The Association of Schools of Construction of Southern Africa (ASOCSA) has achieved one of the major goals set at its inception, namely: truly representing the Southern African region. Newly appointed council members from African countries and the hosting of the 4th Built Environment Conference in Zambia indicate progress towards the realisation of the ASOCSA vision. This will enhance the exposure of the Journal of Construction (JOC) in Africa.

The application lodged with the Department of Education to have this journal included on the list of approved journals remains the only outstanding challenge set at the start of the Association. As ASOCSA intends being a custodian of education standards in the Southern African region the JOC should be recognised as a mouthpiece of exemplary standard.

Once again papers in this issue originate from sources throughout Africa. The contribution from Nigeria addresses issues of Design-Build and traditional procurement methods in Lagos. Theories and concepts of Increased Cost Adjustment (ICA©) Formulae for Cost Recovery is a South African contribution. The article on service quality and competitive advantage as a challenge for Zambian contractors includes perspectives from Britain. The article on standardisation of subjects required for tertiary built environment education programmes and the technical paper on the preliminary findings of a South African construction industry-academia survey indicate the aspirations of a real and meaningful contribution to standard setting in tertiary built environment education programmes in Southern Africa.

Thank you to the contributing authors and reviewers of this edition of JOC. A special invitation is extended to the other members of the built environment to participate in future contributions.

Felix le Roux
Pretoria, South Africa
February 2009
ABSTRACT
Design-Build (D&B) is a method of obtaining construction services where a single organisation is retained to provide architecture/engineering and construction services under one contract. This contrasts with the more Traditional Procurement Approach (TPA) where an architect or engineer prepares drawings and specifications and the owner separately engages a contractor through a competitive bidding or negotiated process. Research shows that there has been a continuous increase in the use of D&B over the past 15 years. A random sample of 40 respondents with an average of 20 years experience in the construction industry in Lagos, Nigeria, drawn from Managing Directors, Construction Managers, Chief Engineers, and Contractors in six different types of construction projects was taken. The survey results indicate that D&B was rated to perform better where time, cost, quality, comprehensiveness, suitability to different types of construction projects, and acceptability were of the essence and the project was highly complex. D&B is recommended subject to a more stringent contractor-selection process in order to assess reliability, sincerity, honesty and understanding of the needs of the owner.

KEYWORDS:
Design-build contracts, risk allocation, project constraints, traditional procurement systems

INTRODUCTION
During the 1980s the technical and academic press reflected client concerns of project performance in construction with much debate around international comparability and standardisation of contracts and contract procedures. This was in an environment of significant change in the legal, economic and social structures of states in both developing and developed countries. Privatisation, in its many guises, had been effected not only in Europe and North America, but also in eastern Europe (through the transition from socialist to capitalist systems), and in Africa and Asia (through Structural Adjustment Programmes). Jackson and Price (1995) detailed how the process of market liberalisation has conflicted with developmental goals worldwide. The conflict is evidenced in practice, policy and ideology. Within the field of construction performance the emphasis has been placed on practice and policy, not on ideology. The concern with broader developmental goals means that procurement systems that consider more than speed, quality, price competition and certainty, and risk transfer are needed.

Procurement systems must be appropriate to circumstances. Kumaraswamy (1994a), drawing upon examples from Sri Lanka, argued that the achievement of “technology transfer” has been thwarted by the use of inappropriate procurement systems. The need for paradigm shift was supported by Kumuraswamy (1994b) Norval (1994) who presented a framework for the establishment of procurement systems which build-in industry developmental goals in South Africa.

RESEARCH OBJECTIVES AND SIGNIFICANCE
The aim of this study is to do a comparative analysis of the D&B and the TPA methods. The objectives include analysis of the relative advantages and disadvantages of the D&B on the basis of time speed of project delivery, complexity, cost of project, legal mechanisms, and financial and liability risk transfer. This work exposes the reality that growth of alternative systems for the procurement of buildings has had a significant effect on the role of the builder by unbundling his activities, which hitherto were confined to carrying out building works.

Review of Related Literature
According to OBD (1997) there are four procurement methods: The Lump Sum (Traditional Design-Bid-Build), Design & Construct or Build, Construction Management (Management Contracting), Build Own Operate and Transfer (BOOT) and Project Management (Project Managers/Clients representative led) as shown in Figure 1. Ndekgri and Turner (1994) suggest that the use of D&B is on the increase with many clients perceiving it as providing better value for money and giving rise to fewer disputes than other procurement methods. Lindsey (2003) indicate that the value of contracts using the D&B form has doubled since 1995 and exceeded the total value of works procured under traditional methods. One key advantage of using D&B is the opportunity to integrate the design and construction components, and Saxon (2000) and Banik (2001) argue that integration of design and construction offers better performance in time and cost, resulting in fewer defects. Adams (1999) has shown that most clients regard D&B as the optimum route to obtain value for money. Smit (1995) suggests that the popularity of D&B arose from its perceived ability to bring design and construction processes closer together culturally, while Hughes (1992) argues that D&B offers a high degree of cost certainty, encourages economic solutions, and considers value as well as price.

Key criteria for developing a procurement strategy are interdependent and often in tension: time (speed or certainty of completion date), cost (price level or cost certainty) and quality (functionality and performance). Emphasis on only one of the key criteria will almost certainly have a negative effect on the others. The business case will help determine which criteria are most important and which could constitute the greatest risk (Haskell, 2007). NSW Department of Commerce (2007) expounds the criteria as shown in Table 1, and identifies interrelationships be-
tween funding, timing, policy matters, project complexities, agency requirements, brief, type of work, and site considerations.

Construction Excellence (2004) concludes that traditional procurement is unsuitable for fast track projects. The client develops the business case for the project, provides a brief and budget, and appoints a team of consultants to prepare a design, plus tender documents. The client appoints the building contractor to construct the works to the design, by the contract completion date and for the agreed price. Usually much of the work is subcontracted to specialist firms, but the contractor remains liable. The consultants administer the contract on behalf of the client and advise on aspects associated with design, progress and stage payments, which must be paid by the client. Risk allocation means determining where the liability and responsibility for the various risks involved in the project will lie. Liability under a contract is generally shared between the principal and the contractor, with some being covered by insurance or reallocated to other parties. The principal to the contract generally drafts the contract document and determines how risks are to be allocated (Little, 2007).

Banik (2001) collects comprehensive information regarding contractors’ perspectives on risk allocation and identifies 21 important risks. The survey result allocates eight of the risks to the D&B contractor, ranging from constructability of design (100%) to labour disputes (67%). Three to the owner - site access/rights of way (81%), differing site conditions (71%) and catastrophes (81%); two shared risks where both owner and design-builder have the responsibility - financial failure of any party (72%) and 71% for permits and approvals; eight others such as tax rate change, third party litigation, environmental risks, inflation, weather conditions, government regulation, and unidentified utilities were identified (70%), but were neither allocated to any of the parties nor shared. According to Haskell (2007) risks such as errors of omissions, constructability of design, and redesign if over budget are shared by the owner and the designer in TPA while the risk of permit and approvals are to be shared with the contractor. The risks of quality control and assurance, strikes and labour disputes, differing subsurface, weather conditions, inflation and third party litigation are allocated to the owner and the contractor.

Some researchers have begun to face the concept of sustainability and procurement (Pasquire, 1997, and Elliot and Palmer, 1997). They considered which procurement system was best able to accommodate environmental assessment, and found that the traditional system, or construction management (which both give the client a high degree of control) or partnering, were rated highly for their relative environmental compliance, although D&B appeared to be showing a degree of acceptability in economic terms when compared with traditional approaches.

Source: Office of Building & Development (1997)

**Figure 1:** Schematics for types of procurement methods.
Table 1: Project characteristics affecting choice of procurement method.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding</td>
<td>Funding source and availability, flexibility of budget, including contingencies, cash flow requirements / restrictions</td>
</tr>
<tr>
<td>Timing</td>
<td>Required start date, time available for completion, flexibility available in the programme, staging requirements</td>
</tr>
<tr>
<td>Policy matters</td>
<td>Government policies impacting on the project, requirements of regulatory authorities</td>
</tr>
<tr>
<td>Project complexities</td>
<td>Interfaces with other contracts/projects, stakeholder attitudes and influence, coordination with other agencies, principal supplied materials, eg. furniture, environmental, heritage, archaeological issues</td>
</tr>
<tr>
<td>Agency requirements</td>
<td>Extent of control over design activities, resource limitations: availability and expertise</td>
</tr>
<tr>
<td>Brief</td>
<td>Completeness and clarity of the brief, likelihood of changes from outside the agency’s control (political, funding or technological), status of investigation work, availability of design or performance standards</td>
</tr>
<tr>
<td>Type of work</td>
<td>New work, refurbishment, maintenance or demolition, building or civil engineering or other, removal of hazardous materials or site rehabilitation, specialist technical requirements or technology</td>
</tr>
<tr>
<td>Site</td>
<td>Geographical location, greenfield or developed site, premises are currently occupied or vacant, availability of site services, unknown conditions requiring investigation or preparatory work</td>
</tr>
<tr>
<td>Other</td>
<td>Value of project, desirability/availability of innovative designs, construction techniques, proprietary systems</td>
</tr>
</tbody>
</table>

Research Methods

A four-page detailed questionnaire was sent to 40 Nigerian construction companies randomly selected from a sampling frame of registered Nigerian Construction companies based in Lagos. The questionnaire was accompanied by a letter that clearly stated the objectives of the study and definitions of the terms used. The selection of sample population was done in four different categories: senior managers, managing directors, construction directors, and chief engineers with an average of over 20 year’s construction industry experience. About 65% to 82% response rates were achieved for the three major questions respectively. The questionnaire sought information on: time, speed of project completion, cost of project, complexity, legal mechanisms, financial and liability risk transfer with comparison in terms of comprehensiveness, conciseness, acceptability and the suitability of the two procurement approaches to six different types of construction projects.

