety and Health Authority (OSHA) is currently reviewing its 2003 Act to incorporate the client’s obligations. It was therefore considered important to test the respondents’ awareness on who is to take up the H & S matters in a construction project.

There is a general consensus that H & S maters are the responsibility of the project team mainly client, consultants and the contractor by 59%. The old phenomenon that H & S is the responsibility of the contractor was picked by about one-third (31%) of the respondents which was influenced by the students from building economics discipline to the tune of 68% of 31%.

6.5 Construction industry H & S performance

The industry H & S poor performance has been a concern of most researchers. In the view of that, it was found utmost important to gather the
opinions of the respondents on the Tanzanian construction industry H & S performance.

![Graph showing assessment of H & S performance with categories: Don’t know (1%), Satisfactory (33%), Very good (13%)](image)

More than 50% of the respondents believe that the Tanzanian construction industry H & S performance is satisfactory. Similarly one third of the respondents have indicated that the industry is H & S performance is poor. The reason for such results is may be the respondents’ interest and knowledge in the industry’s H & S performance.

### 6.6 Improvement of construction of H & S knowledge in High learning Institution

A number of studies (Williams and Anderson, 2005; Misnan *et al.* 2008; Smallwood, 2005) have indicated the need for H & S education and training in colleges and at workplace. More importantly is the insufficient contents in the courses which H & S matters are taught. Respondents were requested to comment on how to improve the H & S knowledge in high learning institutions and the responses are summarized in Figure 6.5 below.

![Graph showing improvement of H & S knowledge with categories: Update the contents (20%), No changes (3%), Introduce a new programme (19%), Introduce a subject](image)

Majority of the respondents (58%) suggest that there is a need to introduce H & S in construction subject and 20% and 19% suggest update of the contents and introduction of a new programme respectively. Interestingly,
3% of the respondents were satisfied with the contents of the H & S issues in their programmes.

7. CONCLUSION AND RECOMMENDATION

The construction H&S knowledge among students majoring in construction career is still inadequate. Assessment on various H & S aspects indicates that their knowledge is on average good in most selected aspects and fair in three aspects namely, H & S induction courses, OSHA-Tanzania and courses offered by OSHA. On the H & S responsibility and the industry's performance, majority of students believe that all project team members are obliged to take up H & S matters in a project and whilst about one-third have indicated that it is the responsibility of the contractor. Furthermore, the performance of the industry on H & S matters has been assessed by majority of students as satisfactory and exactly one-third have ranked it poor. Despite the fact that students acquire H & S knowledge through lectures as their main source, the contents are not sufficient to equip them with appropriate H & S knowledge. This is evident in their recommendations where a majority have suggested an introduction of an H & S in construction subject.

Generally it can be concluded that all programmes involved in the study have topics in of their subjects that covers construction H & S matters. A mere coverage of H & S matters will not equip a graduate with the basic knowledge to address the H & S issues in a construction project. To equip graduates with appropriate knowledge in construction H & S the following are recommended: conduct a need assessment survey to establish if the Tanzanian construction industry is in need of construction H & S programme; review construction careers programmes curricula and introduce construction H & S subject; and during min curricula review revisit current contents of the construction H & S in the programmes and update accordingly.

8. REFERENCES

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Antecedents of Risk Assessment and Management Practices (RAMP) Deployment within Ghanaian Construction Related Medium & Large Sized Enterprises (MLEs)

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ABSTRACT AND KEYWORDS

Purpose

This paper reports on antecedents defined as organisational factors that can enhance (critical success factors) or impede (barriers) the implementation of risk assessment and management practices (RAMP) among medium to large-sized Ghanaian construction organisations.

Design/methodology/approach

A survey conducted in May 2009 of randomly selected samples yielded responses from 34 contractors, 46 consultants, and 23 clients or owners (private and public) within the Ghanaian construction industry. Response data was subjected to descriptive statistics and subsequently analysis of variance (ANOVA) and other non-parametric tests were used to examine the differences in the identification of the antecedents of RAMP.
Findings

The descriptive and empirical analysis demonstrated a disparity of the ranking of the 10 critical success factors among the groups; however the differences were not significant. ‘Management style’ and ‘team work and communications’ were ranked as the most important critical success factors whereas ‘goals and objectives of the organisations’ and ‘customer requirements’ were considered to be the least important. The following were identified as major barriers; ‘awareness of risk management processes’ and ‘lack of experience’ whereas ‘time constraints’ was ranked lowly. There was a statistically difference at the $p < .05$ level in the ranking of importance or identification of the barriers for 2 out of 7 barriers for the three groups as follows; ‘Barrier 2 = Lack of Experience’, $[F(2, 99) = 3.399, p = .040 < 0.05]$, and “Barrier 4 = Lack of Information”, $[F(2, 99) = 4.671, p = .012 < 0.05]$. Despite reaching statistical significance, the actual difference in mean scores between the groups was quite small.

Research limitations/implications

The geographical location of the respondents as only drawn from the Greater Accra Region made it difficult to generalise the findings.

Practical implications

For risk assessment and management practices to be implemented effectively, Ghanaian MLEs should consider the identified critical success factors. Furthermore, regardless of the type of organisation, ‘management style’ and ‘team work and communication’ are necessary for the successful deployment of risk assessment and management practices.

Originality/value

This study makes a contribution to the body of knowledge on the subject within a previously unexplored context. The study provides insights on the antecedents (critical success factors & barriers) of risk assessment implementation across the Ghanaian construction sector.

Keywords

barriers, critical success factors, construction industry, Ghana, implementation, risk assessment
1. INTRODUCTION

The Construction industry in Ghana has been growing steadily over the years. The Government’s objective in the Ghana Poverty Reduction Strategy (GPRS II) to promote urban infrastructure development and the provision of basic services including increased access to safe, decent and affordable shelter has given the industry a further boost. Ghana seeks to be the gateway to West Africa and the champion of African excellence. The 2008 Budget Statement of Ghana projected the Construction industry to grow by 11.0 percent, exceeding the 10.0 percent target for the year. This statement attributes the growth to the increased road construction and other infrastructural development throughout the country. The Construction industry in Ghana has been growing steadily over the years. An annual value of public procurement for goods, works and consultant services represents about 10% of Ghana’s Gross Domestic Product, (World Bank 2003). Other studies have linked the relationship between the construction industry and the nation economy (Rameezdeen and Ramachandra, 2008). Its contribution to economic growth and development notwithstanding, the Ghanaian construction industry is fraught with frequent cost overruns and delays on a lot of projects.

The above observation calls for the further exploration into the possible implementation issues of risk assessment and management techniques on construction projects executed in Ghana. For example, how many construction organisations in Ghana currently implement risk assessment and management techniques? If there are, what are the critical success factors and barriers to the deployment of RAMP? Can the level of RAMP deployment be assessed? Thus, based on the analysis of past research, the main objectives of this paper are as follows:

1. To identify the antecedents (critical success factors and barriers) of RAMP of MLEs in the Ghanaian construction sector;
2. To examine whether differences exist in the perceptions of those antecedents by the construction professionals working with the clients, contractors and consultants.

The study will focus on medium and large-sized enterprises (MLEs) within the Ghanaian construction sector.

2. LITERATURE REVIEW

2.1 Review of literature on antecedents of risk assessment and management practices

Oakland (1995 cited in Salaheldin, 2009) defined CSFs as the critical areas which organization must accomplish to achieve its mission by examination and categorization of their impacts. Within the concept of benchmarking, Deros et al (2006) defined CSFs as a range of enablers which, when put...
into practice will enhance the chance for successful benchmarking implementation and adoption in an organization. Drawing heaving on Deross et al., (2006) definition of CSFs, within the context of this study, are defined as drivers or enablers for successful risk assessment and management practices implementation and the generic definition of antecedents is that of organisational factors that can enhance (critical success factors) or impede (barriers) the implementation of risk management.

Several studies have examined the antecedents to risk management practices (e.g. Latham, 1994; Egan Reports, 1998, 2002; Mok et al., 1997; Akintoye and MacLeod, 1997; Frimpong et al., 2003; Abor, 2005; Ayirebi Dansoh, 2005; Hassanean and Affify, 2007; Osburn, 2008; Luu et al., 2008). Generally speaking, the studies on antecedents have focussed on the following themes: “Management style”, “Awareness of risk management processes”, “Co-operate culture”, “Positive human dynamics”, “Customer requirements”, “strategic planning”, “effective use of tools and techniques”, “teamwork”, and “availability of specialist risk and management consultants”. The following section brief describes some of these studies.

Mok et al. (1997) observed that the successful implementation of risk management process (RMP) depended on whether the critical success factors could be overcome. Abor (2005) study of managing foreign exchange risks amongst Ghanaian firms noted that coping with risk has always been an important “managerial function”. The management style adopted in any organization will therefore go a long way to affect the way risks are managed. The study by Aje et al., (2009) also revealed that contractor's management capability has a significant impact on time and cost performance of building projects. According to Assibey-Mensah (2008), over the years, Ghana's indigenous construction firms have had to compete unsuccessfully for construction contracts with large, well-equipped, and well-managed foreign construction businesses.

A range of studies have also examined the “awareness of risk management processes”. This is also closely linked to the critical success factors of “effective use of methods and tools” and “availability of specialist risk and management consultants”. Frimpong et al., (2003), observed that lack of awareness of risk management processes can inherently lead to poor resource management. Frimpong et al., (2003) further observed that project management tools and techniques play an important role in the effective management of a project. Dada and Jagboro (2007) study of the impact of risk on project cost overrun in the Nigerian construction industry also identified improper assessment of risk factors as a contributory factor ineffective project delivery. Manelele and Muya (2008) study of risk within community based projects in Zambia also identified lack of technical advice as one of the project initiation risks. Hassanean and Affify (2007) study
among the Egyptian international and local contractors found limited project management experience among the local contractors as one of the barriers to the identification of risks relevant to construction contracts. The study (Hassanein and Affify, 2007) also highlighted the necessity of project management experience over the local experience of any context as desirable expertise for identification of risk. Some of the earlier studies such as Akintoye and MacLeod (1997) also identified lack of familiarity with the techniques as one of the reasons provided by contractors for not using techniques of risk analysis and management. According to Luu et al (2008), in developing countries, construction firms seem to put little effort in strategic management due to unawareness of strategic measures and lack of effective tools. A comprehensive review of techniques that support risk management can be found in the study by Ahmed et al (2007).

Co-operate culture can be defined as an environment where team members are able to work or act together or jointly for a common purpose or benefit. Osburn (2008) assert that cooperate culture has the potential to make the organization more than the sum of its parts. By inference, an organisation where co-operate culture was weak was bound to be ineffective. Ofori (1994) pointed out that technology development requires financial resources, conducive economic conditions, relevant administrative support, a physical infrastructure, organisations which can apply new technology and a supportive culture. Rather unfortunately most of these are weak in developing countries.

“Positive human dynamics” and “team work and communication” are closely interrelated as both are vital in managing risks on projects. Furthermore, lack of communication amongst team members is in itself a risk factor. Tchankova (2002) opines that changes in people’s values, human behaviour and state of social structure are another source of risk. According to Carter (1986), the parties within the construction industry represent different professions and their multidisciplinary skills limit the scope of co-operation between them. Projects rely on clients, consultants, contractors amongst other stakeholders. Mathur (2007) stated that stakeholders include those who will design the product, develop it, test it, buy it, use it and train others to use it, market it, expect profit from it and maintain it. Lester (2007) acknowledged that relationships to the project by stakeholders can vary from being very supportive to antagonistic but he added that this needs to be managed effectively so that it does not have any effect on the project. It is essential that for each project, communication and team work is encouraged.

The “customer requirement” critical success factor can be argued to be closely aligned with the “goals and objectives of the organisation”. Using the definition as provided by Powell (1995), customer requirements or ‘customer focus’ is the determining customers (both inside and outside the organisation) requirements, and then meeting those requirements no
matter what it takes. The need for understanding customer requirements was also highlighted within the Latham (1994) and Egan Reports (1998; 2002). The importance of strategic management has also been highlighted by several studies (Tummala and Burchett, 1999; Assibey Mensah, 2008; Ayirebi Dansoh, 2005; Luu et al., 2008). For example, the study by Tummala and Burchett (1999) identified the mission and aims of a project as one of the driving forces for risk management processes in developing an appropriate risk management model; whereas Luu et al. (2008), concluded that strategic management may be a critical way to cope with the risky situations that arise on projects.

"Consideration of external and internal environment" can be viewed as part of the strategic planning which involves auditing of the external environment. For example, Ayirebi Dansoh (2005) observed that the operating environment for construction firms in Ghana is constantly changing in the face of a volatile economic environment, shifting political climate and a highly competitive market. Ahmed et al., (2007) also highlighted need for risk assessment given the global focus and competition of the construction industry. Hlaing et al., (2008) study in Singapore revealed that emerging challenges linked to the turbulent economy can have an impact of the procurement methods with shifts in the way that risks were allocated. In particular, the study observed that, under such conditions, clients tended to allocate or shift greater risks to contractors.

3. RESEARCH METHODOLOGY

To identify the antecedents (critical success factors and barriers) of risk assessment and management practices implementation within the Ghanaian construction sector, the following specific methodology of this study based on literature review, a pilot study and a question survey was employed.

3.1 Sample

This study issued 180 questionnaires to randomly selected professionals within the Greater Accra region of Ghana. The list of all registered construction related firms in Ghana was obtained from the relevant ministries and professional bodies (Tulli et al., 2007; Frimpong et al, 2003). A total of 103 useable questionnaires were returned, 34 (33 percent were from contractors, 46 (45 percent) were from consultants and 23 (22 percent) from clients. This comprised a 54 percent response rate and was therefore deemed adequate for the purpose of data analysis. Fitzgerald (2000 cited in Odyinka et al., 2008) state that this is way above the norm of
20-30 percent response rate in most postal questionnaire of the construction industry.

The majority (56 percent) of the respondents have more than five years experience in the construction industry. A total of twenty five (25%) of the respondents work for organisations having more than 300 employees and only 17% had less than 25 employees. The rest (58%) had more than 25 and less than 300 employees. This confirms that organisations were drawn from medium and large organisations are per classification of the Ghanaian Statistics Service (GSC), which considers firms with less than 10 employees as small scale enterprise and those with more than 10 as medium to large enterprises.

Table 1.0 shows the frequency of respondents according to their professions.

<table>
<thead>
<tr>
<th>Position</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cumulative percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity Surveyor</td>
<td>32</td>
<td>31.07</td>
<td>31.07</td>
</tr>
<tr>
<td>Engineer</td>
<td>33</td>
<td>32.03</td>
<td>63.10</td>
</tr>
<tr>
<td>Project Manager</td>
<td>22</td>
<td>21.36</td>
<td>84.46</td>
</tr>
<tr>
<td>Architects</td>
<td>11</td>
<td>10.68</td>
<td>95.14</td>
</tr>
<tr>
<td>Site Managers</td>
<td>5</td>
<td>4.86</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The background of the respondents supports the notion that they were involved with running of projects at both operational and strategic levels, therefore had some knowledge of issues related to the critical success factors and barriers to the deployment of risk management processes. According to Bing et al. (2005), this also enhances the internal data validity.

3.2 Measurement Instrument

The data collection instrument was a self-administered structured questionnaire. The questionnaire was pre-tested by sending to 20 professionals within the Ghana construction industry via email survey in March/April 2009. Based on the feedback, the questionnaire was modified. As observed by Forza (2002), the choice of professionals for piloting was to test whether the questionnaire accomplished the study objectives. Gill and Johnson (1991) also observe that piloting is also necessary as it is very difficult to predict how respondents will interpret and react to questions. Another reason for piloting would be to estimate the probable number of refusals and non-contacts and then compare the effectiveness of various ways of reducing non-responses. (Moser and Kalton, 1979).

The questionnaire was divided into four parts, as follows: demographics, evaluation of projects, awareness of risk assessment and management processes, and antecedents (critical success factors and barriers) survey. The first part (demographics) comprised six questions and sought information pertaining to organisation size (turnover and number of
employees), professional background, and years of service in construction industry. The second part was the evaluation of risk factors survey which comprised 25 variables and designed to assess and measure the degree of risk factors. The third part was design to investigate the usage, awareness and benefits of risk management processes. The final part was the antecedent’s surveys and was designed to indentify the critical success factors and barriers to the deployment of risk management. The critical success factors sub instrument comprised 10 items namely: (1) management style; (2) awareness of risk management processes (3) co-operate culture; (4) positive human dynamics; (5) customer requirements; (6) goals and strategic objectives of the organisation; (7) impact of environment; (8) usage of tools; (9) team work and communication; and (10) availability of specialist risk management. The barriers survey sub-instrument comprised 7 items. Each item in the critical success factors and barriers instrument was measured from a range of (1) strongly disagree to (4) strongly agree. Thus using the criticality cut off point of 2.40 on a 1-4 Likert scale represented agreement levels (mean score greater than 2.4).

3.3 Statistical methods

The primary focus of the study presented in this paper was to identify the critical success factors and barriers of risk assessment and management practices within the Ghanaian construction sector. In view of the different groups (clients, contractors and consultants), it was deemed necessary to ascertain whether differences existed in the perceptions of the critical success factors and barriers. Statistical Package for Social Sciences (SPSS) computer program version 17.0.0 was used to analyse the data generated by the research questions. Analysis of Variance (ANOVA), and separate independent t-test were used for the analysis. An internal consistency of the survey was conducted using reliability to the ‘critical success factors’ and ‘barriers’ measurement instruments and the Cronbach’s Alphas values were 0.840 (F-statistic = 5.379, Sig. = 0.000) and 0.700 (F-statistic = 2.899, Sig. = 0.009) respectively, with the ‘critical success factor’ alpha greater than 0.7 thus indicating a high reliability of scales (Nunnally, 1978).

4. RESULTS AND DISCUSSION

This section examines the contractor’s, clients, and consultants perception of the antecedents (critical success factors and barriers). The hypothesis of no significant differences in the perception of the different types of organisation (by sector) to the antecedents (critical success factors and barriers) of risk management was tested using ANOVA at 5 percent level of
significance. Tables 2.0 (critical success factors) and 3.0 (barriers) summarises the results of the analysis.

4.1.1 Perceptions of critical success factors by Groups

Examination of Table 3.0 indicates that there is no statistical significance difference ($p < 0.05$) in the perception of the construction professionals working for the different types of organisations regarding the critical success factors considered necessary for the deployment of risk assessment and management practices. This suggests that construction professionals within the Ghanaian construction industry, irrespective of the sector (clients, consultants or contractors) that they worked for generally have similar opinions regarding the critical success factors influencing the deployment of RAMP. As such, the null hypothesis of no significant difference in the perception of different types of organisations to the critical success factors to RAMP is upheld.

Although the analysis shown in Table 2.0 (columns 11 and 12) shows no statistical differences of opinion in the perception of the different types of organisations, it is evident that whilst ‘team work and communication’ ranked 1st overall, it also ranked 1st under the contractors and client, it however ranked 2nd under the scoring by the consultants. As observed by Dey and Ogunlana (2004), the construction process involves various kinds of people with various ideas, experience and skills. They added that people usually have different interests, so coordinating project goals is very difficult. It is also hardly surprising that the contractors ranked “availability of specialist risk management consultants” higher than the clients and consultants. On the otherhand, it is worth noting that consultants ranked “management style” the most critical success factor. In additional, “awareness of risk management processes” and “team work and communication” were ranked 2nd and 3rd place respectively.

On the other hand, contractors ranked “management style” lower than the clients and consultants. This is in contrast to Abor (2005) assertion that coping with risk has always been an important managerial function. The management style adopted in any organization will therefore go a long way to affect the way risks are managed. However it is encouraging to note that despite the low ranking by the contractors of “management style”, they acknowledged the need for “awareness of risk management processes” as a critical success factor better than the clients. It can be argued that without the awareness of the risk management processes, there is no way someone will use the risk management processes. These findings are also consistent with literature in developing and developed countries. For
example the importance of relationships and communication was highlighted in Lester (2007) whereas Abor, (2005) identified managerial function and Luu et al., (2008) highlighted the need for strategic management. Lack of awareness of risk management processes by Ghanaian professions was observed in the Agyakwa-Baah, (2009) study.

The overall rank for “goals and objectives of organisations” was ranked 7th overall despite the importance of this critical success factor as observed by Tummala and Burchett (1999). They argue that the business strategy, which encompasses goals and objectives should be the driving forces for Risk Management implementation. The study by Aje et al. (2009) in Nigeria also found contractor’ management capability to have a significant impact on cost and time performance of building projects.
<table>
<thead>
<tr>
<th>Critical Success Factors of RAMP</th>
<th>Full Sample</th>
<th>Contractors (N=33)</th>
<th>Clients (N=23)</th>
<th>Consultants (N = 46)</th>
<th>F Stat</th>
<th>Level of sig. (p values)</th>
<th>Significant Difference (Yes or No)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>Rank</td>
<td>M</td>
<td>R</td>
<td>M</td>
<td>R</td>
<td>M</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>CSF₁ = Management Style</td>
<td>3.41</td>
<td>2</td>
<td>3.30</td>
<td>4</td>
<td>3.39</td>
<td>2</td>
<td>3.50</td>
</tr>
<tr>
<td>CSF₂ = Awareness of Risk Management Processes</td>
<td>3.34</td>
<td>3</td>
<td>3.30</td>
<td>5</td>
<td>3.35</td>
<td>6</td>
<td>3.37</td>
</tr>
<tr>
<td>CSF₃ = Co-operate Culture</td>
<td>3.11</td>
<td>9</td>
<td>3.15</td>
<td>1</td>
<td>0</td>
<td>3.30</td>
<td>8</td>
</tr>
<tr>
<td>CSF₄ = Positive Human Dynamics</td>
<td>3.23</td>
<td>6</td>
<td>3.24</td>
<td>7</td>
<td>3.35</td>
<td>4</td>
<td>3.15</td>
</tr>
<tr>
<td>CSF₅ = Customer Requirement</td>
<td>3.08</td>
<td>10</td>
<td>3.15</td>
<td>9</td>
<td>3.04</td>
<td>10</td>
<td>3.04</td>
</tr>
<tr>
<td>CSF₆ = Goals and Objectives of the Organisation</td>
<td>3.22</td>
<td>7</td>
<td>3.27</td>
<td>6</td>
<td>3.09</td>
<td>9</td>
<td>3.24</td>
</tr>
<tr>
<td>CSF₇ = Consideration of External and Internal Environment</td>
<td>3.17</td>
<td>8</td>
<td>3.24</td>
<td>7</td>
<td>3.35</td>
<td>4</td>
<td>3.02</td>
</tr>
<tr>
<td>CSF₈ = Effective Use of Methods and Tools</td>
<td>3.30</td>
<td>4</td>
<td>3.36</td>
<td>3</td>
<td>3.30</td>
<td>7</td>
<td>3.26</td>
</tr>
<tr>
<td>CSF₉ = Team Work and Communication</td>
<td>3.44</td>
<td>1</td>
<td>3.52</td>
<td>1</td>
<td>3.48</td>
<td>1</td>
<td>3.37</td>
</tr>
<tr>
<td>CSF₁₀ = Availability of Specialist Risk Management consultants</td>
<td>3.24</td>
<td>5</td>
<td>3.39</td>
<td>2</td>
<td>3.39</td>
<td>3</td>
<td>3.04</td>
</tr>
<tr>
<td>Average Scores</td>
<td>3.29</td>
<td>3.30</td>
<td>3.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2.0:** Contractors', Clients and Consultants' perception of critical success factors to RAMP

Note ¹: The higher the mean, the more important the critical success factor
Table 3.0: Contractors’, Clients and Consultants’ perception of barriers to RAMP.

<table>
<thead>
<tr>
<th>Barriers of RAMP</th>
<th>Full Sample</th>
<th>Contractors (N=33)</th>
<th>Clients (N=23)</th>
<th>Consultants (N = 46)</th>
<th>F Stat</th>
<th>Level of sig. (p value)</th>
<th>Significant Difference (Yes or No)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>R</td>
<td>M</td>
<td>R</td>
<td>M</td>
<td>R</td>
<td>M</td>
</tr>
<tr>
<td>Br1 = Awareness of Risk Management Processes</td>
<td>3.21</td>
<td>1</td>
<td>3.18</td>
<td>1</td>
<td>3.13</td>
<td>2</td>
<td>3.17</td>
</tr>
<tr>
<td>Br2 = Project Completed within Budget</td>
<td>3.09</td>
<td>2</td>
<td>2.85</td>
<td>5</td>
<td>3.13</td>
<td>1</td>
<td>3.17</td>
</tr>
<tr>
<td>Br3 = Product to the Required Quality</td>
<td>3.02</td>
<td>3</td>
<td>2.82</td>
<td>6</td>
<td>2.87</td>
<td>5</td>
<td>3.15</td>
</tr>
<tr>
<td>Br4 = Reduced Accidents on Site</td>
<td>2.94</td>
<td>6</td>
<td>2.62</td>
<td>7</td>
<td>2.83</td>
<td>6</td>
<td>3.17</td>
</tr>
<tr>
<td>Br5 = Availability of Specialist Risk Management Consultants</td>
<td>2.78</td>
<td>5</td>
<td>3.00</td>
<td>2</td>
<td>3.00</td>
<td>3</td>
<td>2.89</td>
</tr>
<tr>
<td>Br6 = Time Constraints</td>
<td>2.86</td>
<td>7</td>
<td>2.91</td>
<td>3</td>
<td>2.74</td>
<td>7</td>
<td>2.85</td>
</tr>
<tr>
<td>Br7 = Implementation Cost</td>
<td>2.97</td>
<td>4</td>
<td>2.88</td>
<td>4</td>
<td>2.96</td>
<td>4</td>
<td>3.00</td>
</tr>
<tr>
<td>Average Scores</td>
<td>2.90</td>
<td></td>
<td>2.95</td>
<td></td>
<td>3.06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1: The higher the mean, the more impact the barrier has to deployment of risk assessment, * *Significant at p < 0.05.

Burchett et al. (1999 cited in Francis and Skitmore, 2005) found that degree of utilisation of risk management to be dependent on ‘managers’ concerns and time involvement, human / organisational resistance and understanding of quantitative techniques. Burchett et al. (1999 cited in Francis and Skitmore, 2005) found that degree of utilisation of risk management to be dependent on ‘managers’ concerns and time involvement, human / organisational resistance and understanding of quantitative techniques

Burchett et al. (1999 cited in Francis and Skitmore, 2005) found that degree of utilisation of risk management to be dependent on ‘managers’ concerns and time involvement, human / organisational resistance and understanding of quantitative techniques. Despite the differences in the ranking of the critical success factors by the contractors, clients and consultants, using the criticality cut off point of 2.40 defined earlier, examination of Table 2.0 indicates that all the critical success factors were above the agreed point for all the respondents, therefore it could be argued that all the factors were deemed as important. In order to confirm and ascertain whether there were any significant differences in the rankings of the critical success factors by the three groups, Kendall’s coefficient of concordance was conducted and the results are shown in Table 4.0.

Table 4.0: Spearman rank correlation coefficients for critical success factors

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Contractor / Clients</th>
<th>Contractor / Consultants</th>
<th>Clients / Consultants</th>
</tr>
</thead>
<tbody>
<tr>
<td>R (rho)</td>
<td>0.673*</td>
<td>0.630*</td>
<td>0.376*</td>
</tr>
</tbody>
</table>

* Correlation is significant at 0.05 level (2-tailed)
Examination of Table 4.0 shows the spearman rank correlation coefficients (rho) of different pairs of respondents, i.e. rho is 0.673 between the respondents from contractors and consultant organisations. These statistical results indicate a general consensus on the ranking of the critical success factors among the different group of respondents.

4.1.2 Perceptions of barriers by Groups

The summary of the respondents' ranking and mean scores of the 7 barriers is presented in Table 3.0. The majority (68.71%) of the advocated barriers fell within the medium range whereas the minority (1) of 12.50% was perceived to be high. The inference to be drawn is that deployment of risk assessment and management practices are impeded by medium levels of barriers according to the clients, consultants and contractors. The ‘Awareness of Risk Management Processes’ was regarded as the most significant barrier (Mean = 3.206; Std. dev = .694; rank = 1st) based on the total sample. In order to ascertain whether the differences in ranking (as shown in Table 3.0) were significant, a one-way between-groups analysis of variance (ANOVA) was conducted with the significance level of analysis set at a p-value of 0.05.

The analysis of variance revealed that there was a statistically difference at the p < .05 level in the ranking of importance or identification of the barriers for 2 out of 7 barriers for the three groups as follows; “Barrier 2= lack of experience”, [Table 3: F(2, 99) = 3.399, p = .040 < 0.05], and “Barrier 4 = lack of information”, [Table 3: F(2, 99) = 4.671, p = .012 < 0.5]. Despite reaching statistical significance, the actual difference in mean scores between the groups was quite small. The post-hoc comparisons using the Tukey HSD test indicated that the mean score for the contractors (mean score = 2.61, std. dev =.8638) was significantly from consultants (mean score = 3.15, std. dev =.7293) for the “lack of information” barrier, with a mean difference (I – J) of (-.54611). On the other hand, contractors (mean score = 2.61, std. dev =.8638) did not differ significantly from clients (mean score =3.00, std. dev =.7977) and consultants (mean score =3.15, std. dev =.7293) did not differ significantly from clients (mean score = 3.00, std. dev =.79772).

5. CONCLUSIONS

This paper presented part of the MSc dissertation study which sought to identify the critical success factors and barriers of risk assessment and management practices (RAMP) deployment within the MLE’s Ghanaian construction sector. This involved a questionnaire survey of clients (or owners), contractors and consultants involved with construction projects.
The significance of this study lies in a previously under-researched area within the African context and developing economy, more so it includes both private and public organisations from the client side, consultants and contractors. Another significant contribution of this paper is that it sheds light on the understanding of critical success factors necessary for the implementation of risk assessment and management practices (RAMP) within the Ghanaian construction sector, an area previously under-researched. It also expands the effort of studying critical success factors and the evaluation of their impact on project outcomes across the developing economies and particularly within the African context.

The study has a number of managerial implications in that the identified critical success factors and barriers could be used as a road map for the successful implementation of RAMP. Secondly, there is a need for all employees in the construction industry as well as the general public to be made aware of the benefits of using risk management processes. The third managerial implication is the need of awareness for ‘management style’; ‘awareness of risk management process’; and ‘teamwork and communication’ as the top critical success factors desirable for the implementation of risk management processes. Lack of goals and objectives of the organisation has contributed to poor risk assessment and management practices.

5.1 Recommendation for further research

The following recommendations are proposed:

- As the survey was limited to construction organisation within the Accra region, future direction should include employing a wider sample to include organisations from other regions and sectors such as the service industry to gain a better insight on the factors contributing to or impending the deployment of risk management
- Research should be carried out on construction organisations that have successfully implemented risk management processes in developing countries as case studies to identify the critical success factors that helped them succeed and the challenges they faced and how they overcame them. The resultant findings could be used as best practice or guidelines for risk management deployment within developing economies.
- Clients should be sensitized on the benefits of carrying out risk management processes on projects and be encouraged to ensure that it is carried out effectively on their projects.
- Availability of specialist consultants might increase the awareness of the use of risk management processes in the Ghanaian Construction Industry, and probably provide the expertise needed in the use of risk management processes so that the methods and tools can be used effectively.
Professionals need to specialise in risk management and set up consulting practices so that others can seek expert advice and assistance on how to carry out the risk management process on projects, and construction Organisations in Ghana need to organise training programmes on project management especially risk management for their employees so as to empower them with tools and techniques they will need in managing projects.

6. REFERENCES


Building Entrepreneurship Education Program as a Key Element to Promote the Successful Creation of Small, Medium and Micro enterprises (SMMEs) to Built Environment Students

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Department of Built Environment: Construction Management & Quantity Surveying
Faculty of Engineering

ABSTRACT AND KEYWORDS

Purpose

This paper examines the curriculum content of the building entrepreneurship program with the intent of identifying several modules and then determining whether they add value to the successful creation of small, medium and micro enterprises (SMMEs) to Built Environment students. The overall intent is to understand the nature of these modules and examine the potential elimination or re-conceptualization of those modules that do not promote the successful creation of SMME’s.