Secondary data were extracted from published works of professional builders, textbooks and literature from internet services.

Data Analyses

The data received was analysed using the formulae as cited in Gidado and Anshi (2004) to calculate the Importance Index (IM) and the Severity Index (SI). The analysis adapted the IM equation to analyse the suitability of the D&B configuration and the TPA to the various types of construction projects, while the SI index focused primarily on the effect of the constraints affecting the management of the two approaches.

Severity Index: \[ SI = \frac{Rw 	imes W}{Rt} \]

- \( Rw \) = number of respondents
- \( W \) = weight or points assigned
- \( Rt \) = total number of responses obtained for that variable

The scale of how the issues were rated is given below:

- \( SI < 3 \), implies not very serious, never felt its effect (Low)
- \( SI = 3 \) to 5 , implies moderately serious / effects felt some of the time (Medium)
- \( SI > 6 \), implies very serious or felt its effects most of the time (High)

The mathematical expression of the importance index is:

Importance Index: \[ IM = \frac{100 \times \hat{\Omega}(a \times f)}{A \times F} \]
percentage of the respondents (94%) claimed that the use of D&B for project procurement could account for a reduction in overall project time compared to TPA contracts. Interestingly, up to 27% claimed to have achieved more than 20% saving in time when they use D&B compared to TPA. In terms of cost, 75% of the respondents believed that up to 20% saving could be achieved when using D&B system. This seems to agree with the findings of Akintoye (1994) that costs of buildings can be reduced with D&B relative to TPA.

The questionnaire asked the respondents to compare D&B procurement system (in terms of comprehensiveness, conciseness, clients’ trust and acceptability) with TPA. The results are shown in Figure 3, indicating that D&B procurement is considered much better than the traditional system.

DISCUSSION

The results show that, in Lagos, Nigeria, the D&B procurement method, given the same project size and conditions, will be executed at a reduced overall cost, considering the possibilities of cost control and little allowance for variations, which are least existent in the traditional approach. D&B is imputed with a time saving mechanism, which allows many activities to overlap, thereby minimising delay in completion time and reducing frequent adjustments in design. Single source (contractor) accountability prevalent in the D&B may reduce the degree of complexities that may be expected to increase delay possibilities, whereas the close involvement of clients may necessitate more frequent design changes and adjustments.

According to the survey, D&B will often require less management stress, at least from the client’s point of view, and conditions of contract are likely to be less complicated with reduced possibilities of claims and likelihood of litigation when compared with the traditional approach. However, the traditional approach still provided a better pedestal for ensuring quality control. The D&B delivery system provides the possibilities of transferring sizeable financial and liability risks to the contractor.

CONCLUSION AND RECOMMENDATIONS

Current views lead to the conclusion that contractors in D&B contracts are more willing to assume risks than the traditional contractors. It provides opportunities for innovation and excellence in construction while rewarding both the owners and the contractors. The D&B approach affords fewer constraints in its management. However, by its nature, the client commits the cost of construction, as well as the cost of design much earlier than the traditional approach. While risk is shifted to the contractor, the design liability insurance enables the designer-builder to cover the risk. Changes made by the client during design may be expensive,
because they affect the whole of the design-build contract, rather than just the design team costs. The TPA strategy is a low risk option for clients who wish to minimise their exposure to the risks of delays or design failure. Risk allocation is higher for the design-builder, but the approach can be more easily managed.

According to Smith (2000), who quotes the construction industry institute in Texas and Pennsylvania State University, D&B results in cost savings of at least 6% compared with the conventional design-bid-build project (Traditional Procurement) project delivery method. Additionally, the D&B project saves at least 4.5% in costs and is 23% faster.

D&B procurement system is therefore recommended, subject to more stringent contractor selection process, in order to assess reliability, sincerity and honest understanding of the needs of the owner.

REFERENCES
ABSTRACT

Purpose – Rising construction input costs have an adverse impact with regard to optimum cost reimbursement to contractors where contracts allow for increased cost adjustments on some basis. This paper has a two-fold aim, namely to establish the shortcomings of increased cost adjustment methods and to introduce an alternative method. Methodology/Scope – The literature on the shortcomings of existing increased cost adjustment methods was reviewed. The ICA formula was developed based on a set of assumptions derived from a comprehensive breakdown of contract costs. Findings – After the development of the ICA formula, an illustrative case study comparing the ICA formula over other methods was undertaken. The adjusted amount using the ICA formula was between the amounts obtained using the traditional method and the Haylett formula, hence the optimality of the ICA formula with regard to cost recovery. Research limitations – Given that this paper establishes theoretical concepts of the ICA formula, no field work was done, only an illustrative case study was undertaken. Practical implications - The study recommends the use of the ICA formula as an alternative method for valuation of fluctuating contracts given its suitability within the current macroeconomic climate. Value/Originality - The study contributes to the existing body of knowledge of both practitioners and academia. It is a scientific demonstration that theoretically and practically recognises the uniqueness of each construction contract with regards to increased cost adjustment. It is anticipated that the adoption of the ICA formula as an alternative method for price adjustment will result in balanced cost recovery/reimbursement between the client and the contractor.

KEYWORDS:
ICA formula, increased cost adjustment methods, shortcomings, South Africa.

INTRODUCTION

The construction industry has been challenged through the rise of construction delivery costs, which in some instances do not tally with the budgeted ones owing to continuous and unpredictable changes within the macroeconomic environment. Given such a situation, contractual clauses have been formulated to cater for optimum recovery of cost escalations. Subsequently, various increased cost adjustment methods have been developed and reviewed from time to time.

Until the late sixties, the inflation rate was low and contractors were prepared to accept the risk of the rise of building costs and made due allowance for this in their tenders [1]. As a consequence of the world oil crisis in the seventies, prices increases became unpredictable [1]. Fixed price contracts were no longer suitable since contractors were at risk with regard to recovery of profit due to cost escalation. Contracts were then subject to a cost-escalation provision in which a contractor was compensated for all increases in costs from the base date of tendering [1]. Since then, several methods for cost recovery have been tried and include traditional method and consumer price index (CPI) based formulae. However, each of these methods has shortcomings with regards to optimum cost recovery.

The traditional method of ascertaining the price fluctuation requires the contractor, at the time of tender, to provide a list of the principal materials, plant and labour to be used in the contract and the unit price for those materials on which bill rates were based [2]. The traditional method is referred to as a partial fluctuation reimbursement because the amount of increase recovered is much less than the total amount by which costs have really increased/varied [3].

CPI based formulae include Osborne and Haylett formulae for building works, the Engineering formula for civil works and the Baxter formula for civil contracts that are expected to be in excess of 24 months duration. Known also as full reimbursement methods, CPI based formulae were introduced in the United Kingdom in the 1970s as an alternative to the traditional method to fully reimburse the contractor for losses incurred due to price fluctuation [3]. However, the BLS [4] neither encourages nor discourages the use of price adjustment measures in contractual agreements. While this paper will provide a critical overview of CPI based formulae with regards to increased cost recovery; further discussions will be confined to the Haylett formula which is currently predominantly used in South African building contracts. Subsequently the theories and concepts of development of another formula to overcome such shortcomings will be provided.

PROBLEMS WITH CPI BASED FORMULAE

The CPAP (Contract Price Adjustment Provisions), also colloquially referred to as the Haylett formula, was introduced in 1976 as a formula method of compensation or reimbursing for price fluctuation in labour costs, material prices, plant and equipment, and fuel [5]. CPAP [6] stipulates that the purpose of the formula was to provide for the needs of contractors who required a clear-cut, agreed recovery formula method to avoid dissension and disputes with employers and subcontractors and provide a reasonable reimbursement of unusual price fluctuations. This formula is based on the Consumer Price Indices [3] published by the Central Bureau of Statistics. The CPI number measures relative price changes from one time period to another. The problem with the CPI is that it may
overestimate or under estimate the market conditions as at how prices have risen. When the formula is used, no attempt is made to calculate the actual amount of loss involved; consequently, the sums recoverable by the formula method will differ from those recoverable under traditional method and will be usually greater [3]. Trickey [7] contended that relying on an incorrect index could give very misleading results. Since no audit of the amount of cost increase is done for each individual item, one would wonder whether clients pay the real losses incurred. CPAP [4] clearly states that the formula cannot precisely reflect the actual cost fluctuations on any particular piece of work or contract. De Vynck [5] noted that the proportions and indices applied are indicative of average price movements and do not represent any particular contract. The Haylett formula provides roughly 85% constant, which is subject to adjustment. De Vynck [5] contended that as 15% non-adjustable portion eliminates profit recovery, this could be penalising the contractor for profits not really earned.

In a low inflation environment, CPI formulae may operate satisfactory. De Vynck [5] believed that the stability of the South Africa’s macroeconomic situation could see the disappearance of the index because it was possible to predict the future price fluctuations in building materials. Unfortunately, the macroeconomic environment never stabilises and, to date, no study has been carried out to ascertain at which level the increase of the CPI would be problematic with regard to increased cost adjustment. This is also not within the scope of this paper. This study increases the awareness of the problems of application of methods used for increased cost adjustment relative to macroeconomic environment. It opens debate with stakeholders along the matter of increase cost adjustment and stimulates a need for advanced research studies.

**METHODOLOGY**
The philosophy of the adjustment of the increased cost is reliant on three arguments, namely:

- Each contract is unique, thus the increased cost adjustment should take this into account.
- The allowable profit margin on a contract is calculated on a percentage basis at tender; therefore, the percentage obtained at the end of the contract should be relatively closer to the allowable.
- The contract sum breakdown reveals that its components are affected in different ways in terms of losses of the contractor’s profit margin.

An ICA formula was developed with reference to the above-mentioned arguments. A comprehensive contract sum breakdown was done and subsequent theoretical concepts were formulated. The combination of concepts resulted in a sound formula. An illustrative case study of a construction contract comparing methods for increased cost adjustment was drawn.