Design/methodology/approach

The research approach involves a critical examination of the building entrepreneurship modules of the Built Environment Departments. Several literature sources related to entrepreneurship education were reviewed to provide a step forward towards improving the curriculum content of the building entrepreneurship program.
Findings

The paper reports that there are a large number of modules that make-up the building entrepreneurship program which are conducted by the Built Environment lecturers. Each of these modules does not necessarily add value to the promotion of the successful creation of SMMEs to Built Environment students.

Practical implications

The study will increase knowledge and awareness of entrepreneurship education towards the crucial role in transforming our country's economy from stagnation and jobless growth, to that of a vibrant and high growth of SMMEs to both Built Environment lecturers and students.

Originality/value

The identification of the modules which do not contribute to promote a successful creation of SMME’s to Built Environment students provides the initial step towards improving the curriculum content of the building entrepreneurship program.

Keywords:

Building entrepreneurship modules, entrepreneurship education, SMMEs

1. INTRODUCTION

In the last three decades, South Africa’s capacity to absorb new employees into the formal labor market has fallen from approximately 62% to less than 4% (Davies, 2001). Perhaps this was one of the reasons why entrepreneurship curriculum was integrated into Built Environment program in the last two decades. The integration of an entrepreneurship syllabus (from business school) with building syllabus (from engineering school) established a new program known as 'Building Entrepreneurship IV”. In Finland, implementing entrepreneurial studies in engineering education is adopted from an Act that states: “After graduation the student should be able to work as an expert, but also as an entrepreneur” (Kontio, 2006).

The goal of entrepreneurship education should intend that whatever the graduates from technical faculties are working on; they always keep an eye on the entrepreneurial aspects (European Commission, 2008). Brijlal (2008) asserted that in order to motivate self-
employment after graduation entrepreneurship programs should be offered to all faculties. Why is there a need to motivate self-employment after graduation to university graduates? Of the economically active unemployed youth, 87 per cent are qualified university graduates. This is according to the survey conducted in September 2007 by Statistics South Africa. The survey looked at people with degrees, diplomas and certificates. Moreover, the general unemployment rate was relatively stable in Quarter 2: 2009 at 23, 6% as against 23, 5% in Quarter1:2009. The crisis of unemployment has resulted in policies promoting entrepreneurship as one promising solution (Papayannakis et.al, 2007). According to National Qualification Framework (2000), to contribute to the full personal development of each leaner and the social and economic development of society at large, developing entrepreneurial opportunities must be the intention underlying any curriculum program. Dana (1993, p. 86) and O’Neill (2004, p. 5), asserted that the end product of entrepreneurship education should be a creative student who understands how to bring an idea from conception to starting and managing a business. In South Africa, an overall unemployment was currently 25.5 per cent (StatSA, 2007) and over 75 per cent among the youths (25-34 years) (African Development Forum, 2006, p. 6), and every entrepreneurship trainer is aiming to produce “job creators and not job seekers”.

In SA University of Technologies (UT), integration of an entrepreneurship syllabus with building syllabus established a program known as “Building Entrepreneurship IV”. However, this programme utilizes a classroom approach in delivering entrepreneurship lessons. This becomes a problem because classroom approach utilizes pen and paper exercises with no emphasis on imagination, practical creativity and innovation (O’ Neill, 2004). Botha (2006) highlighted that most programmes pay high attention to the knowledge aspects but are weak on the skills and attitudinal aspects that are crucial to the success of any potential or start-up entrepreneur. Dhliwayo (2008) claimed that with traditional classroom approach students will hardly discover the extent of entrepreneurial discipline, because this approach tie the “trainee/student entrepreneur” to the four walls of the classroom, depriving him or her of the experiential, real life learning experience. Arguably, UT have not prepared built environment students for self-employment as a career option, resulting in the loss of many potential start-ups of small and medium-size enterprise contractors by construction students. Botha (2006) stated that a focus on entrepreneurial behaviour and the development of newer and smaller businesses is less readily accepted. This has far influence some academic faculties to give little credibility to entrepreneurship as an appropriate area of study (Cooper et al, 2004). Even though little is known about effective way of teaching entrepreneurship (Brockhaus, 2001), Gorman and Hanlon (1997) advocated that entrepreneurship education can positively influence the entrepreneurial attributes. Co and Mitchell (2006) opine that the higher
institutions can play a role in creating an entrepreneurial mindset and behaviour in students, and can both provide necessary support and legitimacy to their attempts to become job-creators. In Canada for example, 40% of engineering graduates who received entrepreneurial training had started their own small businesses (Menzies and Paradi, 2000). Klandt (1993) argue that “entrepreneurial capabilities are not inborn but can be learned, and therefore assume that they may be enhanced or developed by a guided learning process”. The purpose of this paper is to evaluate various building entrepreneurship modules and examine the potential elimination or re-conceptualization of those modules that do not promote successful creation of SMME’s, to building students.

2. ENTREPRENEURSHIP EDUCATION

While there is an overlap between entrepreneurship and small business management Rwigema and Venter (2004) claim that not all small businesses are entrepreneurial. He contends that many small business owners start with low growth ambition while entrepreneurs normally aim for high-potential enterprise. However, Matlay and Westhead (2005) believe that entrepreneurship can take a variety of forms in all sizes such as micro, small, medium and large businesses. Despite these differences Ahmad, Baharun and Rahman (2004) believe that small medium enterprise (SMEs) is normally the starting place of entrepreneurs. When it comes to education according to Jones and English (2004), entrepreneurship can be viewed in terms of the skills that can be taught and the characteristics that can be engendered that will enable the individual to develop new and innovative plans. Jaafar and Aziz (2008) opine that entrepreneurship education can be viewed as a platform to inculcate new entrepreneurs. Falkang and Alberti (2000), enterprise education (EE) focuses on developing enterprising students and inculcates an attitude of self-reliance using appropriate learning processes. The burning question in research study concerning entrepreneurship education is whether entrepreneurs are naturally born or can be trained. However, Manson and Western (2004) postulated that the characteristics assigned to successful entrepreneurs such as intelligence, creativity, risk management, tolerance of uncertainty and persistence in achieving an inner goal are not so different from those of successful engineers. The probability of building engineering students becoming job-creators’ instead of job-seekers is based on whether the education is “for” entrepreneurship or “about” entrepreneurship. According to Laukkannen (2000) there are two areas of entrepreneurship education that academics need to consider.
(1) Education “about” entrepreneurship. This involves developing, constructing and studying the theories referred to the entrepreneurs, the firm creation, the contribution to economic development, the entrepreneurial process and the small and middle sized firms. It takes into account undergraduate, Masters and PhD students as well as policy makers and researchers. It views entrepreneurship as a social phenomenon.

(2) Education “for” entrepreneurship. This addresses present and potential entrepreneurs with the objective of developing and stimulating the entrepreneurial process, providing all the tools necessary for the start-up of a new venture both within an outside an existing organization.

Arguably, to enable students to become job-creators instead of job-seekers once they leave the education system, entrepreneurship modules should focus on education for entrepreneurship rather than about entrepreneurship.

3. METHODOLOGY

The study relies on the review of building entrepreneurship modules against recent and old studies of entrepreneurship education. This approach aims to critical evaluate the building entrepreneurship modules and expose those modules that do not necessary promote the successful creation of SMME’s. The study attempts to re-conceptualize those modules and highlight the importance of entrepreneurship education towards the crucial role in transforming our country’s economy from stagnation and jobless growth, to that of a vibrant and high growth of SMME’s to both Built Environment lecturers and students. Furthermore, the study helps to construct a practical building entrepreneurship program to provide learners with opportunity to develop entrepreneurial skills that can be transformed into real life experience. European Commission (2008) argues that the goal of entrepreneurship education should intend that whatever the graduates from technical faculties are working on; they always keep an eye on the entrepreneurial aspects. According to Neumann (2000) a researcher can collect data bearing in mind a research question and variables, and then reassemble the information in new ways to address the research question. Furthermore, Mouton (2001) defines a non-empirical study as analysis of the meaning of words and concepts through clarification and elaboration of deferent dimensions and meanings. The study is designed and carried out by critical evaluating the various building entrepreneurship modules, and then determining whether they add value to the successful creation of
SMME’s to Built Environment students. Current debates, developments, meanings, aims and elements of entrepreneurship education are presented on this study. Earlier and current studies were examined to establish the theme of entrepreneurship education. The relevant articles, journal papers, conferences papers and textbooks were utilized to compose the theoretical framework of the study. As listed above, there are many modules taught in the building entrepreneurship program. To this end, the study is limited at this stage to the literature review and the evaluation of only 2 modules (offered at CPUT) together with general methods utilized by the Board of Examination System dominating institutions; to evaluate the course mark of the building engineering students. The evaluation of other modules from future research papers will inform the development of the rest of the research activities.

4. ENTREPRENEURSHIP EDUCATION IN BUILT ENVIRONMENT

4.1 Building entrepreneurship module

Degree programmes in the Built Environment at NMMU is offering courses and topics related to entrepreneurship, consider a case below for both construction management and quantity surveying Bachelor of Technology Degrees:

<table>
<thead>
<tr>
<th>Building Entrepreneurship IV modules</th>
<th>BTech (Quantity Surveying)</th>
<th>BTech (Construction Management)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module</td>
<td>Topics with module</td>
<td>Module</td>
</tr>
<tr>
<td>Building Entrepreneurship 4</td>
<td>Financial management &amp;</td>
<td>Same</td>
</tr>
<tr>
<td>(DBE4010)</td>
<td>cost control; Income tax;</td>
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<td>Budgetary control; Costing</td>
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<td>&amp; cost control; Incentives;</td>
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<td>Entrepreneurship &amp;</td>
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<td></td>
<td>business management in</td>
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<tr>
<td></td>
<td>building industry; Finances</td>
<td></td>
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<tr>
<td></td>
<td>&amp; forming of business.</td>
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</tbody>
</table>

Source: NMMU Department of Construction Management (2009)

However, one needs to differentiate between a general business and economics studies and entrepreneurship education. European Commission (2008) asserted that the goal of entrepreneurship education is to promote creativity, innovation, risk-taking and self-employment and should not be confused with general business and economics studies. Furthermore,
according to European Commission (2008) entrepreneurship education includes the following elements:

- developing personal attributes and skills that form the basis of an entrepreneurial mindset and behavior (creativity, sense of initiative, risk-taking, autonomy, self-confidence, leadership, team spirit, etc.);

- raising the awareness of students about self-employment and entrepreneurship as possible career options;

- working on concrete enterprise projects and activities; and

- providing specific business skills and knowledge of how to start a company and run it successfully.

Brijlal (2006) argue that entrepreneurship modules in universities are focusing too much on business management skills, and little emphasis is placed on motivation of the entrepreneur as a person. As an educational program entrepreneurship should meet and reduce the challenge of the fear of failure, promote factors for entrepreneurial activeness and instil strong self-esteem to students. Not opposing the fact that entrepreneurs do need business management skills, Koiranen (2008) opine that entrepreneurship is often about bringing about change and making difference. He further listed that one of the skills needed by entrepreneurs when dealing with other people is: leadership; motivation; delegation; communication and negotiation. The necessity of experience in learning entrepreneurship is so much that many researchers believe there is no other way possible to learn entrepreneurship rather than personal experience (Henry, et al., 2005). Even though there is still an ongoing argument on whether entrepreneurs are born or bred, Henderson and Robertson (2000) believe that even though we cannot teach someone to be an entrepreneur, we can teach the entrepreneurial skills needed to be successful. Arguably, the current education system employed to teach "Building Entrepreneurship" or any other program hoped to enhance entrepreneurial behaviour or an enterprise mindset of students in a classroom approach will have less impact towards inspiring and enabling students to start-up a sustainable enterprise contractor. Hence, Harris and Gibson (2008) claimed that the "high involvement in experiential activities can better enable students to reach their entrepreneurial potential via skill attainment and increased expectations for success".
4.2 Assessment method utilized in building entrepreneurship modules

Believing that there is more to practice of medicine than knowing, Miller (1990) argued that the Board examination system (dominating institutions) utilizes incomplete tools in assessing only “knowledge base” of medical students to evaluate what is required of them to carry out professional functions effectively. He further argues that medical graduates must “know how” to use the knowledge they have accumulated, for otherwise they may be little more than “idiot servants”. Similarly, building engineering student must be evaluated concerning the “know how” to use the knowledge they have accumulated in the entrepreneurial education program. The table below demonstrates a typical evaluation system utilized by Board of Examination of Built Environment departments to assess engineering students' knowledge concerning entrepreneurship:

<table>
<thead>
<tr>
<th>Building Entrepreneurship Module and Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTech: Quantity Surveyor / Construction Management</td>
</tr>
<tr>
<td>Module:</td>
</tr>
</tbody>
</table>

Source: Durban University of Technology (2009)

Eighty per cent (80%) mark of the evaluation assess the students’ base “knowledge” only. This is supported by a ground breaking research findings showing that South African universities use 80 per cent theory (class time) and only 20 per cent outside classroom methods in teaching entrepreneurship (Co and Mitchell, 2006, p. 354). The theory is broken down to business plans 32 per cent, lecture, 26 per cent, and case studies 22 per cent. However, there is more to practice of entrepreneurship than knowing and a more practical assessment approach can better do the job. To this end, the figure below demonstrates a framework proposed by Miller (1990) for evaluating the medical students’ capacity to carry out their professional functions effectively.
This diagram suggests that the Board of Examination System dominating institutions would be insufficient if students are evaluated based on knowledge only. Miller (1990) believes that medical students must not only demonstrate the "know how" but also must "show how" they do it. According to Miller (1990) the "show how" evaluates the students performance and the "know how" evaluates the students competence. Equally, building engineering student must not only be evaluated with pen and paper exercises, but also must be evaluated concerning their performance to start, run and manage the small construction related businesses during their academic year. The feasibility of building engineering students to become job-creators when they leave education system becomes a matter of concern when Gauteng Treasury (2009) report characterizes construction industry as a temporary and insecure employment sector. Both medical physician and engineer entrepreneur students need at some point of their study to be evaluated pragmatically concerning both their competence and performance. Arguably, no student can learn to become a doctor or even to become an entrepreneur out of theory. In addition, the lecturers doing the teaching should be to some extent entrepreneurs themselves, building their input on real-life experience (European Commission, 2008). Successful initiative programs indicate that

Source: Miller GE. 1990 "the assessment of clinical skills/competence/performance"
the best adviser for a start-up entrepreneur (particular in early stages) is entrepreneur with own real life experience (Prasad, 2007). Arguably, it is lecturers who are entrepreneurs-themselves who can scout and or train young entrepreneurs.

4.3 Evaluation of building entrepreneurship modules

The study is limited at this stage to the literature review and the evaluation of only 2 modules (lecture 1 and 3) of building entrepreneurship program offered at CPUT. The evaluation of other modules from future research papers will inform the development of the rest of the research activities. The following table contains detail modules of building entrepreneurship course.

<table>
<thead>
<tr>
<th>Building Entrepreneurship IV modules</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LECTURE 1</strong></td>
</tr>
<tr>
<td>Learn the concept of entrepreneurship</td>
</tr>
<tr>
<td>Discover the extent of the entrepreneurial discipline</td>
</tr>
<tr>
<td>Understand the characteristics and strengths of an entrepreneur</td>
</tr>
<tr>
<td>Identify the personal attributes and mental tools of the entrepreneur</td>
</tr>
<tr>
<td>Discover the essential difference between entrepreneurship and small business</td>
</tr>
<tr>
<td>Checking available channels</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>LECTURE 2</strong></th>
<th><strong>LECTURE 7</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand the relationship between the economy and entrepreneur</td>
<td>Financial factors for the entrepreneur</td>
</tr>
<tr>
<td>Discover the essential difference between entrepreneurship and small business</td>
<td>Determine the extent of service/production</td>
</tr>
<tr>
<td>The tree way calculation of demand</td>
<td>How to forecast sales</td>
</tr>
<tr>
<td>How to forecast sales</td>
<td>Calculating the costs/spending</td>
</tr>
<tr>
<td>What are the general and administration costs</td>
<td>The implication of taxation</td>
</tr>
<tr>
<td>The implication of taxation</td>
<td>How to prepare financial statements</td>
</tr>
<tr>
<td>How to calculate profit and loss – the statement of income</td>
<td></td>
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</tbody>
</table>

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Proceedings 5th Built Environment Conference
Building Entrepreneurship Education Program as a Key Element to Promote the Successful Creation of Small, medium and Micro enterprises (SMME’s) to Built Environment Students

18-20 July 2010
Durban, South Africa
<table>
<thead>
<tr>
<th>LECTURE 3</th>
<th>LECTURE 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define the extent of the business landscape</td>
<td>The business plan</td>
</tr>
<tr>
<td>Describe the concept opportunity</td>
<td>Decide on the feasibility of the business</td>
</tr>
<tr>
<td>Sensitize the learner to the identification of opportunity</td>
<td>Understanding business plans</td>
</tr>
<tr>
<td>Itemize business opportunities in theoretical terms</td>
<td>Establishing your vision</td>
</tr>
<tr>
<td></td>
<td>Addressing the needs of target audience</td>
</tr>
<tr>
<td></td>
<td>Learn the eight detailed components of a business plan</td>
</tr>
<tr>
<td></td>
<td>Know the steps toward the completion of the business plan</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>LECTURE 4</th>
<th>LECTURE 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunity and entrepreneurial motivation</td>
<td>The Copyright Act</td>
</tr>
<tr>
<td>The opportunity to create wealth</td>
<td>The purpose of the Act</td>
</tr>
<tr>
<td>Beneficiaries of entrepreneurial ventures</td>
<td>Its amendments</td>
</tr>
<tr>
<td></td>
<td>Definitions</td>
</tr>
<tr>
<td></td>
<td>Copyright in original works</td>
</tr>
<tr>
<td></td>
<td>Infringements of copyright and remedies</td>
</tr>
<tr>
<td></td>
<td>Copyright tribunal</td>
</tr>
<tr>
<td></td>
<td>Extension or restriction of operation of Act</td>
</tr>
<tr>
<td></td>
<td>Miscellaneous provisions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LECTURE 5</th>
<th>LECTURE 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishing a strategy for ethical responsibility</td>
<td>The Patents Act</td>
</tr>
<tr>
<td>Identify the nature of good</td>
<td>The purpose of the Act</td>
</tr>
<tr>
<td>Decide on why unethical behavior exists</td>
<td>Its amendments</td>
</tr>
<tr>
<td>Identify ethical practices</td>
<td>Definitions</td>
</tr>
<tr>
<td>Define code of conduct</td>
<td>Its administration</td>
</tr>
<tr>
<td>Discover approaches to managerial ethics</td>
<td>The register of patents and the patent journal</td>
</tr>
<tr>
<td>Expose the holistic approach</td>
<td>Powers and duties of registrar and commissioner</td>
</tr>
<tr>
<td>Find the meaning and purpose of ethical responsibility under the following headings:</td>
<td>Patent agents and patent attorneys</td>
</tr>
<tr>
<td>ethical consciousness</td>
<td>Applications for patents</td>
</tr>
<tr>
<td>ethical process and structure</td>
<td>International applications under the patent</td>
</tr>
<tr>
<td>institutionalization</td>
<td>Grant, duration and effect of patent</td>
</tr>
<tr>
<td>Ethics and business decisions</td>
<td>Corrections and amendments</td>
</tr>
<tr>
<td>complexity of decisions</td>
<td>Licenses</td>
</tr>
<tr>
<td>questions to examine the ethics of business decisions</td>
<td>Assignment, attachment and hypothesation of patents and applications for patents</td>
</tr>
<tr>
<td>Discover the responsibility challenge</td>
<td>Revocation of patents</td>
</tr>
<tr>
<td>Expose the benefits of social responsibility</td>
<td>Infringement</td>
</tr>
<tr>
<td>Identify trends in environmental awareness</td>
<td>Evidence</td>
</tr>
<tr>
<td>Expose the nature of social responsibility in terms of the environment</td>
<td>Appeals to commissioner and the court</td>
</tr>
<tr>
<td>Classify corporate social behavior</td>
<td>2009/BUILDING ENTREPRENEURSHIP 6 IP 4</td>
</tr>
<tr>
<td>The opportunity for ethical leadership by entrepreneurs</td>
<td>Acquisition of rights to inventions and patents by the state</td>
</tr>
<tr>
<td></td>
<td>Offences and penalties</td>
</tr>
<tr>
<td></td>
<td>Miscellaneous</td>
</tr>
<tr>
<td>LECTURE 11</td>
<td>LECTURE 12</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Understand the globalization concept</td>
<td>Understand the impact of the political environment</td>
</tr>
<tr>
<td>Understand the extent of appreciation of the global situation with emphasis on the African continent including an understanding of the advantages and disadvantages of globalization</td>
<td>Establish the workings of politics in a nation</td>
</tr>
<tr>
<td>Discover the South African situation including an understanding of the advantages and disadvantages of globalization especially in terms of national and international focus Understand the role of general agreement on trade and tariffs (GATT), the World Bank (WB) and the International Monetary Fund (IMF), etc.</td>
<td>Identify the types of political systems most practised in the world Understand the systems which underpin the political system Identify and grasp the roles of the legislative and legal institutions and identify the influences of the political system on business</td>
</tr>
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<table>
<thead>
<tr>
<th>LECTURE 13</th>
<th>LECTURE 14</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>International Entrepreneurship - Part 3 : The Cultural Impact - International Cultural Environments</strong></td>
<td><strong>International Entrepreneurship - Part 4 :</strong></td>
</tr>
<tr>
<td>Establish the meaning of nation as a descriptive of the term society</td>
<td><strong>A - The Economic Environment</strong></td>
</tr>
<tr>
<td>Determine the importance of culture as a concept Identify and understand the behavioral association, which affect business Establish the importance of work in culture Understand the importance of reconciling international differences Understand the terms polycentrism, ethnocentrism and geocentrism and their cultural implications Determine and grasp the role of factors which affect change in culture Understand the cultural dimensions of international marketing (C9)</td>
<td>Understand the economic systems classifications Identify countries by classification Understand and identify the macro-economic issues in international business Grasp the steps of adapting to foreign economic environments in the process of internationalization Identify some ethical dilemmas</td>
</tr>
<tr>
<td></td>
<td><strong>B - The Global Monetary System and Foreign Exchange Market</strong></td>
</tr>
<tr>
<td></td>
<td>Understand and have a keen grasp of the international monetary system Have a reasonable grasp of the foreign exchange market Understand foreign exchange markets and rates and rate determination Have a reasonable understanding of exchange rate forecasting</td>
</tr>
</tbody>
</table>

Source: CPUT: Department of Built Environment (2009)
4.3.1 Module 1 (lecture 1)

- Learn the concept of entrepreneurship
- Discover the extent of the entrepreneurial discipline
- Understand the characteristics and strengths of an entrepreneur
- Identify the personal attributes and mental tools of the entrepreneur

Module 1 introduces the building engineering students to entrepreneurship discipline and to an entrepreneur as an individual. Each student is required to select one entrepreneur and study thoroughly the historical background, present and future ambitions concerning the business organization of the selected entrepreneur. The moral story behind the module is to draw up common aspects, routes, challenges and personal qualities of what makes a successful entrepreneur. According to Laukkannen (2000) this module establishes theories about entrepreneurs and their entrepreneurial processes. Arguably, this module provides “knowledge” about an entrepreneur and his/her successful entrepreneurial story. However, according to Politis (2005, p. 407) entrepreneurial learning is an experiential process in which knowledge develops through experiencing, reflecting, thinking and acting. Hence, European Commission (2008) opine that just reading to know about entrepreneurship is not an adequate starting point for introducing, enhancing entrepreneurial behaviors’ and influencing the intentions of students from engineering faculty. With traditional classroom approach students will hardly discover the extent of the entrepreneurial discipline, because this approach tie the “trainee entrepreneur” to the four walls of the classroom, depriving him or her of the experiential, authentic real life learning experience (Dhliwayo, 2008). In addition, Brijlal (2008) asserted that a formal training towards who would be entrepreneur can be less helpful than hoped. He further believes that in developing skills of entrepreneurs for small businesses, training ought to be less formal and focus more on hands-on approach. Timmons and Spinelli (2004, p. 66) asserted that there is a limit in what can be taught in entrepreneurship education and the only way to learn is through one’s own personal experience. Therefore, for students to understand the characteristics and strengths of an entrepreneur modules should be learner-centered. Research seems to suggest that successful entrepreneurial training has more to do with learning by doing rather than reading and understanding the concept of entrepreneurship. Advocating that entrepreneurs are exceptional learners who learn by doing, Raffo et al. (2000, p. 360) and Smilor and Chak (1997, p. 344) opine that entrepreneurs gain knowledge from almost everything, from everyone, customers, suppliers, competitors and employees. Arguably, for building engineering students to learn about entrepreneurship experiential learning is needed. Hence, a general perception exists that engineering students will appreciate a more practical approach in learning about entrepreneurship.
(European Commission, 2008). Introduction of business enterprise to students with no-business degrees background requires students to set up and run their own business for the duration of the academic year¹. This pragmatic approach is coupled with modules introducing students to entrepreneurship and its attended strategies. In Finland, the “entrepreneurship education for engineering first-year student is operated in a virtual practice enterprise network where everything else is like real life experience except money and goods are not moving anywhere” (Kontio, 2006). Arguably, for building engineering students to understand the characteristics and strengths of an entrepreneur, the subject should be practical. As a practical subject, entrepreneurship program provides learners with opportunity to develop skills that can be transformed into real life experience (Brijlal, 2008). Believing that entrepreneurship training can help to stimulate entrepreneurial attributes to improve employment Friedrich (2005) asserted that training should be workable (practical) as opposed to traditional theoretical approach. Arguably, Module 1 does not thoroughly introduce engineering students to an entrepreneur and his entrepreneurial processes.

Therefore, in order to introduce or even educate building engineering students about the concept of entrepreneurship in order discover the extent of the entrepreneurial discipline, training has to focus more on hands-on approach, or else students might forget by the time they graduate and leave the education system. Hence, Chinese believe that:

“Tell me and I'll forget; show me and I may remember; involve me and I'll understand” (Chinese Proverb)

Arguably, for students to thoroughly discover the extent of entrepreneurial discipline modules should be both pragmatic and learner-centered. This pragmatic approach can be achieved through several teaching methods. For example, Frese, et al. (2003) states that action leaning requests learners to take an active approach (e.g. learn-by-doing) and lean extensively from the positive and negative feedback. This process might reveal the students’ hidden personal attributes and mental tools that are commonly assigned to successful entrepreneurs.

4.3.2 Module 2 (lecture 3)

- Define the extent of the business landscape
- Describe the concept opportunity
- Sensitize the learner to the identification of opportunity
- Itemize business opportunities in theoretical terms

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¹ Postgraduate Diploma in Management: Enterprise Management
Proceedings 5th Built Environment Conference
Building Entrepreneurship Education Program as a Key Element to Promote the Successful Creation of Small, medium and Micro enterprises (SMME’s)
to Built Environment Students

18-20 July 2010, Durban, South Africa
Module 2 aims to introduce the building engineering students to the business environment with an intention to inspire the learner to see the window of opportunity. The intentions are good, yet the teaching method is questionable. If students are requested or obligated to define, describe, sensitize and itemize the business landscape, the concept of opportunity, the identification of opportunity and the business opportunities in theoretical classroom approach, they can hardly turn ideas into real-life experience once they leave the education system. Hence, when it comes to entrepreneurship education the content for both business and non-business students might be similar, “but the way of delivering it will be different (European Commission, 2008). As mentioned earlier, a general perception exists that engineering students will appreciate a more practical approach in learning about entrepreneurship (European Commission, 2008). To this end, a more experiential approach is needed. According to Kolb (1984), an experiential learning is the process whereby knowledge is created through the transformation of experience.

According to Botha (2006, p. 57) most of entrepreneurial programs give “high attention to the knowledge aspects but are weak on the skills and attitudinal aspects that are crucial to the success of any potential or start-up entrepreneur”. Accordingly, defining, describing, sensitizing and itemizing will leave the students well informed about the entrepreneurial theories and opportunities. Alfred North Whitehead pointed out that: “there is nothing more useless than a merely well informed man” (Cited by Miller, 1990). This is evident to a number of unemployed graduates who have obtained an entrepreneurship university degree from business school and now lost in the maze of job-seekers. According Dhliwayo (2008) an increase in practical demand in relevancy for application of knowledge is needed. O’Neill (2004, p. 5) posed a research question that reads, “What does an entrepreneurship student become if he or she does not become an entrepreneur”?

If odds are hard for entrepreneurship graduates to taken ideas into real-life business when they do not find placement in the labor market. How difficult it is to Built Environment students with one year compulsory entrepreneurship program to taken ideas into real-life experience. However, Manson and Western (2004) opine that the characteristics assigned to successful entrepreneurs such as intelligence, creativity, risk management, tolerance of uncertainty and persistence in achieving an inner goal are not so different from those of successful engineers. In Canada, 40% of engineering graduates who received entrepreneurial training had started their own small businesses (Menzies and Paradi, 1999). Dhliwayo (2008) strongly believe that through experiential learning it is possible to produce entrepreneurs in the same way nurses are produced through appropriately designed work integrated learning.
Arguably, defining (business landscape), describing (concept of opportunity), sensitizing (the identification of opportunity) and itemizing (business opportunities) particularly in a theoretical classroom approach promote education “about” entrepreneurship. To building engineering students, education about entrepreneurship promotes nothing but awareness about entrepreneurship. Hence, the Interim Status Report about entrepreneurship education under the quantity surveying and construction management degrees, suggest that a graduate will be able to demonstrate awareness of entrepreneurship (NMMU, 2009). To a country were unemployment is so rife, education which promotes demonstration awareness about entrepreneurship rather than which inculcates successful creation of SMME’s needs to be changed. Hence, Dhlawayo (2008) opine that a new approach needs to be put in place if entrepreneurship education and training is indeed to produce entrepreneurs. This theoretical classroom approach adds no value towards practical successful creation of (SMME’s) to Built Environment students. This is because classroom approach utilizes pen and paper exercises with no emphasis on imagination, creativity and innovation (O’ Neill, 2004, p. 4). Furthermore, Smith (2005, p. 357) noted that entrepreneurship education is disconnected from practice. In effect, it leaves the building engineering students with knowledge to define (business landscape), describing (concept of opportunity), sensitizing (the identification of opportunity) and itemizing (business opportunities), with no effect on practice. The study of entrepreneurship is still undeveloped (Kuratko, 2005, p. 583) and it needs further research concerning the way it should be taught. Jones and English (2004, p. 416), opine that a different approach that which divert from the traditional lecture centred and business disciplines such as management and marketing, is needed.

5. CONCLUSIONS AND RECOMMENDATIONS

To contribute to the full personal development of each leaner and the social and economic development of society at large, developing entrepreneurial opportunities must be the intention underlying any curriculum program (National Qualification Framework, 2000). This intention has raise hopes that if entrepreneurship program can be integrated into engineering curriculum, students will somehow be able to become job-creators instead of job-seekers once they leave the education system (Co and Mitchell, 2006). However, the feasibility of entrepreneurship education towards inculcating the building students to become job-creators instead of job-
seekers depends both on its teaching methods and curriculum content. The reviewed building entrepreneurship modules are found to be focusing on education "about" entrepreneurship, rather than for entrepreneurship. The problem of unemployment, crime, stagnate economic growth and "characterization of construction industry as a temporary and insecure employment sector" by Gauteng Treasury report in 2009, has drawn the attention of South African government to see self-employment as one possible solution. It is recommended that in order for students to practice entrepreneur in real-life experience once they leave the education system, building entrepreneurship should be viewed and taught as a practical programme. European Commission (2008) opines that engineering students will appreciate a more practical approach in learning about entrepreneurship. If South Africa is serious about transforming economy from stagnation through creation of SMMEs, students should be encouraged and influenced to a point where they see self-employment as a dignified career option (Brijlal, 2008). Entrepreneurship education can represent a positive influence in dignifying self-employment as a career option, and in turn promote entrepreneurship as a useful and respectable career prospect for graduates (Galloway and Brown, 2002).