**THEORETICAL CONCEPTS OF THE ICA FORMULA**

### Generic Idea

The idea of developing an ICA formula was born after the author sojourned in Zimbabwe, a country that beat the world record in price escalations in the 1st decade of the 21st century. For example, the CPI for civil engineering plant was reported to increase from 247,096.7 in October 2003 to 387,964.20 in October 2004 with an average CPI increase of 11739 per month [8]. In 2003, the author was working in the estimating department of a construction contracting company in Zimbabwe. Towards the end of the year, he was transferred to the quantity surveying department; eventually, working on a contract he was involved at tendering. The author was eager to see how the anticipated profit at tender was going to be achieved during the construction stage. At each monthly contract valuation, the computation of allowable costs against the actual costs showed the current profit margin diminishing far below the expected. A further observation revealed that the amount of increased cost exceeded far beyond the basic amount. This situation hypothesised the lack of proper recovery of increased cost. An initial research was done from 2004 to 2005, which revealed that contractors were not reimbursed their losses owing to the shortcomings of increased cost methods along with the development of the ICA formula. The original ICA formula proposed that each construction contract fell under one of 51 options. At this advanced stage, this paper further establishes theoretical concepts for the ICA formula that provides infinite options.

### Building up the ICA Formula

The ICA targets the reconciliation of the decline in profit margin of the contractor with the original allowable. The ICA formula uses the actual costs on a particular project and prompts an appropriate percentage of adjustment \( m \) at each interim contract valuation.

The ICA formula is developed upon *ceteris paribus* assumptions by providing a contract sum breakdown as follows:

1. **Direct works/costs**
2. **Preliminaries and General (P&G)**
3. **Contractor’s sum**
4. **Prime Cost sum**
5. **Sub-total contract sum**
6. **Contingencies sum**
7. **Total contract sum**

Other parameters to be taken into consideration are as follows:

1. **Cumulative basic price amount**
2. **Cumulative net increased cost**
3. **Administration fees (%)**
4. **Allowable profit (%)**

**Assumption I - Contractor’s sum: Direct works(X) of versus P&G(Y)**

“The higher the direct works proportion, the lower the P&G proportion, as a result a greater amount is recovered on increased cost adjustment thus the contractor’s profit is slightly affected and vice versa.”

In fact, the contractor recovers the increased cost on most of the direct works items by means of a percentage adjustment while the increased cost on preliminaries and generals is not recoverable since it is not subject to adjustment. An illustration showing how a contractor is reimbursed much amount for increased cost, where the direct works proportion is higher than where it is lower, is shown in a case study drawn in Table 1. As shown in Table 1, two contracts A and B have the same original contract amount of R600 000. They start and end at the same time, but they have different cost proportions. Assume a net cost increase of 50% of the original cost, which affects both the direct works and preliminaries and generals; then the net increased cost amounts at R300 000 for both contracts A and B. Since there is no provision for adjustment for preliminaries and generals, only the increase...
The contractor recovers (R13 375) on project A which has a higher direct works proportion (89%) than on project B (R8 750), which has a lower direct works proportion (58%). Consequently, less profit is recovered on project B than on project A.

In order to reconcile such a decline in profit, we have to develop a marginal expression \( f \) which decreases when the direct cost proportion is higher and increases when the direct cost proportion is lower. Table 2 shows a systematic development of the marginal expression \( f \) where \( x = \frac{X}{S} \) and \( y = \frac{Y}{S} \).

The marginal expression \( f \) was simply and purely developed from the imagination, with the sole objective of getting an expression that has an increasing/decreasing feature. The objective is achieved by multiplying the product of \( x \) and \( y \) by either their difference or their sum throughout three domains. The value of \( x \) or \( y \) dictates which domain one has to choose for a particular project.

**Conditions**

a. \( x + y = 1 \) (The sum of direct works and preliminaries and generals proportions equals 100%.)

b. \( x \neq 0 \) & \( y \neq 0 \) (The contractor’s sum components: direct works and preliminaries and generals are always different from zero.)

c. \( x > y \) (It is assumed that the direct works proportion is always greater than preliminaries and generals proportion.)

d. \( 0.55 \leq x \leq 0.95 \) and \( 0.05 \leq y \leq 0.45 \)

**Domain 1**

For \( 0.80 \leq x \leq 0.95 \) and \( 0.20 \geq y \geq 0.05 \)

\[ f = xy(x-y) = x^2y - xy^2 \]

By substituting \( x \) by \( \frac{x}{S} \) and \( y \) by \( \frac{y}{S} \):

\[ f = \frac{xy}{S^2} \]

**Domain 2**

For \( 0.80 \geq x \geq 0.70 \) and \( 0.20 \leq y \leq 0.30 \)

\[ f = 0.6xy \]

By substituting \( x \) by \( \frac{x}{S} \) and \( y \) by \( \frac{y}{S} \):

\[ f = \frac{0.6XY}{S^2} \]

**Domain 3**

For \( 0.55 \leq x \leq 0.70 \) and \( 0.45 \geq y \geq 0.30 \)

\[ f = xy[(x+y)-(x-y)] = x^2y + xy^2 - x^2y + xy^2 = 2xy^2 \]

By substituting \( x \) by \( \frac{x}{S} \) and \( y \) by \( \frac{y}{S} \):

\[ f = \frac{2XY}{S^2} \]

Figure 1 provides the graphic representation of a marginal expression \( f \) versus contractor’s cost proportions \( x \) and \( y \). The graph is interpreted as follows: The graph was designed with Microsoft excel scatter chart. The proportions of direct works and preliminaries and generals have been intentionally combined in the same Cartesian plan. The bottom \( x \)-axis represents the values of preliminaries and generals cost proportions while the top \( x \)-axis represents the values of the direct costs proportions plotted in reverse. \( Y \)-axis represents the values of the marginal expression \( f \), which are calculated in Table 2.

Note that \( y \) and \( x \) that appear on the graph should not be confused with the nomenclature of cost proportions \( x \) and \( y \) suggested by the authors during the building-up of the ICA formula. The linear regression equations for straight lines help to predict a value of a dependent variable (here, value of the marginal expression \( f \)) given the value of

<table>
<thead>
<tr>
<th>Domain</th>
<th>C*D</th>
<th>0.6°C</th>
<th>Domain 3</th>
<th>C*E</th>
<th>Domains combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain 1</td>
<td>0.8 ≤ x ≤ 0.95</td>
<td>Domain 2</td>
<td>0.7 ≤ x ≤ 0.8</td>
<td>Domain 3</td>
<td>0.55 ≤ x ≤ 0.7</td>
</tr>
</tbody>
</table>

Table 1: Illustration of cost reimbursement according to contractor’s cost proportions.

<table>
<thead>
<tr>
<th>Contractor’s sum S</th>
<th>Amount</th>
<th>Proportions</th>
<th>Net cost increase (50%)</th>
<th>Increased cost adjusted (5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct works X</td>
<td>535,000</td>
<td>89%</td>
<td>267,500</td>
<td>13,375</td>
</tr>
<tr>
<td>P&amp;G Y</td>
<td>65,000</td>
<td>11%</td>
<td>32,500</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>600,000</td>
<td>100%</td>
<td>300,000</td>
<td>13,375</td>
</tr>
</tbody>
</table>

Table 2: Building up a marginal expression \( f \).

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>Y</td>
<td>xy</td>
<td>x-y</td>
<td>(x+y)-(x-y)</td>
<td>xy(x-y)</td>
<td>0.6(xy)</td>
<td>xy[(x+y)-(x-y)]</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>0.95</td>
<td>0.05</td>
<td>0.0475</td>
<td>0.90</td>
<td>0.04275</td>
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</table>
independent variable (here, direct works or preliminaries and generals cost proportions). R-squared measures the goodness of fit of a regression to data. But, the regression equations and $R^2$ are beyond the scope of this paper. The researchers preferred to keep the introduction to ICA formula in generic form.

Assumption II - Contract sum M: Contractor’s sum S versus Prime costs Z

“The higher the contractor’s sum, the lower the prime cost sum; consequently little amount is obtained from PC sum and vice versa”.

As shown in Table 3, two contracts A and B have the same contract amount of R600 000 but with different contractor’s sum and prime cost proportions. The contractor had allowed 5% attendance and profit on the prime cost amount. It is obvious that where the prime cost proportion is higher (89%) the contractor gets more money (R24 318) than where the prime cost proportion (11%) is lower. It is assumed that where the contractor’s sum is lower, the contractor uses less of his resources for example, administration costs while revenues from management fees are higher.

⇒ A marginal probability is allocated as follows: $\frac{S}{M}$

Assumption III - Price fluctuation: Cumulative Increased costs I versus Cumulative Basic price amount B

“The more the prices fluctuate, the more the profit is affected and vice versa”.

⇒ A marginal probability is allocated as follows: $\frac{I}{B}$, where $I$: cumulative net increased cost and $B$ cumulative basic price amount.

Assumption IV - Allowable profit margin

“Each contract has an allowable profit margin”.

⇒ The profit margin expressed as a percentage ‘p’ is allocated to each contract.

Assumption V - Administration fees: Increased/decreased cost

“There are costs incurred during the price adjustment exercise”.

⇒ An administration fee expressed as a percentage ‘a’ is provided.

The combination of the above assumptions generates the formula as shown in Table 4. Note that under the concepts of the ICA formula, only a percentage for administration fee is multiplied by the net decreased value then the obtained amount is credited to the contractor’s fluctuation account.

Distinctive features of ICA formula over other methods

• The ICA formula audits every single item while CPI formulae group works into categories.
• The ICA formula adjusts price increase using the actual calculated net increased costs while CPI formulae do not attempt to calculate the actual amount of loss involved.
• With the ICA formula, the increased cost adjustment percentage varies continuously according to the level of the cost increase over the basic amount. But the traditional method provides only a single percentage of adjustment to be used throughout the contract.