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An analysis of the Performance of Walter Sisulu University Experiential training students in the Construction Industry

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ABSTRACT AND KEYWORDS

Purpose of the paper

The purpose of this paper is to analyse external stakeholder feedback regarding the performance of National Diploma: Building students during their year of experiential training.

Methodology

Data relative to the students, their employers and the performance of the student was obtained from monthly reports completed by employers over a two-year period.

The data analysis was primarily aimed at determining the opinion of employers regarding the students they employed according to twelve performance parameters. However, supplementary data relative to the type, location and period of employment assisted in establishing the emergence of a trend.

Findings

Construction businesses operating in the former Transkei provided employment to 65\% of the students in each of the groups surveyed. A mere 7\% were employed by quantity surveying practices with the municipalities and Department of Public Works only employing 5\%. The performance of the students according to twelve performance parameters is rated as either good or very good in the greater majority of instances as are the comments
Research limitations

The research was limited to two groups of experiential training students over a two year period.

Practical implications

Given that, the results of the survey indicate the performance of the students, without exception, to be good, the validity of the data needs to be ascertained by means of a questionnaire or interview with the employers.

Original value

Monthly reports submitted by the employers of students undergoing experiential training are analysed and the results are documented to provide feedback to a range of built environment stakeholders.

Keywords

experiential training, construction industry

1. INTRODUCTION

This study developed from an appraisal of National Diploma: Building students from the Gcuwa campus of the Walter Sisulu University (WSU) during the second year of the program. Those students that passed the major subjects in first year are promoted and required to work for at least nine months in an organisation concerned with the construction industry. While working, the students are required to submit monthly reports and complete an array of assignments relative to the subjects of quantity surveying, construction technology, and construction management.

The quantitative data used in the study was obtained from monthly reports that list twelve performance parameters against which the student’s supervisor or mentor rates the performance of the student. A summary of the tasks undertaken during the month is also required together with any comments from the supervisor. A review of literature pertaining to cooperative education is collated to provide an overview of how work integrated learning is aimed at producing work-ready graduates.

An analysis of the monthly reports provided feedback on the gender, type of work, period of employment and performance of the student appraised on a Likert 5 point scale according to twelve performance...
parameters. The location, contact details and category of employer was also useful data garnered from the reports.

The results of the analysis indicate that two thirds of the students are employed by construction businesses operating in the former Transkei.

2. LITERATURE REVIEW

Cooperative education is described by Groenewald (2004) as a collaborative enterprise in which students, employers and tertiary education providers work together to produce work-ready graduates; that is graduates that have practical skills that complement theoretical academic learning, and that make them of almost immediate value to employers. This description of cooperative education is confirmed by Grainger (2001), who specifically describes cooperative education as a strategy of applied learning. This is a structured program, developed and supervised either by an educational institution in collaboration with an employer, or industry grouping.

Cooperative education programs are generally highly structured and possess academic and employer supervision and assessment. The work is productive, in that the student undertakes meaningful work that has economic value or definable benefits to the employer.

Cooperative education has a variety of names, in the United Kingdom it is described as ‘sandwich programs’, in the United States of America it takes the form of ‘capstone internships’, and in South Africa it is known as ‘experiential training’. Nowadays, the broader term used to describe this learning system is ‘work integrated learning’ (Franks & Blomqvist, 2004).

Cooperative education is something of an intuitive concept; one that appeals to almost anyone engaged in hiring employers or training graduates (Earmes, 2003). Dressler and Keeling (2004) report that a variety of benefits accrue to students as a consequence of cooperative education over conventional programs. These benefits consist of academic benefits, personal benefits, career benefits and are outlined in Figure 1 together with the benefits for employers and tertiary education providers.
Employer benefits are pragmatic in nature and mostly concern the work-readiness of graduates (Braunstein & Leken, 2004). Overall employer benefits are financial in nature, but also concern issues to do with image. Reported benefits for the tertiary education providers include enhanced student recruitment, stakeholder input into program development, and enhanced links to industry, which often result in on-going, commercially beneficial relationships (Weisz & Chapman, 2004).

Assessment of cooperative education varies from evaluation of reports and limited employer feedback, to more complex arrangements where student learning objectives and outcomes are negotiated at tripartite meetings (Ayling & Hodges, 2007).

There are three basic systems whereby cooperative education is managed. One in which students find their own placements, the tertiary education provider staff posting work offers or providing a list of past employers. Second, is a centralised model in which a central group more actively manages placements, sometimes securing the placement for the student. Third, is a comprehensive management system where placements are arranged for the student, student learning is closely monitored, and the placement staff strives to strengthen links with industry (Coll & Earmes, 2000).

Earmes and Bell (2005) draw on socio-cultural theories of learning in order to understand cooperative learning as an educational strategy. Legitimate peripheral participation allows the knowledge and skills relative to a particular workplace, to be acquired. Through their practical craft, or artistry, practitioners implement their professional or academic knowledge base.
A further concept that is acquired is that of distributed cognition where knowledge is not resident solely in an individual but is distributed across the workplace.

Internship or work-placement experience is being given a much more central place in Australian university curricula according to Bates et al. (2007) and there are demands that such courses become more tightly described as programs of learning with conceptual foundations that underpin their content and delivery.

Work efficiency runs deeper than just knowledge and skills; it involves the sense of belonging to a particular profession and of having successfully adopted the cultural and behavioural norms associated with membership. These include details like the dress codes and rules and sanctions systems that are often unspoken as well as the assumption that the individual shares a common set of values, attitudes, skills, esoteric knowledge and jargon often inaccessible to those who are outside the profession.

Induction into a profession takes time according to Fook et al. (2000), and organisations that provide students with tasks that are achievable, as well as genuinely beneficial to the organisation, are assisting in developing the efficiency required for a student to acquire a competent professional identity.

Bates et al. (2007) summarise that for students to be prepared for the workplace through a placement:

- The curriculum statement should clearly state what is required of each of the three partners – universities, workplace organisations, and students;
- The curriculum statement should specify the guidance and support available to each student and there must be an active and intentional partnership between the university and the organisational workplace in which the students are placed;
- Well-organised partnerships allow students to seek the support they need when required and acknowledge that for many students this is their first experience of work in the career they have chosen, and
- The curriculum must provide opportunities for the student to apply what they have already learned and encourage them to become autonomous in their own learning.

3. METHODOLOGY

At WSU the performance of the students is appraised using the Likert 5 point scale (1 = very poor to 5 = very good) according to the twelve performance parameters listed in Table 1.
Please answer the following appraisal for the purpose of monitoring the student’s progress, by placing a \( \sqrt{ } \) in the appropriate column (to be completed by the supervisor)

<table>
<thead>
<tr>
<th>Performance parameters</th>
<th>Very poor</th>
<th>Below average</th>
<th>Average</th>
<th>Good</th>
<th>Very good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity of work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Responsibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theoretical knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communications skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human relations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Punctuality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initiative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description of tasks (NB filled by the student)

____________________________________________________________

____________________________________________________________

Other comments (NB filled by supervisor)

____________________________________________________________

____________________________________________________________

Table 1: Sample of monthly appraisal form

Given the individual and collective importance of the twelve performance parameters, a combined average score was calculated for each student’s performance. Table 2 shows how the monthly reports of the students were appraised according to a collective of the performance parameters.

<table>
<thead>
<tr>
<th>Period worked months</th>
<th>Very poor</th>
<th>Below average</th>
<th>Average</th>
<th>Good</th>
<th>Very good</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>14</td>
<td>14 x 3 = 13%</td>
<td>56</td>
<td>38</td>
<td>56 x 4 = 35%</td>
</tr>
<tr>
<td>12</td>
<td>9 x 12</td>
<td>9 x 12</td>
<td>9 x 12</td>
<td>52</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Appraised performance of a particular student

Table 2 shows that this particular student worked for 9 months during which time he/she was rated according to the individual performance parameter as average in 14 instances, good in 56 instances and very good in 38
instances. The mark on the monthly appraisal form allocated to this student would thus be:

\[
= 14 \times 3 \text{ (avg)} + 56 \times 4 \text{ (good)} + 38 \times 5 \text{ (very good)} = 84.4\%
\]

The above method is also used to calculate the average appraised performance from the combined data of the two groups in Table 4.

4. FINDINGS

Table 3 provides the number of students in total and according to gender employed in construction related activities by five employer categories.

<table>
<thead>
<tr>
<th>Category of employment</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Construction</td>
<td>30</td>
<td>9</td>
</tr>
<tr>
<td>Quantity surveying</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Public Works</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Municipality</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>45</td>
<td>18</td>
</tr>
</tbody>
</table>

Table 3: Number of students according to gender employed in construction related activities

It is notable that the majority of students receive their practical training at construction related enterprises, followed by other, which consists of consultants, developers and trading companies. Relatively few of the students receive their training at quantity surveying practices – to be precise – only 8.9% in 2007 and 6% in 2008. That the local municipalities and Department of Public Works employ so few students is a cause for concern given their perceived infrastructure developmental role.

Diagram 1 is a diagram showing the towns and area in which the students are engaged. The number of students employed in each town is recorded within parentheses with the number employed in that town in 2007 above the town name, and the number in 2008 below the town name.
It is notable that seventy-four different companies from the eastern part of the Eastern Cape employed ninety-five students over the two-year period of which six businesses employed students in consecutive years.

The scores relative to the twelve performance parameters for the two groups of students in two consecutive years are provided in Table 4.

<table>
<thead>
<tr>
<th></th>
<th>Very poor</th>
<th>Below average</th>
<th>Average</th>
<th>Good</th>
<th>Very good</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>-</td>
<td>1.3</td>
<td>13.6</td>
<td>45.8</td>
<td>39.4</td>
</tr>
<tr>
<td>2008</td>
<td>0.1</td>
<td>2.9</td>
<td>9.1</td>
<td>47.2</td>
<td>42.3</td>
</tr>
</tbody>
</table>

**Table 4:** Proficiency of students undergoing experiential training relative to twelve performance parameters
The results indicate that the appraisal proficiency of students undergoing experiential training is below average in a mere 1.3% of the 45 cases in 2007 and 2.9% of the 49 cases in 2008. It is notable that the students are on average appraised as being either good or very good, according to the twelve performance parameters. Using the method as set out in Table 2 the average appraised performance of the 2007 group is calculated to be 94.1%, and the average appraised performance of the 2008 group is slightly higher at 96.2%.

5. CONCLUSIONS

Grainger (2001) asserts that cooperative education is the means by which academic content or professional knowledge gains real value, as it is only when students are implementing their ever-developing professional knowledge that they can reflect and receive feedback on how they are implementing in practice what it is they have learned. This paper analysed the performance of two groups of cooperative education students and categorises the type of employment and the location of the employer.

The assessment of cooperative learning remains a perennial problem as testified by Coll et al. in 2002 and Hodges et al. in 2004, and the results of this study show that it remains equally problematic in 2009.

At first glance, the performance of the students according to the appraised monthly reports seems exceptional, not one student failed or performed poorly. Is this possible? In order not to be invidious, no one should be failed because his or her performance is rated poorly. To fail may be interpreted as an acronym for the first action in learning.

The experiential training course requires the student to work for a construction related firm for a period of at least nine months. Should a student then be failed if his / her performance, according to a single party’s opinion, is below average? For a number of reasons the answer should be no.

6. REFERENCES


Towards a Practical Application Model with guidelines to integrate research, teaching and learning in Construction Management Education and Curriculum

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University of Pretoria

ABSTRACT AND KEYWORDS

Purpose

Presentation of a model for the integration of research, teaching and learning in construction management education to enhance student centred learning activities.

Design, Methodology and Approach

This paper is based on the analysis of existing literature with a focus on identification of the factors that impact on the development of sustainable research, teaching and learning integration. The study also identifies principles to act as future guidelines for construction management departments in adopting the processes contained in the model through simplified application principles and approaches for sustainable integration.

Findings

The proposed model supplies the necessary framework to facilitate the processes that will enable integration through and sustainable efforts of practitioners, students and teaching and research personnel. The link between research and teaching is through practice and learning and a renewed relationship between personnel, students and practitioners.

Research Limitation and Implications

The literature survey and initial case study highlighted the recognition of processes and principles involved in collaborative research, teaching and learning activities in a construction management department. This paper
represents the second part of an ongoing research in pursuit of a sustainable framework for the integration of educational functions within a construction management programme.

**Practical Implications**

The study is part of a process to develop a sustainable research, teaching and learning integration that will lead to curriculum development.

**Originality and Value**

The model and guidelines are a change in direction from generic principles towards discipline directed integration of education related activities within a construction management department. The literature review did not identify any existing similar model and matching guidelines for integration.

**Keywords**

Construction management, Research, Teaching, Learning, knowledge and Information.

1. **INTRODUCTION AND CONTEXT**

This paper presents the findings of a research study aimed at exploring the knowledge transfer process from research into teaching and from teaching to research. This is an ongoing study and is primarily based on the findings of Amaratunga and Senaratne (2009) that introduced the seven principles of integrating research into teaching. According to Baldwin (2005) the University of Melbourne’s research activity and research culture should permeate into teaching and learning through a list of approaches. The research methodology of this study is similar to that of Amaratunga and Senaratne (2009) with an added active research element in order to develop a model for future application. The introduction of draft principles serves the purpose of formulating guidelines to the implementation of the model. Both the model and the draft principles are aimed at the discipline of construction management within a university department.

2. **CONTEXTUAL ISSUES**

It is appropriate to reflect on the built environment disciplines as a point of departure. According to Griffith (2004) the built environment consists of characteristics that make exploring the research–teaching nexus fruitful. He proposed a greater emphasis on multi-or interdisciplinary ways of thinking,
and on embedding knowledge in the context of problem solving, policy and professional practice.

Wynn (2003) pointed out that built environment departments are over-enrolled in student numbers, resource capabilities are stretched and that departments are under-staffed on faculty resources. White and Irons (2008) explored the potentially beneficial relationship to faculty, students, and stakeholders through research-led, research-informed or just plain scholarly methods. According to Griffith (2004) the production and validation of knowledge, in the built environment, appear to operate according to different principles than other disciplines, suggesting that conventional or generic ideas about the research–teaching nexus may have limited applicability in the built environment.

Griffiths (2004) stated that the nexus between research and teaching in higher education has so far tended to take place at a generic level, with comparatively little attention paid to the significance of subject-based variations. In the article he considers the research–teaching nexus from the standpoint of the built environment disciplines. It reviews some ideas about the nature and meaning of research, and draws attention to key differences in the modes of knowledge production employed in practice oriented fields, such as the built environment disciplines. It addresses the notion of research-led and research-based teaching and learning, and elaborates on the range of ways in which knowledge production and student learning can be brought together.

Durning and Jenkins (2005) present an analysis of the perceptions of built environment academics on teaching/research relations. Departments, institutions and disciplines address issues that are of central concern worldwide. Their study indicates that securing effective teaching/research links is potentially vital for ensuring that students learn of the complexity of knowledge and develop high order academic and ‘professional’ skills. It also demonstrates how issues of departmental organisation and culture result in failures to support staff to achieve potential synergies between these activities. Evidence is provided that, in built environment disciplines there are distinctive features of teaching/research relations that need to be considered in departmental policies.

Brew & Boud (1995) suggest that the debate should concentrate on the link between research activities and teaching performance, namely: the act of learning (with the emphasis on ways in which knowledge is generated and communicated). According to Healy (2005) the relationship ultimately depends on how the terms ‘research’ and ‘teaching and learning’ are conceptualized. Trowler and Wareham (2008) pointed to the importance of defining the terms and placing them in context. Lucas et. al. (2008) drew attention to the diversity in discipline and institution. Jenkins and Zetter (2003) and Jenkins (2004) pleaded for focus on discipline and department. According to Elton (2001) the question of a link between
research and teaching has no simple or general answer. He argues that the link is primarily due to the processes, rather than the outcomes, inherent in research and teaching and student-centred teaching and learning processes are intrinsically favourable towards a link. Macfarlane and Hughes (2009) believe the history of educational development is rooted in the improvement of teaching techniques.