FINDINGS AND DISCUSSIONS

Illustrative Comparison Between Increased Cost Adjustment Methods

At this stage of further improvement of the ICA formula, the researchers find it necessary to draw an illustrative case study to compare the cash flows obtained using different methods. The traditional method, Haylett formula and the ICA formula will be compared. Table 5 illustrates the cost breakdown of a fluctuating contact to be carried out in five months. Assume the direct cost proportion $x$ of 87% and the preliminaries proportion $y$ of 13%. The contractor had allowed 10% profit margin $p$ on the contract. The cost increase on the net direct cost was subject to adjustment due to increased cost. One has to note that the contractor’s internal figures, which reflect the profit margin and allowable costs are not disclosed to the public. Only external figures are disclosed to the public. The findings of comparison of increased cost adjustment methods are shown in Table 6 and Figure 2. Methods include the traditional method, ICA and Haylett formulae.

Traditional Method

Five percent was used for adjustment of the net increased cost. The adjusted amount in column G is obtained by multiplying 5% to the net increase in column F. The total amount claimed is obtained by summing the total sum for the projected external valuation in column E, the net cost increase in column F and calculated adjusted amount in column G. For example the total claimed amount in the second month is calculated as follows:
Total cumulative amount in the second month = R120 000+R27 000+(R27 000*0.05)=R148 350.

ICA Formula
For a contract with no prime cost sums with direct cost proportion of 0.87, the ICA formula option falling under domain 1 was adopted to calculate the percentage m of increased cost adjustment.

\[ m = a + \frac{pl(X^2Y - xy^2)}{BS^2} \]

where a is the administration fee of 5%, p is the allowable profit of 10% at tender, l is the net increased cost at month of valuation, X is the original total direct cost sum, Y is original total preliminaries sum, B is the basic price amount in the month of valuation and S is the original total contractor’s sum. The value of l, X, Y and S are found in respective columns F, C, D, B and E. For example the percentage m of adjustment in the third month is calculated as follows:

\[ m = 5 + \frac{10^3*32000(217500^2*32500 - 217500*32500^2)}{142364*250000} = 5.19\% \]

The total amount claimed is obtained by summing up the total sum for the projected external valuation amount in column E, the net increased cost in column F and calculated adjusted amount in column J. The total cumulative amount in the third month equals to R180 000+R32 000+(R32 000*0.5188)= R213 660.

Haylett Formula
CPAP [6] calculates the amount of adjustment as follows:

\[ A = 0.85V \left( \frac{X}{X_o} \right) \]

where A is the amount of adjustment, 0.85 is a constant which provides for a 15% non-adjustable element, V is the work value of the index applicable to such work group and valuation period, X is the value of the index applicable to such work group and valuation period and Xo is the value of the index applicable to such work group for the base month.

Since this is an illustrative case, we will calculate the ad hoc index by means of the net costs of this particular project. Basically, the index number for a given good for a given period is calculated as follows: Calculate the difference between the actual price of a good and its price at the beginning of period over the price at the beginning of the period multiplied by 100. For example, the index at the end of the fourth month is calculated as follows:
Actual price is equal to the direct cost (R174 000) in column B plus the net increase cost (R39 000) in column F, which totals to R213 000 in column L. Index equals to R213 000 in column L minus R174 000 in column L over R174 000 multiplied by 100 plus 100 a base index number in column M which represents a base period. The index number in the 4th month is 122.

The amount of adjustment in the 4th month is calculated as follows:

$$A = 0.85V \times \left( \frac{X_t}{X_0} \right)^{-1}$$

Since no attempt is made to calculate how much prices have gone up, the value $V$ of executed works in the 4th month is R220 000.

$$A = 0.85 \times 220000 \times \left( \frac{122}{100} \right)^{-1} = 41914$$

The total amount in the 4th month is R220 000 + R41 914 = R261 914.

By comparing the monthly cash flow between the existing methods for increased cost adjustment against the ICA formula, monthly cash flow is between the traditional method and Haylett formula. This is an indication that the ICA formula may provide an optimum recovery for increased cost adjustment.

### CONCLUSIONS

The study consisted of identifying the shortcomings of the existing increased cost adjustment methods in terms of their non-suitability for use in a highly inflationary economic environment and developed the ICA formula as an attempt for a remedial solution. The literature uncovered the shortcomings of the existing increased cost adjustment methods. In particular, it was revealed that the CPI based formulae either overstated or understated the market conditions.

The ICA formula was then developed in order to reconcile the shortcomings found in existing increased cost adjustment methods. The ICA building-up was based on three major concepts including the uniqueness of each construction contract, the allowable profit margin that should be realised at the end of the contract and a comprehensive breakdown of a contract sum in a way the contractor’s profit was affected. An illustrative case study compared the cash flows of a contract using the ICA formula against other methods. It was shown that the amount obtained through ICA formula was in-between the traditional method and the Haylett formula. Hence the ICA formula has the potential for optimum cost recovery considering both the client and the contractor.

### Table 6: Cumulative cash flows.

<table>
<thead>
<tr>
<th>Months</th>
<th>Direct costs</th>
<th>Projected cash flow external</th>
<th>Net increase</th>
<th>Traditional Method</th>
<th>ICA formula</th>
<th>Haylett formula</th>
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<td>Adj</td>
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<td>180,000</td>
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<td>32,500</td>
<td>250,000</td>
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</tr>
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</table>
and the contractor. When a traditional method is used, it puts a financial burden to the contractor and the recovery using the Haylett formula puts a financial burden to the client.

MERITS, LIMITATIONS AND RECOMMENDATIONS

While the application of CPI based formulae requires indices compiled with an external agency, ICA has the advantage of using the real cost incurred on a particular contract. Given current market price fluctuations, the adoption of the ICA formula as an alternative method for increased cost adjustment will provide an optimum cost recovery, hence the equitable share of the financial responsibilities between both the client and the contractor. Since inflation and a continuous increase in construction input costs is becoming a global challenge to the construction industry, there is a need for construction industry stakeholders to pursue theories provided under the ICA concepts.

Further studies are necessary to determine at which level of price increase the existing increased cost adjustment methods begin to generate problems. Further studies are required to establish various applications of the ICA formula such as, for example, this formula to be used as a guideline tool or cost prediction model to ascertain the required mark-up for adjustment of increased costs where disputes arise in this regard.

REFERENCES

The Fourth Built Environment Conference
2009

Livingstone, Zambia
17 - 19 May 2009

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www.asocsa.org
Objectives

The Fourth Built Environment conference provides 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 are:

- To provide a forum for multi-disciplinary interaction between academics and practitioners;
- To provide an internationally recognised, 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 aim to bring together researchers, academics, administrators and practitioners representing educational institutions, government agencies, contracting organizations, consulting enterprises, financial institutions, and other construction related organizations from all over the world.

Conference theme

The conference has a broad scope and topics are organized around the conference theme of the Built Environment.

Main topics

- Sustainable construction
- Education and Professional Development
- Service delivery / Customer service
- Information Technology
- Legislation and Regulatory Framework
- Safety, Health, Environment and Quality Management
- Construction Industry Development
- International Construction
- Risk Management
- Housing

Conference outcomes

Responses are sought 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 diversity be promoted?
- How can the regulatory environment be more effective?

Venue:

The Falls Conference Center, Livingstone, Zambia

Organisers / Contact persons

South Africa

- Prof. TC Hauott, Academic Program Chair
  hauott@cput.ac.za
  Tel: +27 21 959 6637/6845 – Fax: +27 21 959 6870

- Ferial Michaels, Conference Organizer
  Mobile: 082 440 4688
  Tel: 021 930 6525 – Fax: 021 930 5947
  ferial@rfmdesign.co.za

Accommodation:

Zambesi Sun
Royal Livingstone
Protea Livingstone

Please refer to www.asocسا.org for further accomodation details.
SERVICE QUALITY AND COMPETITIVE ADVANTAGE: A CHALLENGE FOR LOCAL ZAMBIAN CONTRACTORS

Dr Sambo Zulu, School of the Built Environment, Leeds Metropolitan University, Leeds, LS1 3HE, UK, Email: s.zulu@leedsmet.ac.uk, Tel: +441138127644
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ABSTRACT
Purpose: This paper examines service quality and its potential to enhance competitive advantage of local contractors in the Zambian Construction industry. The study acknowledges that local contracting companies and organisations face immense challenges due to changes in global and national environments. With the increase in foreign direct investment and foreign contractor firms entrance in developing countries, local contractors are expected to provide better service quality in order to remain competitive. The authors argue that improving service quality would help local contractors to enhance their competitiveness in a globalised economy.

Design/Methodology/Approach: The findings in this paper are based on a case study of service quality levels provided by maintenance contractors in an international organisation in Zambia. An instrument based on the SERVQUAL approach was used to collect service quality data. The determination of service quality was based on the comparison between the expected and perceived service quality levels.

Findings: Generally the findings show that service quality expectations for the client are not met. It is generally acknowledged in literature that service quality is one of the leveraging factors for companies to create a competitive advantage over others and therefore the authors recommend that local contractors improve their service quality levels if they are to remain competitive in a globalised economy.

Originality/Value: This research is part of a large project focusing on the understanding of issues impacting on the development of the Zambian construction industry. This paper contributes to the understanding of key challenges facing local contractors in the Zambian construction industry. It also addresses the importance of service quality as a leveraging tool to enhance a firm’s competitive advantage.

KEY WORDS:
Competitive advantage, globalisation, service quality, SERVQUAL, Zambia

INTRODUCTION
The changing environment in developing countries and specifically the impact of globalisation represents threats and opportunities. Zambia, like many Sub-Saharan African countries, has undergone significant transformation since the early 1990s. One of the significant changes has been the opening up of the markets from a controlled economy. The control of economic markets and political influence is a major risk to foreign investors in developing countries. Opening up of the economy in Zambia has meant that many foreign companies have seen this as an opportunity to invest in former risky areas. While there are still some risks to investing in developing countries, there seems to be a change in attitude by foreign investors towards developing countries that have opened up their markets through liberalisation policies. The construction industry has been seen as one of the entrance avenues by foreign investors into developing economies due to the potential for growth, as there is a huge market for capital projects. However, while foreign contractors/investors see this as an opportunity, local contractors are faced with competition from foreign contractors who are able to offer cost advantages due to their well developed supply chains. In addition, foreign contractors with their capital machinery are able to provide a quicker service than local contractors. It is therefore important that local contractors find a way of creating leverage against this competition in order to survive the growing competition. The authors acknowledge that improving the quality of service can be a good way to create competitive advantage for these companies. It is generally acknowledged in literature that service quality can help companies leverage their competitive advantage.