Simons and Elen (2007) present and discuss the results of a literature review conducted to understand ambivalences observed in reflections on the research–teaching nexus. They attribute these ambivalences to the mixed use of the two approaches: a functional approach that regards research as a tool in the learning environment in order to develop competencies that are functional for the knowledge society, and, an idealistic approach that regards research as a process of edification and understands academic education as participation in research. Visser-Wijnveen et.al. (2010) remind academics that it is unclear what form this relationship should take and present categories and dimensions to clarify this relationship in determining what academics’ ideal research-teaching nexus would look like. Five profiles of the research-teaching nexus are distinguished, namely: teach research results; make research known; show what it means to be a researcher; help to conduct research; and provide research experience. Trigwell and Prosser (2009) define a close relationship between teaching and research as one which is espoused by most academics, yet there is little empirical evidence to support the relationship.

According to Robertson and Blackler (2006) research into the research–teaching ‘nexus’ has undergone significant changes in focus and methodology. The initial quantitative concern with correlating measurements of research productivity and teaching effectiveness shifted in favour of exploring the experiences of participants (academics and students).

Visser-Wijnveen et.al. (2009) indicate that different conceptions among academics may stem from varying conceptions of knowledge. Academics were interviewed on their conceptions of research, teaching and knowledge that ranged from knowledge as facts to knowledge as a personal construction. Their conceptions of research ranged from research as disclosing patterns to research as creating patterns. Their conceptions of teaching ranged from teaching as knowledge transmission to teaching as encouraging critical thinking. Williams & Sher (2007) determined that although a nexus between teaching and research has long been an aim of universities, this goal has been elusive, and the full potential of such connections has yet to be realized. Halse, et. al. (2007) address two questions that are part of a broader debate about the relationship between teaching and research, namely: are outstanding university teachers engaged in research and are they disseminating their teaching expertise to other university teachers? The analysis indicates that outstanding
Ljunggren (2009) attempts to provide a new perspective on current shifts in knowledge production through analysing the relationship between research and education and focuses on the interaction within applied research centres with close industry cooperation. The results suggest that the interaction between research and education benefits from a collaborative environment, since researchers hold positive attitudes towards integrating research, education and collaboration, and students are given the opportunity to work within applied research projects. The findings are discussed in terms of researchers’ ability to handle their scholarly tasks of research, teaching, and collaboration, and the importance for acknowledging research collaborations from both research and teaching perspectives.

Brew (2003) concludes that in order to bring teaching and research together, a fuller understanding of how academics conceptualise research and scholarship is needed. The paper suggests that if the relationship between teaching and research is to be enhanced it is necessary to move towards a model based on the notion of academic communities of practice. The implications for higher education are a need to reconceptualise the role of higher education and to renegotiate relationships between teachers and students. Johnes (2006) explores final-year students’ perceptions of research in a non-research intensive institution of higher education. It is argued that students value the enthusiasm, knowledge and credibility of a research-active staff but suggests that research needs to be embedded into the curriculum for these benefits to work. Research is only one of a number of criteria that students use to assess the teaching they receive. Students value the skills and opportunities that conducting their own research develop.

Prosser, et.al. (2008) contributes to that debate by describing the variation in the way university academics’ experience research, then linking that empirical evidence with previous work to explicate the relations between variation in research, teaching, and understanding of the subject matter being taught. Anderson and Schonborn’s (2008) term “conceptual understanding” has been used rather loosely over the years in educational practice, with a tendency to focus on a few aspects of an extremely complex phenomenon. They describe the nature of expert (versus novice) knowledge and show how the conceptual understanding of experts is multifaceted in nature requiring competence in a wide range of cognitive skills. They discuss five such facets of conceptual understanding that require competence in the cognitive skills of memorization, integration, transfer, analogical reasoning, and system thinking. Haslett (2009) noticed that in recent years studies have given rise to a number of concepts, such as the research-teaching nexus and research-informed teaching, but the
relationships that these concepts have to one another, and to the wider research-teaching debate, is not well-understood by a significant number of academics.

3. RESEARCH METHODOLOGY

The research was conducted within the broad guidelines and methods similar to that of Amaratunga and Senaratne (2009) and their advice were followed concerning the use of the case study method as it is considered most suitable for this type of research. This study, at this point, was based on a single case study, which is of exploratory and explanatory nature. The case study was conducted by identifying the unit of analysis and a sampling strategy. The unit of analysis considered was an academic department within a university, while the study expanded to individual and university levels where appropriate. The sampling strategy was limited to the department that focuses on a vocational discipline, namely construction management. The aim of this case study was not to explore the research and teaching link in academic departments beyond the construction management discipline, although it might be applicable to other disciplines.

Specific objectives were formulated to determine the degree of agreement / disagreement with the stated findings of Amaratunga and Senaratne (2009), namely: to identify possible issues in transferring research knowledge into teaching in the department / discipline; to identify specific enablers and barriers in creating this link in the department / discipline; to identify best practices in the department / discipline; and to discuss further suggestions to improve the link in the department / discipline. The data collection methods also included semi-structured interviews and document surveys were used to triangulate data. The interview sample mainly comprised of academic staff and graduate students and alumni. The discussion topics addressed during the case study are briefly summarized in the text below.

4. RESULTS

4.1 Key issues on research to teaching transfers

Respondents agreed that: Academics need to be practitioners as well as teachers. Informal practices are in place but formal strategies are equally important. It is important to identify what aspect of research needs to be transferred to students. Research expertise of staff should increase with the level of studies. Part-time students expect practical knowledge more than research knowledge. Students do not link their objective of getting a marketable degree to research. Faculty is motivated when their teaching modules are closely related to their research activities.
Respondents were unsure whether: Curriculum limitations allow for linking teaching modules and research activities. It is difficult to match the actual real world research and the teaching module objectives. The research that faculty are doing is not directly relevant to teaching programmes. It is problematic to mainly focus on research output, i.e. publications.

Respondents disagreed on whether: The ideal situation is to transfer research indirectly to teaching. People who do research are better at teaching. The difficulty of research in subjects is due to the diversification of subjects. Workload limitations make it difficult for academics to be active in research. It is important to gain skills like critical thinking. Research skills facilitate thinking processes. It is necessary for faculty to master research skills in order to teach students. Research into teaching transfer at different levels is different. Part-time students are more motivated as they know the benefit in terms of work prospects. Pressure to do research facilitates the teaching process. Organising teaching around research is easier.

4.2 Enablers of research to teaching transfers

Respondents agreed that: Research strength in research-biased departments is another enabler. Recognised faculty and positive attitudes are seen as enablers within departments. Individual faculty motivation and the existence of research-active faculty are enablers to transfers. The existence of research institutes, funding opportunities and resources are key enablers.

Respondents are unsure whether the following are enablers: The significance of including research in the mission statement of departments. University level drivers and management structure. External links with professional bodies, such as other universities. An inter-disciplinary working culture within the built environment. Applied disciplines research is more relevant with more opportunity to use research in teaching.

Respondents disagreed on: Availability of modern and expensive equipment for research. The opportunity to use students in their labour-intensive research activities. In the built environment faculty’s work is seen as research.

4.3 Barriers on research to teaching transfers

Respondents agreed that the following are barriers: In teaching-biased departments the common barrier is the absence of a research culture. In research-biased departments, barriers are high workload, time restrictions, etc. Less motivation and financial incentives for research faculty to do teaching. Barriers arising from students’ lack of motivation and
participation. Students expecting delivery of handouts rather than gaining knowledge through self-learning. The fear and risk factor, such as: student’s ability, wrongly designed programmes; etc.

Respondents were unsure of: The effect of inadequate funding and support given to individually motivated faculty to undertake research. Less interaction between academics, researchers and students to disseminate their research. A mismatch between faculty’s research and teaching programmes.

Respondents disagreed on: There exists a division between research-active staff and teaching-only staff in departments. Learning outcomes in module specifications limit the inclusion of research knowledge into teaching. Insufficient teaching is undertaken by research-active faculty. Experienced faculty should be teaching undergraduate courses, especially in the 1st year. The built environment focuses on industry requirements rather than faculty’s research expertise. The aim of most students, nowadays, is to get a paper certificate.

4.4 Good practices of research to teaching transfers

Respondents agreed that the following are good practices: Project-based working, problem-based learning and active learning. Programmes enriched with additional workshops, seminars and guest lectures. Teaching staff recruitments from research personnel and PhD students.

Respondents were unsure of: Engaging in research through academic enterprises. A student placement-based scheme in vocational disciplines facilitates the transfer process.

Respondents were in disagreement on: Special modules that aim at delivering research knowledge within programmes.

4.5 Suggestions to improve research to teaching transfers

Respondents agreed that: Academics need to create a balance between teaching and research and overcome barriers within departments.

Respondents were unsure of the benefits of: Formal mechanisms to boost informal research-based teaching. Innovative teaching through student-centred, problem-based learning mechanisms. Increasing interaction among all members to create this cultural change. Including research to teaching in the learning outcomes of module specifications. Introducing an equipment pooling mechanism so that resources can be effectively shared.

Respondents disagreed with the following statements: Informal mechanisms rather than formal mechanisms. Students’ awareness of staff research and access to other research activities is important. Using research staff effectively by encouraging them to assume a research profile with teaching duties. To overcome research funding problems create business based on cutting-edge research. Increase financial gains through
academic enterprises and short programmes.

5. DISCUSSION OF THE RESULTS

It appears that Senaratne and Amaratunga (2009) assumed consensus among their interviewees on all aspects listed above and therefore deducted their principles from the complete list. However, in comparison, our respondents indicated uncertainty and disagreement pertaining to a majority of these statements. In the proposed model activities commence at the left hand side of the model and progress to the collaboration process section after research and teaching personnel have come to an agreement on the research topic and best suitable method of research. It is clear that research proposals and opportunities will emerge from a variety of sources and likewise will result in various outcomes. One important addition to the model is the presence and active participation of research personnel.

The research activities are also directed at disseminating information, knowledge and research results to practitioners in the industry through formal existing and future channels, such as: continued development and education and active participation in future conferences, seminars and short courses. In designing the model it is concluded that practitioners are the key to any proposed solution. Once the topic of research is identified, defined, discussed and accepted, logistics such as the required number and experience of participating students are brought into the equation. We then assign a member of faculty to the project. The practitioner assumes the duty of research leader. Faculty features in an advisory capacity. Depending on the research topic we will assign dedicated workspace, internet connections and admin support through university resources. We decided to implement pilot programs that are limited to determining the extent of existing research information and knowledge and its interest and applicability to local conditions and practice. The intended outcomes are: (a) study manuals, for teaching purposes, and (b) research reports, for publication purposes, that result from practitioner directed research.
Diagram 1: The proposed construction management research and teaching model
6. CONCLUSIONS

Construction Management personnel are not seen to be functioning as individual researchers. Graduate students are responsible for almost all research outputs and publications. If academic personnel are required to produce research outcomes that fall within the field of their choice and also other outcomes that fall within the topics of current and expected future curriculum, it would benefit teaching and learning activities within the department. The proposed model changes the approach from teaching personnel waiting for research to emerge in order to integrate it into their teaching, to being actively involved. The model is a second generation model and will surely evolve further. The basic features of the proposal are: the key role of practitioners who are best equipped to conduct practical application evaluations and play an active part in ensuring curriculum adjustment to ensure practical relevance.

As long as research personnel are allowed to research the topics of their choice, it will lead to the situation where it will becomes increasingly difficult to integrate research, teaching and learning as there might not exist corresponding topics in all three dimensions. Research is currently mainly conducted in isolation by graduate students and the indication is that it will continue. That is the challenge to departmental management, in general, and construction management, in particular.

Teaching personnel need to be research-informed and apply effective teaching methods. Academic departments need to manage academic’s research and teaching workloads and consider rotation of their teaching responsibilities. Academic departments should consider adopting clear distinctions between voluntary and elective Research Focus Areas (RFA’s). Voluntary RFA’s should include practice orientated research topics. Research and teaching integration should be a formal subject, included in the curriculum, where participating practitioners, students and personnel are formally introduced to and trained in the subject rules and principles. Research results should contain contributions of participating practitioner, students and personnel (teaching and research). The proposed method of integration should define the benefits to research, teaching and learning in every individual research project with clearly identified expected outcomes that are directed at contribution towards teaching and learning and not only serve as a publication manufacturing endeavour.

7. RECOMMENDATION

Built environment education departments should benefit from a summarized conclusion to discipline directed research on the research,
teaching and learning integration nexus. Individual departments’ particular circumstances will require unique models if sustainability is envisaged.

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Elements of a successful Masters Real Estate programme in South Africa: A literature survey

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ABSTRACT AND KEYWORDS

Purpose

The aim of this paper is to report elements of a successful Masters Real Estate (MRE) curriculum which were identified in a literature review for the critical assessment of postgraduate real estate education in South Africa.

Methodology

Several literature sources related to real estate education were used to identify elements of a successful MRE curriculum.

Findings

Literature survey revealed that several elements including: industry ties, research and publications, a faculty of scholars who understand the real estate business, a combination of theory and practice, and course content relevant to the property industry are essential elements in a successful MRE programme.
Research limitations

Results of the survey will not directly influence change to the processes of curriculum development for postgraduate real estate education in South Africa. Curricula development will largely depend on outcomes of discussions of lecturing staff and university administrations implementing the courses.

Value

The study will support processes of curricula improvement for MRE programmes in South Africa

Keywords

Masters Real Estate curriculum, industry requirements

1. INTRODUCTION AND RESEARCH APPROACH

In 1990 the University of Pretoria introduced a Master of Science degree in Real Estate. Since then a number of universities in South Africa have followed suit. (Table 1 shows the universities and course details for the programmes). The introduction of these programmes shows that there is progress in and demand for postgraduate real estate education in South Africa (Cloete, 2002). However, the property industry is subjected to changes and extraordinary forces which are redefining new skills and knowledge for real estate professionals (Roulac, 2002). This is why it is important for educators to take cognisance of relevant real estate education research and involve industry practitioners in the processes of curriculum assessment and development. This paper is short and focused and applies literature research to identify elements that must be considered to make the existing or new MRE programmes successful by meeting industry requirements. This exercise was an essential component of critical assessment of MRE curricula in South Africa.

2. DEMAND FOR POSTGRADUATE REAL ESTATE EDUCATION

Before educators can design successful curricula in the eyes of the industry, it is significant for them to be aware of the reasons for the demand of professional real estate education. Hakfoort et al., (2003) did a study on the demand for professional real estate education in the Dutch real estate industry. The results suggested that human capital and signalling arguments are the most important motives for real estate professionals to take part in real estate courses, while firms are motivated by screening and
firm capital arguments. Further, the results revealed that professionals are persuaded to attend professional real estate education due to: knowledge deficiency, network, perks, labour market, and selection or screening motives.

3. REAL ESTATE CURRICULUM CHANGE

In order for a MRE programme to be successful, it must make curriculum change its integral component. Two important issues in connection with curriculum change have merged from literature. The first concerns the curriculum paradigm (what knowledge and skills should be taught) (Butler et al., 1998). To address this concern it is important for real estate educators to seek input from real estate practitioners to assist in defining knowledge and skills to be included in a curriculum. The second issue concerns the learning paradigm (how should the curriculum be taught) (Butler et al., 1998). To address this challenge Butler et al., (1998) suggested that the learning paradigm be changed from the traditional passive educational delivery system into the disquieting arena of active learning and real-world experience.

Table 1: Details of Masters Real Estate programmes in South Africa

<table>
<thead>
<tr>
<th>University &amp; Dept / School</th>
<th>Name of degree</th>
<th>Admission requirements</th>
<th>Period</th>
<th>Delivery</th>
<th>Total credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretoria (Construction Economics)</td>
<td>MSRE</td>
<td>Hons, 4 or 5 yr relevant degree, Work experience</td>
<td>2 yrs and treatise</td>
<td>8 block weeks</td>
<td>230</td>
</tr>
<tr>
<td>Witwatersrand (Construction Economics &amp; Management)</td>
<td>MSPDM</td>
<td>Relevant good bachelors degree, Work experience</td>
<td>1 yr full time, 2 yrs part time &amp; treatise</td>
<td>1 week block release</td>
<td>180</td>
</tr>
<tr>
<td>Cape Town (Construction Economics &amp; Management)</td>
<td>MSPS</td>
<td>Hons or 4 yr relevant bachelors degree, Work experience</td>
<td>2 yrs &amp; treatise</td>
<td>Block system</td>
<td>180</td>
</tr>
<tr>
<td>Free State (Quantity Surveying &amp; Construction Management)</td>
<td>MPS</td>
<td>Relevant good bachelors degree</td>
<td>2 yrs &amp; treatise</td>
<td>8 work-shop weeks</td>
<td>240</td>
</tr>
<tr>
<td>Nelson Mandela Metropolitan (Construction Management &amp; Quantity)</td>
<td>MSBE</td>
<td>Relevant good bachelors degree, Work experience</td>
<td>1 yr full time, 2 yrs part time and treatise</td>
<td>4 or 5 block weeks</td>
<td>202</td>
</tr>
</tbody>
</table>
4. ELEMENTS OF A SUCCESSFUL MRE PROGRAMME

Important elements discovered from the literature survey which must form part of a successful MRE curriculum are reviewed next.