This study explores the potential for contractors to use service quality as a leveraging tool to create competitive advantage. Preliminary findings were reported in Zulu and Chileshe where the potential for service quality to enhance competitive advantage was considered. This paper is an extended version of the above paper. The paper first discusses the changing landscape of the Zambian environment in general and the construction industry in specific. Secondly, service quality is discussed in light of its ability to create competitive advantage. The last section presents a case study of service quality levels in the Zambian construction industry. Based on the findings, the authors provide their opinion of what contractors should do in order to survive the changing landscape.

CHANGES IN THE ZAMBIAN CONSTRUCTION INDUSTRY
The Zambian economic and political environment has seen significant changes since 1991 when it returned to multi-party democracy. One of the changes was the liberalisation of the economy from a controlled economy to a free market state. This brought about increased competition from within the economy and entrance of foreign players into the economy. The construction industry has not been immune to these changes as several foreign contractors have now successfully established themselves in the industry. The construction industry makes a significant contribution to national economies. Zambia has seen a steady growth in its construction industry over the past ten years. Its contribution to GDP has grown from 3.5% in 1996 to 13.9% in 2006. Bosten also recognises that the construction industry is seen as one of the important entry points for foreign investors as it is a profitable and important sector in emerging economies. Since
1991 the Zambian construction industry has seen a leap in the number of foreign companies. With the liberalisation of the economy, the industry has continued to grow and has seen an increase in foreign company involvement in the industry. The increasing number of Chinese firms and general foreign direct investment pledges into the Zambian construction industry is an example of this change. Foreign direct investment increased from USD4,933,500 in 2005 to USD140,328,266 in 2006[10] while the number of Chinese construction companies has grown in the last ten years from about three to twenty [11].

The increased investment and numbers entering the industry from abroad seems to suggest that the industry has the potential to make profits. It is suggested that many foreign contractors who enter the industry have a competitive advantage over local contractors. For example, Burke [11] notes that the advantage that Chinese contractors have over local companies is that they offer good quality at low cost. Burke [11] argues that the cost difference could be as much as twenty percent (20%). Burke [11] also suggests that these Chinese contractors are gaining popularity with both the public and private sectors for good quality and timely completion. It is generally agreed that Africa’s quality performance in many areas lags behind best international practice [12].

The Zambian construction industry is dominated by Small and Medium Enterprise (SME) contractors. An examination of the national construction council’s register reveals that most of the registered contractors belong to the SME category [13]. Albaladejo [14] notes that SMEs constitute the future of an industry and an economy as a whole as it is expected that these companies will one day be in the largest category of the industry. However, with the current globalised economy they face major challenges. Beyene [15] argued that with the increase in globalisation, Africa’s SMEs should be prepared to be active participants in the global economy. Although SME contractors participate only in the local Zambian economy, the economy itself attracts global attention, and therefore the local companies are participants in a globalised economy. Beyene [15] also argues that most SMEs in Africa lack organisation and knowledge in modern management techniques compared to their foreign counterparts. The World Bank [16] in its evaluation of a project in Zambia also found that one of the factors that impacted on local contractors was that they lacked equipment to undertake construction works. It is important therefore that local companies find solutions to these emerging threats.

It is against this background that solutions to the competitiveness of domestic contractors should be found. The authors suggest that enhancing service quality would help local contractors to create a competitive advantage against foreign entrants. Studies have shown that service quality can enhance the competitiveness of the firm [17, 18].

**SERVICE QUALITY AND COMPETITIVE ADVANTAGE**

Service quality has been extensively studied over the past decade. There are different definitions of service quality. Zeithaml as cited in Caro and Garcia [19] defines service quality as the assessment of the overall experience or superiority of the service by the customer. Bitner and Hubert, also cited by Caro & Garcia [20], define service quality as ‘the consumers’ overall impression of the relative inferiority or superiority of the service’. Both these definitions focus on the assessment of the level of service by the customer. The work of Parasuraman et al [21], suggest that service quality can be measured by the difference between a customer expectation and perception of the service received. Service quality has been mostly measured using the service quality gap theory where the difference between the customer’s expectation before the service encounter and the evaluation of the service encounter, provides the basis for assessment of service quality [3]. There are different methods for measuring service quality. However, one of the most common methods is the use of the service quality measurement model (SERVQUAL) developed by Parasuraman et al [21]. The model assesses service quality using five dimensions which include reliability, responsiveness, assurance, empathy and tangibles. Kim et al [4] also, despite criticism of the SERVQUAL instrument, support it as having superior diagnostic capacity than many other instruments. The SERVQUAL instrument has been used extensively and has also been adapted for industry or process specific studies. For example, it has been used and adapted for the construction industry [22, 23, 24, 25, 26].

The impact of service quality on performance and customer satisfaction has been examined [27, 28, 29]. The service quality impact on fostering a firm’s competitive advantage has also been examined [18, 17, 27]. Chryssochoidis and Theocharakis [18] in analysing factors impacting on a firm’s competitiveness, concluded that service quality is an important factor for the attainment of competitive advantage. Maclaran and McGowan [12] noted that smaller firms are very vulnerable to competition from larger firms as the larger firms can easily create a cost advantage due to economies of scale. However, they argue that small firms are better placed to create differentiation through service quality as, due to their size, they can personalise their service. Ropert and Wren [27] also noted that companies ‘which are adept at service quality can build competitive positional advantage’. Clow and Vorhies [3] suggest that service quality brings, about among other things, increased competitive advantage, while Kim et al [4] recognise that service quality is considered as an essential strategic tool for firms to create competitive advantage over their competitors. Rahman [5] also stated that in order for firms to have sustainable competitive advantage, they have to put in place strategies that will help them retain customers and that one such strategy is the use of improved service quality. It is clear from the above discussion that service quality can be used as a tool to enhance competitive advantage.
THE CASE STUDY

The study used a case study approach to understand the service quality position of local contractors. The use of case studies provides a researcher with an opportunity to investigate an issue at a greater depth than many other methods. One of the criticisms with case studies is that the results can lack empirical or statistical generalisation (Fellows and Liu 2003). Descombe (2003), however, argues that careful considerations can be made to make it possible to make justification for generalisation of the case study findings. The authors acknowledge this potential limitation with the use of case studies.

This case study organisation is an international organisation based in Zambia. Although the company receives services from various organisations and companies, the focus of this research was on quality of building maintenance services as the organisation outsources all its maintenance services for its buildings portfolio. The organisation has a dedicated maintenance department that oversees and manages all maintenance contracts. In order to assess service quality, the organisation’s Estate Manager was asked to assess its expectation and perception of service quality based on the SERVQUAL instrument for maintenance contractors. The measurement items used were an adaptation of the instrument used in Hoxley [22]. Table 1 summarises the dimensions of service quality and their related measurement items included in the research instrument. The Estate Manager was asked to assess both the expected and perceived service quality levels for each of the items on a scale of 1 to 7, with 1 representing very low and 7 representing very high. A total of 10 contractors were assessed.

The determination of service quality was based on assessing the difference between service quality expectation and perception scores [31]. In order to calculate the differences, the aggregate scores in each dimension were computed by finding the mean score.

DISCUSSION OF RESULTS

The data in Table 2 summarises the client’s mean expectations and perception scores. The service quality scores for each dimension were determined by finding the mean score for all the measurement items under the dimensions. The first row, Client expectation, includes mean scores for the service quality level expected by the client. The perceived service quality levels for each

Table 1: Service quality dimensions.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Tangibles</th>
<th>Reliability</th>
<th>Responsiveness</th>
<th>Assurance</th>
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Table 2: ‘Expected’ versus ‘Perceived’ mean scores.
Table 3: Service quality score.

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<th>C4</th>
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<td></td>
<td>-1.02</td>
</tr>
<tr>
<td>Reliability</td>
<td>-1.20</td>
<td>-3.60</td>
<td>-0.40</td>
<td>-1.40</td>
<td>0.20</td>
<td>-4.40</td>
<td>-1.80</td>
<td>1.00</td>
<td>0.20</td>
<td>1.20</td>
<td>-1.43</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>-2.50</td>
<td>-3.25</td>
<td>-0.75</td>
<td>-2.00</td>
<td>-0.25</td>
<td>-5.25</td>
<td>-1.75</td>
<td>0.75</td>
<td>0.00</td>
<td>0.75</td>
<td>-0.20</td>
</tr>
<tr>
<td>Assurance</td>
<td>-0.60</td>
<td>-2.20</td>
<td>0.20</td>
<td>-1.40</td>
<td>0.40</td>
<td>-2.00</td>
<td>0.20</td>
<td>1.40</td>
<td>0.60</td>
<td>1.40</td>
<td>-0.35</td>
</tr>
<tr>
<td>Empathy</td>
<td>-0.75</td>
<td>-2.00</td>
<td>0.00</td>
<td>-0.50</td>
<td>-1.75</td>
<td>-1.75</td>
<td>-0.50</td>
<td>0.75</td>
<td>0.50</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 shows the service quality scores for all the contractors. This was determined by subtracting the expectation score from the perception score. The interpretation of the results are that where a score is '0', then the contractor achieves the client's expectation, '<0' then the contractor fails to achieve the client's minimum expectation and ' >0' then the contractor exceeds client's minimum expectation of service quality. The scores in Table 3 also suggests that some of the contractors provide very poor service quality levels as their service quality scores are significantly below the client's expectation. See for example contractor 2 (C2) and contractor 6 (C6).