4.1 Industry ties

A successful postgraduate real estate programme must have strong industry ties (Weinstein and Worzala, 2008). Employers recruit the graduates from real estate programmes. They are the ones who test the competence of students who have graduated. As a result, they are in a right position to recommend areas requiring changes in the curriculum to improve the quality of graduates (Chikafalimani and Cloete, 2010). Additionally, employers have industrial experience and are aware of the challenges real estate is facing as a profession. In that way they can advise knowledge and skills which require emphasis in the curriculum (Black et al., 1996; and Galuppo and Worzala, 2004). Development of industry ties can take different forms including establishment of real estate department or school advisory committees and meeting accreditation requirements (Chikafalimani and Cloete, 2008).

4.2 Research and publications

An active, ongoing research agenda by a postgraduate real estate programme adds to the reputation of the programme and advances the real estate discipline (Weinstein and Worzala, 2008). Furthermore, research generates funds from publications produced that make real estate programmes financially viable.

In South Africa, research by academics covers the entire spectrum of real estate topics encountered in the international journals (Ghyoot, 2002). However, the small number of real estate academics restricts their contribution to the field. This weakness is noted in the local built environment and construction conferences where few papers in real estate and more specifically in real estate education are presented. To make matters worse, South Africa has no accredited journals devoted to real estate (Ghyoot, 2002). Academics have to publish in business and other journals. This was undesirable state of affairs as it hindered research progress in real estate.
4.3 Educators who understand real estate business

Real estate educators are influential in the processes of curriculum design, review, quality control, development, and delivery (Butler et al., 1998; Callanan and McCarthy, 2003; Gallupo and Worzala, 2004; and Musil, 2005). Responsibilities of real estate educators include: introducing new innovations in the traditional curriculum, applying high quality teaching techniques, and teaching relevant material. Additionally, real estate educators are always required to investigate needs of the industry and students, and to conduct relevant research so that curricula are regularly updated based on those needs and not necessarily based on their personal desires and satisfaction (Manning and Roulac, 2001; and Callanan and McCarthy, 2003). Weinstein (2002) (cited in Gallupo and Worzala, 2004) believes that for a programme to be competitive and successful it must possess several additional attributes such as a faculty who understands business and dedicated to research and publications, strong industry ties, provide conferences, scholarships, and career opportunities. As a result, hiring of experienced and well qualified educators is fundamental to improved real estate curriculum delivery, development and success (Hardin III, 2000; and Finch et al., 2007). Educators also investigate course contents of peer institutions offering similar curricula to ensure that they are offering competitive programmes. A unique MSRE programme at the University of San Diego was developed by borrowing ideas from the University of Wisconsin-Madison programme (Gallupo and Worzala, 2004).

The historical background of real estate professors, schools and departments also plays an influential role in curriculum development and success. Brown (1979) identified differing backgrounds of real estate professors as a contributing factor to the variation of content in real estate curricula. In Africa, many academics were trained in American or European universities (Ghyoot, 2002). When combined with local influences and legal systems, the result is a wide variety of terminology, analysis methods and philosophies in the curricula. Past education influence can be noted in real estate schools and departments in African countries under the British Commonwealth who tended to design and develop curricula following the British property education system (Schulte and Schulte-Daxboek, 2003).

4.4 Combination of theory and practice

Callanan and McCarthy (2003) conducted a study on property education and industry requirements in New Zealand. Real estate graduates in the survey pointed out that more practical fieldwork should be included in their programme, whereas employers indicated that graduates lack sufficient practical expertise to be able to relate theory to practice. The results were in accord with the current paradigm shift in university teaching to producing learning that recognises the importance of industry involvement. The research was an ongoing study, undertaken regularly to ensure that any
new initiatives are accepted and that the curriculum is achieving the intended result - a well-rounded adaptable property professional. The significance of the study is that it identifies the need to appropriately balance theory and practice in order for the curriculum to be successful and best serve the industry. As such Callanan and McCarthy (2003) identify a need to revisit a programme’s balance of these two key issues on a three-to-five year cycle.

4.5 Course content relevant to the property industry

For a comprehensive real estate curriculum to be successful, it should reflect the interdisciplinary and multidisciplinary nature of the field, although a curriculum can be designed in many forms (Black et al., 1996). In addition, a real estate curriculum has to recognise the different constituents whose needs and concerns must be met. Further, the aim of the curriculum should be to produce effective real estate decision makers, managers armed with the concepts, techniques and skills required to solve the problems of today and tomorrow. Black et al., (1996) provided a blueprint for real estate curriculum. They noted that a comprehensive real estate curriculum should be envisioned as a four-cornered approach to cover the many specific topics of the field required to produce a competent real estate professional: market related subjects, financial subjects, legal and public policy subjects, and physical and development subjects.

5. CONCLUSION

A comprehensive literature survey has revealed that industry ties, research and publications, a faculty of scholars who understand the real estate business, a combination of theory and practice, and course content relevant to the property industry are essential elements of a successful MRE curriculum. As a consequence, it is recommended that universities offering the programmes in South Africa should take note of the elements and consider them in the processes of curriculum improvement and development in the future in order to make their programmes successful as well as to meet industry requirements.

6. REFERENCES


Nelson Mandela Metropolitan University, Department of Construction Management and Quantity Surveying, Master of Science in the Built Environment Study Guide, 2009.


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ABSTRACT AND KEYWORDS

Purpose

The aim of this paper is to analyse the different aspects of awareness and benefits of risk assessment and management practices (RAMP) among medium to large-sized Ghanaian construction organisations.

Design/methodology/approach

A survey conducted in May 2009 of randomly selected samples yielded responses from 34 contractors, 46 consultants, and 23 clients or owners (private and public) within the Ghanaian construction industry. Response data was subjected to descriptive statistics and subsequently analysis of variance (ANOVA) and other non-parametric tests were used to examine the differences in the levels of agreement of the perceived benefits.
Findings

The paper finds that although the majority of the respondents are aware of risk assessment and management practices, some professionals argued not as a formal process. Relative to the benefits, there was a disparity in the ranking of agreement scores on 2 of the 8 benefits among the respondents in relation to ‘product to the required quality’ and ‘reduction in contract claims’. However they all agreed on ‘improved team morale’ as the most important benefit.

Research limitations/implications

The geographical location of the respondents as only drawn from the Greater Accra Region made it difficult to generalise the findings.

Practical implications

The paper provides a framework based on an index and scoring method for capturing the awareness and benefit levels of RAMP thus termed RAMP-BAT (Risk Assessment and Management Practices – Benefits & Awareness Tool). This can be used by senior management in assessing the current benefit levels within projects (internal benchmarking) and has potential for external benchmarking purposes.

Originality/value

Provides some insights and deepening our understanding on the awareness and perceived benefits of RAMP among construction professions in Ghana.

Keywords

Assessment, analysis of variance (ANOVA), benefits, construction industry, Ghana, practices

1. INTRODUCTION

The aim of this paper is to assess the levels of awareness and usage of RAMP in order to ascertain the advocated benefits relative to the impact on project outcomes. The Construction industry in Ghana has been growing steadily over the years. The Government’s objective in the Ghana Poverty Reduction Strategy (GPRS II) to promote urban infrastructure development and the provision of basic services including increased access to safe, decent and affordable shelter has given the industry a further boost. Ghana seeks to be the gateway to West Africa and the champion of African
excellence. The 2008 Budget Statement of Ghana projected the Construction industry to grow by 11.0 percent, exceeding the 10.0 percent target for the year. This statement attributes the growth to the increased road construction and other infrastructural development throughout the country. The Construction industry in Ghana has been growing steadily over the years. An annual value of public procurement for goods, works and consultant services represents about 10% of Ghana’s Gross Domestic Product, (World Bank 2003). Other studies have linked the relationship between the construction industry and the nation economy (Rameezdeen and Ramachandra, 2008).

Its contribution to economic growth and development notwithstanding, the Ghanaian construction industry is fraught with frequent cost overruns and delays on a lot of projects. A research into factors that cause delays (Agyakwa-Baah, 2007) revealed that if measures are put in place to avoid or reduce the effect of the factors that bring about delay, a lot of projects would be completed on time and within budget. Therefore awareness of risk management processes is a critical factor in the implementation process. There is also anecdotal evidence that some construction organisations in Ghana that don’t implement risk assessment and management techniques as part of managing their projects, often resulted in project costs exceeding budget and behind schedule (Agyakwa-Baah, 2007).

The above observation calls for the further exploration into the possible impact of risk assessment and management techniques on construction projects executed in Ghana. For example, how many construction organisations in Ghana have an awareness of risk assessment and management techniques? If there are, what is the usage of the techniques? If they implement RAMP, could there be an impact on the project performance? Can the level of awareness, usage and benefits be assessed? The main objectives of this paper are to assess the levels of awareness and usage of RAMP in order to ascertain the advocated benefits relative to impact on the primary measures expressed by the project outcomes of medium and large-sized enterprises (MLEs) in the Ghanaian construction sector.

2. LITERATURE REVIEW

2.1 General review of literature on risk assessment and management practices

While there is ample of literature on risk assessment and management practices ranging from classification of different types of risk (Edwards and Bowen, 1998) Perceptions of risk, (Liu and Cheung, 1994; Adams, 2008) implementation issues (Mills, 2001; Tchankova, 2002), frameworks for...
assessment (Wang et al. 2004; Akintoye et al, 2001; Elseth and Hamann, 1999), critical success factors for RAMP (Ahadzie et al, 2008; Salaheldin, 2009), impact of RAMP on project performance (Agyakwa-Baah 2007; Dada and Jagboro, 2007; Aje et al. 2009; Enshassi et al, 2009), practices, barriers and benefits (Mok et al. 1997; Agyakwa-Baah, 2007), awareness (Akintoye and MacLeod, 1997; Frimpong et al, 2003; Luu et al, 2008). Given the proliferation of studies on risk assessment and management practices, there has been a lack of empirical studies reported which seeks to assess the levels of awareness and advocated benefits of RAMP relative to the impact on project outcomes within the Ghanaian construction industry, particularly among the medium to large-sized enterprises.

2.2 Review of literature on awareness and benefits of risk assessment and management practices

Frimpong et al. (2003) observe that project management tools and techniques play an important role in the effective management of a project, and further identified that a lack of awareness can inherently lead to poor resource management. Dada and Jagboro (2007) study of the impact of risk on project cost overrun in the Nigerian construction industry also identified improper assessment of risk factors as a contributory factor to ineffective project delivery. This can be extended within the broader context of risk assessment and management processes as these are enshrined within the Project Management Body of Knowledge (PMBOK).

Maneile and Muya (2008) study of risk within community based projects in Zambia also identified lack of technical advice as one of the project initiation risks. Within the Egyptian context, Hassanein and Affify (2007) found limited project management experience among the survey of contractors as a barrier to the identification of risks relevant to construction contracts. Akintoye and MacLeod (1997) also identified lack of familiarity with the techniques as one of the reasons provided by contractors for not using techniques of risk analysis and management. According to Luu et al (2008), in developing countries, construction firms seem to put little effort in strategic management due to unawareness of strategic measures and lack of effective tools. A comprehensive review of techniques that support risk management can be found in the study by Ahmed et al (2007). The usage of risk assessment and management practices is closely aligned to the awareness. Francis and Skitmore (2005) in citing Burchett et al (1999) found that degree of utilisation of risk management to be dependent on ‘managers’ concerns and time involvement, human / organisational resistance and understanding of quantitative techniques. The study by Aje et al. (2009) in Nigeria also found contractor’ management capability to have a significant impact on cost and time performance of building projects. Ahmed et al. (2007) identified retention of organisational knowledge and provision of a competitive advantage among the benefits of usage of risk assessment principles. Mills (2001) also observed that systematic risk management helps the quantification of uncertainty.
3. RESEARCH METHODOLOGY

In order to analyse the different aspects of awareness and benefits of risk assessment and management practices (RAMP), a generic framework based on an index and scoring method for capturing the awareness and benefits of RAMP is proposed. This is thus termed RAMP-BAT (Risk Assessment and Management Practices – Benefits, Awareness Tool). The framework is composed of two instruments developed from a range of indices designed to capture the awareness and benefits of risk assessment and management practices. The following research methodology was employed in the study.

3.1 Survey Administration

The final questionnaires were firstly sent to the Ministry of Water Resources, Works and Housing in Ghana for forwarding to the relevant construction organisations in May 2009. A total of 180 questionnaires were sent out and 114 were returned, however 11 were rejected as they were not completed filled out, thus only 103 were included in the analysis representing 57 per cent response rate. This is also similar to a survey conducted by Tuuli et al. (2007) among a similar sample frame and drew a response rate of 54 percent. The response rate was therefore deemed adequate for the purpose of data analysis. Odeyinka et al. (2008) in citing (Akintoye and Fitzgerald, 2000) argue that this is way above the norm of 20-30 percent response rate in most postal questionnaire of the construction industry.

3.2 The Instrument

The questionnaire distributed comprised four sections. The first section sought the background information about the respondents. The second part or section dealt with the risk analysis whereas the third section investigated the usage, awareness and benefits of RAMP. The final part sought the inhibiting factors (barriers) and critical success factors of RAMP. The results presented here and discussed relate only to the first, third sections of the questionnaire. An internal consistency analysis was carried out to the benefits or ‘project outcomes’ instrument and the cronbach’s alpha value was 0.702 thus indicating a high reliability of scales as values are > 0.7 (Nunnally, 1978)

4. ANALYSIS OF RESULTS

The primary focus of the study presented in this paper was to assess the levels of awareness and usage of RAMP, secondly to evaluate their impact
on the primary measures expressed by the project outcomes of medium and large-sized enterprises (MLEs) in the Ghanaian construction sector. In view of the different groups (clients, contractors and consultants), it was deemed necessary to ascertain whether differences existed in the perceptions of the awareness, usage and the impact of RAMP on project outcomes among the three different groups. Statistical Package for Social Sciences (SPSS) computer program version 17.0.0 was used to analyse the data generated by the research questions. Analysis of Variance, Pallant (2005). Information on the respondent organisation according to the type (sector) is presented in Table 1.0.