The aggregate service quality score in Table 3 suggests that, overall, the client does not receive the expected service quality as the aggregate service quality scores are all negative. The findings also suggest that generally contractors are less responsive to the client's needs, while they seem to provide some assurance to the client in respect of their ability to deliver. Responsiveness refers to the willingness of contractors to help clients and provide prompt service. It is not surprising that this has achieved a lowest score as it is evident that the construction industry is prone to poor time performance. Responsiveness has a score of -1.43. This is followed by reliability (-1.02), tangibles (-0.95), and Empathy (-0.35). However, quality assurance (SQ score = -0.20) had the best aggregate service quality score, although this is below the expected service quality levels. The findings in Table 3 also show that only three out of ten contractors achieve the client's expectations as their service quality scores are all positive in all dimensions.

The findings above show that local contractors are in a disadvantaged position in light of the ever increasing competition from foreign contractors. As suggested earlier, it seems that foreign contractors have a cost and performance advantage over local contractors. In order to help local contractors create competitive advantage for themselves, they need to consider increasing their service quality levels. Literature, as discussed earlier, shows that enhanced service quality can be used to create competitive positions. The findings above therefore suggest that local contractors cannot compete favourably in many dimensions with foreign contractors. However, in order for the local contractors to be competitive, they need to consider enhancing their service quality levels, as this has the potential to leverage their competitive positions.

CONCLUSIONS
The paper set out to consider the viability of enhancing service quality as a tool to create competitive advantage. Literature review shows that organisations can improve their competitive advantage by using service quality as leverage. The case study, although based on a relatively small sample of 10 contractors, provides an insight into service quality of building maintenance contractors in Zambia. The findings suggest that overall, based on aggregate scores, the contractors for this organisation provide lower than expected service quality to the organisation. The findings also show that contractors can do more to improve their service quality, especially in relation to the need to be more responsive to clients' needs. In light of foreign competition, which has cost advantages, the authors suggest that local contractors use enhanced service quality to position themselves in a competitive position if they are to survive. However, an examination of service quality in the case study organisation suggests that most local contractors fail to meet a client's expectations. It is therefore important that if contractors are to remain competitive, they need to acknowledge this failing and enhance their service quality to survive in a competitive environment.

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A CASE FOR THE STANDARDISATION OF SUBJECTS REQUIRED FOR TERTIARY BUILT ENVIRONMENT EDUCATION PROGRAMMES

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ABSTRACT
The purpose of this paper is to present a case for the standardisation of the subjects required for tertiary built environment education programmes. The aim is to ensure that the required subjects conform to standards, thereby eliminating the disparities within and between programmes to equitably empower built environment students.

Data relative to the standardisation was obtained by means of a questionnaire from nine built environment stakeholder groups involved with and affected by the effectiveness and appropriateness of tertiary built environment education.

The findings indicate strong support for standardisation of programmes in terms of subjects given the positive results from frequency and measure of central tendency tests. Common subjects at 1st year level and a common 1st year between five built environment disciplines also receive strong support. Subsequent tests for association confirmed the initial findings.

Although the sample selected is representative of the built environment population a more inclusive validation survey is planned.

Implementation of standardised subjects is proposed in response to concerns regarding the employability and skills set of the product of tertiary built environment education programmes promises economic benefits, entrepreneurial opportunities, transparency and the safeguarding and equitable distribution of knowledge to a host of beneficiaries.

Given that a syllabus prescribes the subjects required for a particular programme the interpretation and explanation of the listed subject content is done independently. A series of standardised lectures compiled by subject experts and presented by domain champions will provide an explanation of the subject and promote discussion and feed-back. Furthermore, existing mechanisms such as the National Qualifications Framework would be assured of an aligned approach to tertiary built environment education.

KEYWORDS:
Standardisation, tertiary education, built environment

INTRODUCTION
A quality deficit with regard to built environment (BE) qualifications is concluded following a survey conducted under the auspices of the Council for Scientific and Industrial Research (CSIR). In this survey all the expert interviews indicated a mismatch between the skills set required by industry and those provided by tertiary institutions. Furthermore, the element of mobility is absent [1].

The paper presents a case for the standardisation or alignment of subjects and subject content within tertiary BE education programmes and begins with a review of literature which attests to standardisation in nature, manufacturing, mathematics, accountancy and time.

Subsequent to a random sample survey of nine BE stakeholder groups, an analysis of the responses indicates that there is strong support for standardisation. However, a concern is that creativity and lateral and independent thinking are not catered for in standardisation and are citations from the fourteen percent that are opposed to BE programmes being standardised. The aforementioned concerns should thus be catered for by means of specified tasks, objectives and assignments.

Tables present the results of an inferential statistical analysis of the responses by means of a percentage in the case of ‘yes’ or ‘no’ or ‘unsure’ type questions. A mean score indicates the extent of support to Likert 5 point scale type questions. These tables enable inferences to be made regarding the standardisation of programmes on a national basis and the extent of support for common subjects at various levels of study.

A summary of the scores from three independent tests that indicates strong support for standardisation, common subjects and a common 1st year in tertiary BE education. The concluding comments inculcate a case for the standardisation of tertiary BE education programmes.

LITERATURE REVIEW
Standardisation is defined in The Standard Dictionary of English Language as ‘to make or conform to a standard’ [2]. A standard in turn is any measure of extent, quantity, quality, or value established by law or by general usage and consent. Standards in South Africa remain the preserve of the South African Bureau of Standards (SABS), which was established in terms of Act 24 of 1945.

Standardisation in nature is the rule rather than the exception. A medical doctor trained in human anatomy in any country can diagnose ailments, perform surgery and treat patients anywhere in the world, local laws permitting. Construction of nests by bird varieties found in different countries is the same and bees always construct their honeycombs of octagonal cells. In manufactured goods standardisation was driven by the age of mass manufacture, which began at the beginning of the 20th century with Henry Ford and Ransom Olds. Standardisation in the automotive industry has created its own problems, particularly from so called ‘pirate parts’ which have the form and fit, but may be sub-standard in terms of performance. To a large degree this practice is controlled through ‘trade marks’, indicating the authenticity of the source of manufacture [3].

Non-standardisation has often been deliberate and an example is how cannons and guns used to have different diameter barrels.
and ammunition. Today even the armaments industry is global and the calibre of both small arms and shells have been standardised. Undoubtedly, the most important standard is time, for without this standard there would be chaos.

A most influential mathematician in the 1700s, Leonhard Euler, was attributed with the standardisation of many mathematical terms and notations. Amongst other contributions, he popularised the use of the Greek letter π to stand for the ratio of a circle’s circumference to its diameter [4].

Not conforming to a generally accepted accounting practice would herald numerous problems. A notice placed in the in Daily Dispatch newspaper classified section by the Senqu municipality inviting tenders for the conversion to GAMAP/GRAP accounting standards substantiates this statement [5].

The South African Qualifications Authority Act, promulgated in 1985 developed a National Qualifications Framework whereby qualifications are based on clearly defined national standards. However, it has been argued that ‘standards’ have traditionally been modelled on first world norms which may be inappropriate to South Africa, a developing country in the process of transformation. World class standards have to be met in products destined for export, whereas, ‘second-grade’ products could be designated locally. This implies that a BE qualification needs to be internationally accredited. The government has recognised the importance of standardisation as being for the good of the country and contributing to improving the quality of life of all our citizens.

### METHODOLOGY

The sample stratum selected for the survey can be characterised as consisting of clusters, whose cluster characteristics are similar yet whose unit characteristics are as heterogeneous as possible [6]. Similarly, in this study all the tertiary BE education programmes have a specified syllabus, purpose and design, yet the students, institutions, educationalists, practitioners and the public that implement and use them differ widely in individual characteristics.

The survey instrument was a questionnaire which required a response to the standardisation of BE programmes on a national basis in terms of subjects and an opinion on the inclusion of common 1st year and common subjects at the various levels of study.

Haksever and Manesali used questionnaires for the acquisition of qualitative data using quantitative scales [7]. Similarly, the questionnaire used in this study incorporated the Likert 5 point scale to facilitate an evaluation of responses between the ranges of minor to major; most inappropriate to most appropriate; very poor to excellent and most inadequate to most adequate.

Table 1 provides a list of the BE stakeholder groups, the number of people surveyed in each group and the response received in terms of a percentage. A poor response was received from the Association of Construction and Project Managers (ACPM), the Association of South African Quantity Surveyors (ASAQS), the South African Council for the Project and Construction Management Professions (SACPCMP), the South African Institute of Architects (SAIA) and the South African Institution of Civil Engineers (SAICE). Notwithstanding the low percentage from the BE practitioner groups, a 7.8% response translates into 123 respondents. Consequently, it would not be erudite to ignore these opinions. A respectable 50.2% response was achieved with the BE Education group survey.

### ANALYSIS AND INTERPRETATION OF DATA

The captured data was first analysed using Microsoft Excel to produce descriptive statistics in the form of frequencies and a measure of central tendency in the form of mean scores. Inferences, in turn, were made from the collated and presented data.

However, in order to further analyse the data an expert statistician was consulted to conduct further tests. It is notable that the first test was checking for discrepancies, omissions or errors in capturing the data from the questionnaires prior to further tests for consistency, practical significance, reliability and association being conducted.

The inferential statistical analysis component of the study entailed the combining of the responses to enable summated scores to be calculated to reflect the actual support for topics.

### FINDINGS

Table 2 reveals that the majority of built environment stakeholder respondents are of the opinion that the programmes of the various built environment disciplines should be standardised in terms of subjects on a national basis. The average percentage of those in favour of standardisation is 71.6% compared to the 14.4% that are opposed to the BE programmes being standardised.

Of the groups that are more than 72% in favour of standardised programmes, it is notable that the final year diploma students predominate followed by the ASAQS, ACPM, SACPCMP, and SAIA respondents. The BE educationalists and the SAICE respondents recorded the highest negative responses.