Table 1.0: Characteristics of the sample

<table>
<thead>
<tr>
<th>Sector</th>
<th>Frequency</th>
<th>% of sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor</td>
<td>34</td>
<td>33.0</td>
</tr>
<tr>
<td>Consultant</td>
<td>46</td>
<td>45.0</td>
</tr>
<tr>
<td>Client (private and public)</td>
<td>23</td>
<td>22.0</td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 2.0 presents the demographics of the respondents by professional background

Table 2.0: Characteristics of the sample by professional background

<table>
<thead>
<tr>
<th>Professional background</th>
<th>Frequency</th>
<th>% of sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity Surveyor</td>
<td>32</td>
<td>31.07</td>
</tr>
<tr>
<td>Engineer</td>
<td>33</td>
<td>32.03</td>
</tr>
<tr>
<td>Project Manager</td>
<td>22</td>
<td>21.36</td>
</tr>
<tr>
<td>Architects</td>
<td>11</td>
<td>10.68</td>
</tr>
<tr>
<td>Site Managers</td>
<td>5</td>
<td>4.86</td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Examination of Tables 1.0 and 2.0 indicates that almost half 46 (45.0%) of the respondents were practising with the consultants. From a professional viewpoint, nearly the majority were an equal number of the respondents were Quantity Surveyors (31.7%) and Engineers (32.03%) with 21.36% Project Managers, whereas the minority were drawn from the Architects (10.67%) and were Site Managers (3.2%). The background of the respondents supports the notion that they were involved with running of projects at both operational and strategic levels, therefore had some knowledge of issues related to the perceptions and likelihood and degree of impact of the risk factors on construction projects. Some demographics relative to the length of service in the construction industry was also collected. The majority (36%) of the respondents had worked for 1-5 years; 35% worked for more than 15 years followed by 6-10 yrs (17%); 11-15 (9%) and only a minority (3%) had worked for less than a year.
4.1 Development of the Risk Assessment and Management Practices (RAMP) Relative Agreement Indices

Although Risk Assessment and Management Practices are well implemented within the developed economies, there is a lack of measurement instruments within the African context. One of the reasons for the slow uptake of RAMP within Ghana especially among the construction professions has been the lack of awareness of appropriate techniques and tool. Therefore one innovative aspect of this research was to ascertain the levels of the perceived benefits through a simple yet robust measurement model. This section proposed the development of such indices which can be used to ascertain the levels of perceived benefits of Risk Assessment and Management Practices (RAMP). This would be used for the longitudinal evaluation of the benefits falls under the medium category (i.e. low) in order for management to take appropriate action.

4.2 Computation of the Total Risk Assessment and Management Practices Awareness Scores (RAMP-AS) and Benefits Agreement Index (RAMP-BAI)

Based on the mean scores of the respondents, the Total Awareness Score (RAMP-AS) and Index and the Total Benefits / Index TBS/(I) was generated; this can be used by the Ghanaian Construction Industry and in identifying the levels of awareness and advocated benefits of risk assessment and management practice(s).
4.3 Risk Assessment and Management Practice Awareness Score: RAMP-AS

The RAMP-AS / IS and RAMP-TBS/(I) can be computed using the following expressions:

\[ \text{RAMP-AS} = \left( \sum Y - \sum N \right) = \text{Equ 1.0} \]

Where \( \sum Y \) and \( \sum N \) are the sum(s) of respondents scoring “yes” and “no”

Risk Assessment and Management Practice Awareness Index: RAMP-AI:

\[ \text{AI} = \frac{\sum \text{RAMP-AS} + 1}{100} \text{ (} +1 \leq \text{AI} \leq -1) \text{ Equ 2.0} \]

Where the RAMP-AS value as derived from equation 1.0 which is based on the difference between the positive and negative responses in percentage. The value ranges from -100 to +100 where a negative value was classified as inelastic awareness and the positive value as elastic awareness. Elastic awareness of the risk assessment and management practices inferred that the majority rather than minority of the respondents were aware of the tools and techniques and inelastic vice-versa.

4.4 Overall Levels of Agreement on the Benefits of RAMP

Overall levels of agreement on the Benefits of RAMP can be computed using the following expression:

\[ \text{RAMP-Ben} = \frac{\sum W_i}{N} \text{ Equ 3.0} \]

Where: \( \sum W_i \) = The sum of the average of each respondent or constructional grouping (i.e. Contractors, Clients, and Consultants)

\( N \) = the total number of the Respondents (\( N = 103 \)).

Where the RAIs were the same for two or more statements related to benefits of the Risk Assessment and Management Practices (variables), rank differentiations are achieved by examining the distribution of the rating against such variables. Based on the mean scores of the respondents, the Risk Assessment and Management Practices Relative Agreement Importance Index (RAMP-RAII) was generated; this can be used by the Ghanaian construction Industry and in identifying the levels of benefits to be derived from the effective deployment of Risk Assessment and Management Practices. The RAMP-RAII can be computed using the following expression:
\[ \Sigma w = (0 \leq \text{RAMP-RAII} \leq 1) \]

The relative agreement importance indices (RAII) generated from equation 4.0 was further used to classify the perceived risk assessment and management practices benefits (RAMP-B) into three categories of low, medium and high. These are shown in Table 3.0. The categorisation of taxonomies of risk assessment and management practice benefits is adopted from Chileshe (2004).

<table>
<thead>
<tr>
<th>Average Score ((\Sigma Wi))</th>
<th>RAI</th>
<th>RAMP-B Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.20 to 4.0</td>
<td>0.8 to 1.0</td>
<td>High (H)</td>
</tr>
<tr>
<td>2.40 to &lt; 3.20</td>
<td>0.6 to &lt; 0.8</td>
<td>Medium (M)</td>
</tr>
<tr>
<td>1.60 to &lt; 2.40</td>
<td>0.4 to &lt; 0.6</td>
<td>Low (L)</td>
</tr>
</tbody>
</table>

(Source: Adapted from Chileshe, 2004)

5. DISCUSSION OF THE FINDINGS

5.1 Awareness and usefulness of RAMP

The respondents were asked to indicate whether they were aware of RAMP. If they had, they were asked to indicate whether they had used RAMP on any of the projects that they had worked on. Table 4.0 presents the summary of the descriptive statistics and the scores as computed from equations 1 and 2. In Table 4.0, the frequency of the responses, total risk assessment and management practice awareness scores (RAMP-TAS) and awareness index (AI) of the tools and techniques are presented first, for the full sample followed by the three different groups.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Tools and techniques</th>
<th>Yes. (%)</th>
<th>No.</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>AS (^a)</th>
<th>AI (^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Sample (N = 103)</td>
<td>58.3</td>
<td>41.7</td>
<td>1.147</td>
<td>.496</td>
<td>16.6</td>
<td>0.166</td>
<td></td>
</tr>
<tr>
<td>1 Contractors (N=34)</td>
<td>61.8</td>
<td>38.2</td>
<td>1.382</td>
<td>.493</td>
<td>23.6</td>
<td>0.238</td>
<td></td>
</tr>
<tr>
<td>2 Consultants (N=46)</td>
<td>54.3</td>
<td>45.7</td>
<td>1.456</td>
<td>.503</td>
<td>8.60</td>
<td>0.086</td>
<td></td>
</tr>
<tr>
<td>2 Clients (N=23)</td>
<td>60.9</td>
<td>39.1</td>
<td>1.391</td>
<td>.499</td>
<td>21.8</td>
<td>0.218</td>
<td></td>
</tr>
</tbody>
</table>

Note: The smaller the mean, the more respondents are aware (or usage) of the risk assessment and management practice, \(^a\)AS = Awareness score, \(^b\)AI = Awareness index

Examination of Table 4 indicates that, overall, 21 (61.8)% of the contractors; 25 (54.3%) of consultants and 21 (61.8) % of the clients are aware of risk management processes. However of the 61.8% of the
contractors who are aware, only 11 (52.38%) of them actually implement it. Similarly 14 (56.0%) of consultants and 9 (43%) of clients implemented RAMP. These findings are consistent with literature as observed by Mills (2001) that risk management is not a new concept due to the fact that traditionally, it has been applied instinctively. As seen from the Table 4.0, the contractors demonstrated a higher level of awareness of the tools and techniques ($MS = 1.382$; $RAMP-AS = 23.6$; $RAMP-AI = 0.236$) whereas the consultants were ranked third despite having an elastic awareness ($RAMP-AS = 8.60 > 0$).

As observed by Agyakwa-Baah (2009), contractors should be sensitized on the benefits of carrying out risk management processes on projects. Ahmed et al (2007) further observe that future developments in integrated and generic tools could lead to the widespread usage of risk management principles in project management. This finding is also consistent with literature in developing economies as Aje et al. (2009) study within Nigeria also found contractor's management capability to have a significant impact on risk assessment. Francis and Skitmore (2005) also identified understanding of quantitative techniques as linked to usage of RAMP. Hassanein and Afify (2007) found Egyptian contractors to lack the necessary expertise to properly identify risk and to take appropriate exceptions. Frimpong et al. (2003) also identified poor resources management as one of the reasons for low usage of RAMP. Akintoye and MacLeod (1997 further opine that awareness of tools should be complemented by familiarity.

### 5.2.1 Impact of RAMP on Project Outcomes – Overview and Different Perceptions

One of the aims of the study was to examine the differences in the levels of agreement of the perceived benefits. The survey mean scores and rankings of the three different sub groupings (contractors, clients and consultants) for perceived benefits of RAMP on project outcomes are listed in Table 5.0.
Table 5.0: Perceived Benefits of RAMP on Project Outcomes for the Contractors, Clients and Consultants

<table>
<thead>
<tr>
<th>Perceived Benefit of RAMP</th>
<th>Full Sample (N=36)</th>
<th>Contractors (N=13)</th>
<th>Clients (N=8)</th>
<th>Consultants (N = 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean1 R a Mean1 R a Mean1 R a Mean1 R a</td>
<td>Mean1 R a Mean1 R a Mean1 R a Mean1 R a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Y₁ = Project Completed on Time</td>
<td>3.00</td>
<td>5</td>
<td>3.08</td>
<td>3</td>
</tr>
<tr>
<td>Y₂ = Project Completed within Budget</td>
<td>2.86</td>
<td>6</td>
<td>2.85</td>
<td>7</td>
</tr>
<tr>
<td>Y₃ = Product to the Required quality</td>
<td>3.08</td>
<td>2</td>
<td>3.23</td>
<td>1</td>
</tr>
<tr>
<td>Y₄ = Reduced Accidents on Site</td>
<td>3.03</td>
<td>4</td>
<td>3.08</td>
<td>3</td>
</tr>
<tr>
<td>Y₅ = Reduction in Design / Production Time</td>
<td>2.78</td>
<td>7</td>
<td>2.92</td>
<td>6</td>
</tr>
<tr>
<td>Y₆ = Improved Public Perception</td>
<td>3.03</td>
<td>3</td>
<td>2.92</td>
<td>5</td>
</tr>
<tr>
<td>Y₇ = Reduction in Contract claims</td>
<td>2.75</td>
<td>8</td>
<td>2.31</td>
<td>8</td>
</tr>
<tr>
<td>Y₈ = Improved Team Morale and Productivity</td>
<td>3.28</td>
<td>1</td>
<td>3.23</td>
<td>2</td>
</tr>
</tbody>
</table>

Average Scores | 2.95 | 3.02 | 2.98 |

Note1: 1 = Strongly disagree (SA); 2 = Disagree (D); 3 = Agree (A); 4 = Strongly agree (SA).  R = Ranking of benefit

Examination of Table 5.0 reveals that, for the eight benefits, the mean score ranged from 2.31 (reduction in contract claims) to 3.23 (product to required quality) as per contractor’s scoring; 2.65 (project completed on time) to 3.38 (improved team morale and productivity) as per client’s scoring; and 2.60 (reduction in design / production time) to 3.27 (improved team morale and productivity) as per consultant’s scoring. Based on the average scores of the eight perceived benefits, all the three parties (Contractors, Clients and Consultants) were found to have a medium level of perceptions of RAMP benefits with the Clients achieving a slightly higher levels (3.02). The individual scores were computed from equation 3.0.

Based on equation 2.0, the relative agreement indices could thus be generated for perceived benefits of RAMP. This would result in the classifications (taxonomies) as illustrated in Table 3.0. As an illustration, the agreement index of the ‘project completed on time’ would be equivalent to 0.75 where the value is derived by dividing the overall mean score of 3.00 (Table 5, column 2) by the maximum possible value of 4. The derived
benefit according to Table 3.0 would thus be ‘medium’. Examination of Table 5.0 shows that the majority 32 (87.50%) of the advocated benefited fell in the medium range where as the minority 1 (12.50%) was perceived to be high. The inference to be drawn is that implementation of risk assessment and management practices are of significant benefit to the professionals working with clients, consultants and contractors. The ‘improved team morale and productivity’ was regarded as the most important benefit (M = 3.278; rank = 1st) based on the total sample.

In order to ascertain whether the differences in ranking (as shown in 5.0) were significant, a one-way between-groups analysis of variance (ANOVA) was conducted with the significance level of analysis set at a p-value of 0.05. The analysis of variance revealed that there were significant differences in opinion among the contractors, consultants and clients on the importance of the benefits of RAMP. The significant difference were in the levels of agreement scores for ‘product to the required quality’; [F (2, 33) = 4.167, p = 0.024 < 0.05] and ‘reduction in contract claims’; [F (2, 33) = 4.723, p = 0.016 < 0.05]’. Despite the statistical significance, the actual difference in the mean scores between the groups was quite small.

Clients place more importance on the fact that when risk management is carried out, the product is produced to the required quality. Contractors (Ms = 3.23) also share in this unlike the consultants who do not really agree (Ms = 2.80). These findings are similar to some earlier studies, for example (Agyakwa-Baah, 2007; Dada and Jagboro, 2007; Aje et al, 2009; and Enshassi et al, 2009) all found risk assessment as having significant effect on project performance relative to time and budgets. Ahadzie et al (2008) within the mass housing projects in Ghana also identified ‘overall project costs’ and ‘quality’ as the two of the most important success criterias.

5.3 Analysis of Interviews

The research methodology adopted a triangulation approach using qualitative (interviews) and quantitative (surveys), to that effect a series of 5 interviews with some professionals within the Ghanaian construction industry were sought with the objective of seeking out their opinion on the awareness of risk assessment and management processes. The following section presents some of the opinion on the awareness of risk assessment and management techniques.

5.3.1 Awareness of Risk Management Processes

The interviewees were asked if in their opinion construction organisations were aware of risk management processes. According to five interviewees, construction organisations are not aware of risk management process. Two interviewees believe that organisations are aware of the risk management processes but they do not practice it. Another two said that construction organisations are aware of the processes and practice it but not as a formal
process. They added that most organisations wait for problems to arise before they find solutions to them. One interviewee mentioned that on a scale of 0 to 100, he believes that 10% are aware of risk management processes. He emphasized that those do not know how to carry out the process due to lack of information and expertise. As observed by Akintoye and MacLeod (1997), this awareness of risk techniques should be complemented by familiarity. The data above reveals that 50% of the interviews believe that construction organisations are not aware of the risk management processes. 40% assert that most construction organisations are aware of the processes but 50% of them do not implement them and the other 50% stated that though they practised it although they do not go through the formal risk management process. 10% of the interviews stated that only 10% are aware of risk management processes. The results of the interviews confirmed the findings from the survey part of this study.

6. CONCLUSIONS

This study investigated and assessed the levels of awareness and usage of risk assessment and management practices to ascertain the advocated benefits relative to the impact on project outcomes. The principal conclusions to be drawn from the study are as follows:

- **Awareness of risk management processes is one major barrier to the use of risk management processes.**
- **There is a need for all employees in the industry as well as the general public to be made aware of the benefits of using risk management processes.**
- **Clients should be sensitized on the benefits of carrying out risk management processes on projects and be encouraged to ensure that it is carried out effectively on their projects.**
- **Procurement strategies that encourage risk sharing should be recommended by the Ghanaian government such as the New Engineering Contract (NEC) and partnering agreements.**
- **The proposed framework based on an index and scoring method for capturing the awareness and benefit levels of RAMP through its added advantage of strength; simplicity, generic, robustness and logical can be used for benchmarking purposes.**
- **There is also need for testing the applicability of the generic application of the proposed framework within other construction organisations.**
Despite the disparity in the rankings of the benefits, all the respondents agreed on ‘improved team morale’ as the most important benefit. The study also revealed that a little more than half of the respondents 22 (61%) are aware of the risk management processes and approximately half of these respondents who are aware, have ever carried out the processes on a project. It was also revealed that most of those who have carried out the risk management processes did not use the formal process but carried it out instinctively (reactive risk management).

6.1 Contributions and managerial implications

The paper makes some contribution of exploring the levels of awareness of RAMP and its impact on construction projects. This study further deepens our understanding of the benefits and awareness of RAMP in Ghana. It further contributes to the emergent discourse that the lack of application of the risk management techniques could be due to the myth that it came with training and practising as opposed to the length of experience one had served within the industry.

7. ACKNOWLEDGEMENTS

The material for this paper was extracted from an MSc dissertation in project management on ‘a study into risk assessment and management practices within the medium and large Ghanaian Organisations’ on which A. Agyakwa-Baah and N. Chileshe carried out further analysis. The dissertation was submitted to the Faculty of Development and Society, Sheffield Hallam University, U.K.

8. REFERENCES