Table 3 reveals that, with the exception of the SAIA, all the groups surveyed are supportive of common subjects at 1st year level. Furthermore, a mean score greater than 3.00 in four out of nine instances indicates that support may be deemed to exist for common subjects at 2nd year level. It is notable that the final year diploma programme respondents are of the opinion that subjects should be common between the five built environment disciplines’ programmes for the entire duration of the programmes. A mean of 3.66 relative to common 1st year subjects is an indication of strong support and a mean of 3.16 relative to common 2nd year subjects is an indication of moderate support.
Furthermore, a mean score equal to or greater than 4.00 in the case of the postgraduate, ACPM and ASAQS respondents is indicative of very strong support for common subjects in the programmes of the built environment disciplines.

In terms of the inclusion of a common 1st year in the five disciplines’ programmes a mean of 3.63 reflected in Table 4 confirms the mean of 3.66 reflected in Table 3 relative to 1st year level and indicates that support may certainly be deemed to exist for a common 1st year.

ACPM members followed closely by ASAQS members are deemed to be the most prominent proponents for the inclusion of a common 1st year of study between the built environment disciplines given that their mean scores are 4.13 and 4.11 respectively.

### CONCLUSION

Strong support may be deemed to exist for the standardisation of programmes in terms of subjects given that an average 71.6% of the respondents indicated a positive response to the question posed.

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5. Daily Dispatch, 2009/02/13 pg. 22 – classified section the Senqu municipality invited tenders for the conversion to GAMAP/GRAP accounting standards.
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INTRODUCTION
In line with its vision to be the custodian of construction related higher education in the Southern African region and its mission 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, the Association of Schools of Construction of Southern Africa (ASOCSA) held several regional meetings during 2008 with representatives of industry. The issues raised during these meetings were collated and developed into a survey instrument that was used to establish the views of industry stakeholders and practitioners and academics at universities and technical colleges in South Africa. This short paper presents the preliminary findings of the survey. The study confirms many initiatives that industry and academia can engage in to improve the image of the sector, quality of graduates and overall development of better relations between industry and academia in the region. A much broader based survey is presently underway using these initial responses.

RESEARCH APPROACH
Attendees of the regional meetings were invited via email after the meetings to participate in the study by completing the industry issue survey. All participants in the study were presented with several statements in six categories as follows:

- Government-related issues – 8 statements;
- Education and training related issues – 76 statements;
- Industry related issues – 8 statements;
- Marketing related issues – 4 statements;
- Research related issues – 4 statements; and
- General issues – 11 statements.

They were requested, using a 5-point Likert scale, to indicate to what extent they agreed with each of the statements where 1=totally disagree; 2=disagree; 3=neutral; 4=agree; and 5=totally agree. They were also requested to indicate which agency would be best positioned to take responsibility for addressing the particular issue, namely academic (A), industry (I) or both jointly (J). The data were analysed using the Statistical Package for Social Scientists and the descriptive statistics are presented in this, the first of a two short papers. This paper addresses government-, industry-, marketing-, research-related and general issues. The second paper will focus on the education and training related issues.

SURVEY FINDINGS
Government Related Issues
Responses to the eight statements are presented in Tables 1 and 2. The Cronbach, a score of reliability for the scaled responses to these issues, was 0.94 suggesting that the findings were significantly reliable.

From Table 1 it is evident that almost all respondents (92.9%) agreed that more technical schools needed to be created (mean=4.6) and that government was driving numbers at the expense of quality (mean=4.6). Respondents also agreed that government agencies were not involved in industry-academia forums (85.8%); the NQF had not been communicated to industry (78.6%); and there was not enough involvement in the National Construction Week (64.3%). However, there were mixed responses to the issues of the abuse of RPL, government initiatives negatively affecting the industry; and the removal of work integrated learning from tertiary education with many respondents having neutral views (>20%).

From Table 2 it is evident that, relative to most of the issues, joint responsibility was suggested. For example, 84.6% agreed that a joint effort by industry and academia was needed to ensure more involvement in the National Construction Week. Further, just more than three-quarters (76.9%) of respondents agreed that industry and academia jointly should encourage government to participate in forums where industry and academia interact. Similarly, industry and academia (75.0%) should address the issue of the creation of more technical schools. To a lesser extent, industry

<table>
<thead>
<tr>
<th>Statement/Issue</th>
<th>1(%)</th>
<th>2(%)</th>
<th>3(%)</th>
<th>4(%)</th>
<th>5(%)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>More technical schools need to be created</td>
<td>-</td>
<td>-</td>
<td>7.1</td>
<td>28.6</td>
<td>64.3</td>
<td>4.6</td>
<td>0.6</td>
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<td>Government is driving numbers at the expense of quality</td>
<td>-</td>
<td>-</td>
<td>7.1</td>
<td>28.6</td>
<td>64.3</td>
<td>4.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Government agencies are not involved in industry-academia forums</td>
<td>7.1</td>
<td>-</td>
<td>7.1</td>
<td>42.9</td>
<td>42.9</td>
<td>4.1</td>
<td>1.1</td>
</tr>
<tr>
<td>There is not enough involvement in the National Construction Week</td>
<td>-</td>
<td>-</td>
<td>35.7</td>
<td>28.6</td>
<td>35.7</td>
<td>4.0</td>
<td>0.9</td>
</tr>
<tr>
<td>The National Qualifications Framework (NQF) has not been communicated to industry</td>
<td>7.1</td>
<td>7.1</td>
<td>7.1</td>
<td>64.3</td>
<td>14.3</td>
<td>3.7</td>
<td>1.1</td>
</tr>
<tr>
<td>The Recognition of Prior Learning (RPL) is being abused</td>
<td>-</td>
<td>21.4</td>
<td>28.6</td>
<td>14.3</td>
<td>35.7</td>
<td>3.6</td>
<td>1.2</td>
</tr>
<tr>
<td>Government initiatives are negatively affecting the industry</td>
<td>7.1</td>
<td>7.1</td>
<td>21.4</td>
<td>42.9</td>
<td>21.4</td>
<td>3.6</td>
<td>1.2</td>
</tr>
<tr>
<td>Government wants to remove work integrated learning from tertiary education</td>
<td>28.6</td>
<td>7.1</td>
<td>28.6</td>
<td>14.3</td>
<td>21.4</td>
<td>2.9</td>
<td>1.5</td>
</tr>
</tbody>
</table>
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and academia should address government driving numbers at the expense of quality (66.7%). Joint efforts were needed on issues of communicating the implications of the NQF to industry (58.3%) and the negative impact of government initiatives on the sector as a whole (58.3%). Academia should take the lead relative to the perception that government wants to remove work integrated learning from tertiary education and disseminating the NQF to industry stakeholders while industry should address the impact of government initiatives, programmes and policies.

Industry Related Issues

Responses to the eight statements are presented in Tables 3 and 4. The Cronbach, a score of reliability for the scaled responses to these issues, was 0.80 suggesting that the findings were significantly reliable.

Table 3: Industry related issues: Levels of agreement.

<table>
<thead>
<tr>
<th>Statement/Issue</th>
<th>1 (%)</th>
<th>2 (%)</th>
<th>3 (%)</th>
<th>4 (%)</th>
<th>5 (%)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poaching negatively affects in-house training</td>
<td>72.7</td>
<td>25.0</td>
<td>14.3</td>
<td>14.3</td>
<td>35.7</td>
<td>28.6</td>
<td>3.9</td>
</tr>
<tr>
<td>There is a shortage of foremen/supervisors</td>
<td>66.7</td>
<td>21.4</td>
<td>25.0</td>
<td>25.0</td>
<td>25.0</td>
<td>21.4</td>
<td>1.0</td>
</tr>
<tr>
<td>The image of the industry is generally negative</td>
<td>25.0</td>
<td>8.3</td>
<td>25.0</td>
<td>8.3</td>
<td>25.0</td>
<td>8.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Professional bodies are not concerned about what is produced</td>
<td>14.3</td>
<td>35.7</td>
<td>28.6</td>
<td>35.7</td>
<td>28.6</td>
<td>3.9</td>
<td>1.1</td>
</tr>
<tr>
<td>The quality of on-site welfare facilities needs improvement</td>
<td>72.7</td>
<td>-</td>
<td>21.4</td>
<td>-</td>
<td>21.4</td>
<td>3.6</td>
<td>1.0</td>
</tr>
<tr>
<td>Construction vis-à-vis manufacturing does not compare well in terms of the health and welfare of the workforce</td>
<td>14.3</td>
<td>-</td>
<td>25.0</td>
<td>-</td>
<td>25.0</td>
<td>3.1</td>
<td>1.6</td>
</tr>
<tr>
<td>The average age of foremen is greater than 50 years</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Professional bodies are not concerned about what is produced</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Poaching negatively affects in-house training</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
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<td>21.4</td>
<td>3.6</td>
<td>1.0</td>
</tr>
<tr>
<td>The average age of foremen is greater than 50 years</td>
<td>25.0</td>
<td>-</td>
<td>25.0</td>
<td>-</td>
<td>25.0</td>
<td>3.1</td>
<td>1.6</td>
</tr>
<tr>
<td>Professional bodies are not concerned about what is produced</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

From Table 3, it appears that all respondents (mean = 4.4) agreed that poaching of staff and particularly skilled workers negatively affects the desire to do in-house training. Three-quarters of respondents (75.0%) agreed that there was a shortage of foremen and supervisors. Similarly, 71.5% agreed that the quality of on-site welfare facilities needed improvement. Further, 66.7% agreed that the mindset of consultants needed to change, 64.3% agreed that in terms of the health and welfare of construction workers the industry did not compare favourably relative to the manufacturing sector, and 50% agreed that the image of the industry was generally negative. There were mixed feelings (mean = 2.8) about professional bodies being concerned about what was being produced at universities.

Table 4 suggests that the joint efforts of industry and academia are necessary to address the negative image of the industry (81.8%) and the lack of concern by professional bodies about the quality of graduates produced at universities (77.8%). Industry needs to take the initiative to address the issues of poaching of staff and skilled workers (90.9%), the average age of foremen being over 50 years (87.5%), improvement in the quality of welfare facilities on sites and the relatively poor worker health and safety record when compared with the manufacturing sector (72.7%), the shortage of foremen and/or supervisors (66.7%), and influencing the current mindset of professional bodies (66.7%).

Table 4: Industry related issues: Agency responsible for action.

<table>
<thead>
<tr>
<th>Statement/Issue</th>
<th>I (%)</th>
<th>A (%)</th>
<th>J (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The image of the industry is generally negative</td>
<td>18.2</td>
<td>-</td>
<td>81.8</td>
</tr>
<tr>
<td>The quality of on-site welfare facilities needs improvement</td>
<td>72.7</td>
<td>-</td>
<td>27.3</td>
</tr>
<tr>
<td>The average age of foremen is greater than 50 years</td>
<td>87.5</td>
<td>-</td>
<td>12.5</td>
</tr>
<tr>
<td>There is a shortage of foremen/supervisors</td>
<td>66.7</td>
<td>-</td>
<td>33.3</td>
</tr>
<tr>
<td>Poaching negatively affects in-house training</td>
<td>90.9</td>
<td>-</td>
<td>9.1</td>
</tr>
<tr>
<td>The mindset of consultants must change</td>
<td>50.0</td>
<td>-</td>
<td>50.0</td>
</tr>
<tr>
<td>Construction vis-à-vis manufacturing does not compare well in terms of the health and welfare of the workforce</td>
<td>72.7</td>
<td>-</td>
<td>27.3</td>
</tr>
<tr>
<td>Professional bodies are not concerned about what is produced</td>
<td>22.2</td>
<td>-</td>
<td>77.8</td>
</tr>
</tbody>
</table>
Marketing Of The Industry

Responses to the four statements are presented in Tables 5 and 6. Given that there were only 4 scaled items the Cronbach α was extremely low.

From Tables 5 and 6, it is evident that most respondents (86.9%) agreed that the ASOCSA website should be used for forum discussions and that these should be driven jointly by both industry and academia (90.0%). Further, 58.3% of respondents agreed that an annual function was needed to honour achievements relative to skills development and training and 53.9% agreed that a promotional DVD would improve the image of the industry. Both industry and academia jointly should assume responsibility for these initiatives according to 88.9% and 90.0% of respondents respectively.

Table 6: Marketing related issues: Agency responsible for action.

<table>
<thead>
<tr>
<th>Statement/Issue</th>
<th>I (%)</th>
<th>A (%)</th>
<th>J (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A promotional DVD will improve the image of the industry</td>
<td>10.0</td>
<td>-</td>
<td>90.0</td>
</tr>
<tr>
<td>Careers in construction are not promoted</td>
<td>10.0</td>
<td>20.0</td>
<td>70.0</td>
</tr>
<tr>
<td>The ASOCSA website must be used for forum discussions</td>
<td>10.0</td>
<td>-</td>
<td>90.0</td>
</tr>
<tr>
<td>An annual function to honour achievements relative to skills development and training is needed</td>
<td>11.1</td>
<td>-</td>
<td>88.9</td>
</tr>
</tbody>
</table>

Research Related Issues

Responses to the four statements are presented in Tables 7 and 8. The Cronbach, a score of reliability for the scaled responses to these issues, was 0.59, which is acceptable for a small number of scaled items given the general rule of thumb of 0.70 for large numbers of scaled items.

The findings in Table 7 suggest that 80.0% of respondents agreed that feedback from this survey should be included for dissemination in the Journal of Construction. Further, 72.7% of respondents agreed that the research needs of the industry were not known and 63.6% that the format of the industry/academia forum at the annual ASOCSA conference should be reviewed. Just over half (54.5%) agreed that the Journal of Construction was not distributed widely enough.

Table 7: Research related issues: Levels of agreement.

<table>
<thead>
<tr>
<th>Statement/Issue</th>
<th>1 (%)</th>
<th>2 (%)</th>
<th>3 (%)</th>
<th>4 (%)</th>
<th>5 (%)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback from this survey must be included in the Journal of Construction</td>
<td>-</td>
<td>10.0</td>
<td>10.0</td>
<td>30.0</td>
<td>50.0</td>
<td>4.2</td>
<td>1.0</td>
</tr>
<tr>
<td>The research needs of the industry are not known</td>
<td>-</td>
<td>-</td>
<td>27.3</td>
<td>54.5</td>
<td>18.2</td>
<td>3.9</td>
<td>0.7</td>
</tr>
<tr>
<td>The format of the industry/academia forum at the annual ASOCSA conference needs to be reviewed</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>The Journal of Construction is not distributed widely enough</td>
<td>9.1</td>
<td>27.3</td>
<td>9.1</td>
<td>54.5</td>
<td>-</td>
<td>3.1</td>
<td>1.1</td>
</tr>
</tbody>
</table>

From Table 8, it is evident that industry and academia should assume joint responsibility for reviewing the industry/academia forum at the annual ASOCSA conference (87.5%), increasing the distribution of the Journal of Construction (77.8%), identifying the research needs of the industry (66.7%), and the dissemination of the findings of this survey in the Journal of Construction (37.5%). In the last case, academia should lead this initiative.

General Issues

Responses to the 11 statements are presented in Tables 9 and 10. The Cronbach, a score of reliability for the scaled responses to these issues, was 0.94, suggesting that the findings were significantly reliable.

The findings presented in Table 9 suggest that all respondents agreed that preparatory work for a ‘bosberaad’ was necessary and that SAFCEC and the MBSA should drive the ‘bosberaad’. Further, 90.9% agreed that meetings between industry and academia need to be scheduled, that industry-academia structures need to be established on a regional basis given that regular meetings are not presently held (90.0%). Further, 81.9% of respondents agreed that there should be a ‘bosberaad’ between industry and academic leaders to develop a vision for the industry. Given that respondents (70.0%) agreed that the MBSA and HODs need to participate at ASOCSA meetings of academic Heads of Departments (HODs). These findings are confirmed by 81.9% of respondents who agreed that the interface between industry and academia was inadequate. Other findings of note are that 60.0% of respondents agreed that a national intervention was necessary and that SAFCEC and the MBSA should drive the ‘bosberaad’ initiative (63.7%).

From Table 10 it appears that all respondents agreed that industry and...
Table 9: General issues: Levels of agreement.

<table>
<thead>
<tr>
<th>Statement/Issue</th>
<th>1 (%)</th>
<th>2 (%)</th>
<th>3 (%)</th>
<th>4 (%)</th>
<th>5 (%)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory work for the ‘bosberaad’ is necessary</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>54.5</td>
<td>45.5</td>
<td>4.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Meetings between industry-academia need to be scheduled</td>
<td>-</td>
<td>-</td>
<td>9.1</td>
<td>54.5</td>
<td>36.4</td>
<td>4.3</td>
<td>0.6</td>
</tr>
<tr>
<td>The MBSA and HODs do not meet regularly</td>
<td>-</td>
<td>-</td>
<td>30.0</td>
<td>20.0</td>
<td>50.0</td>
<td>4.2</td>
<td>0.9</td>
</tr>
<tr>
<td>Industry and academics should meet –‘bosberaad’ – leaders in industry and ASOCSA to develop vision</td>
<td>-</td>
<td>9.1</td>
<td>9.1</td>
<td>36.4</td>
<td>45.5</td>
<td>4.2</td>
<td>1.0</td>
</tr>
<tr>
<td>The interface between industry and academia is inadequate</td>
<td>-</td>
<td>-</td>
<td>18.2</td>
<td>45.5</td>
<td>36.4</td>
<td>4.2</td>
<td>0.8</td>
</tr>
<tr>
<td>Industry must participate at ASOCSA academic heads meetings</td>
<td>-</td>
<td>-</td>
<td>18.2</td>
<td>54.5</td>
<td>27.3</td>
<td>4.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Industry-academia structures are needed on regional basis</td>
<td>-</td>
<td>10.0</td>
<td>-</td>
<td>60.0</td>
<td>30.0</td>
<td>4.1</td>
<td>0.9</td>
</tr>
<tr>
<td>The MBSA does not involve HODs in their annual congress</td>
<td>-</td>
<td>-</td>
<td>50.0</td>
<td>10.0</td>
<td>40.0</td>
<td>3.9</td>
<td>1.0</td>
</tr>
<tr>
<td>A national intervention is necessary</td>
<td>-</td>
<td>10.0</td>
<td>30.0</td>
<td>20.0</td>
<td>40.0</td>
<td>3.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Regular industry-academia liaison meetings are not held</td>
<td>10.0</td>
<td>-</td>
<td>-</td>
<td>70.0</td>
<td>20.0</td>
<td>3.9</td>
<td>1.1</td>
</tr>
<tr>
<td>SAFCEC and the MBSA should drive the ‘bosberaad’ initiative</td>
<td>-</td>
<td>18.2</td>
<td>18.2</td>
<td>36.4</td>
<td>27.3</td>
<td>3.7</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Table 10: General issues: Agency responsible for action.

<table>
<thead>
<tr>
<th>Statement/Issue</th>
<th>I (%)</th>
<th>A (%)</th>
<th>J (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The interface between industry and academia is inadequate</td>
<td>-</td>
<td>-</td>
<td>100.0</td>
</tr>
<tr>
<td>Regular industry-academia liaison meetings are not held</td>
<td>-</td>
<td>12.5</td>
<td>87.5</td>
</tr>
<tr>
<td>Meetings between industry-academia need to be scheduled</td>
<td>-</td>
<td>12.5</td>
<td>87.5</td>
</tr>
<tr>
<td>The MBSA does not involve HODs in their annual congress</td>
<td>14.3</td>
<td>-</td>
<td>85.7</td>
</tr>
<tr>
<td>The MBSA and HODs do not meet regularly</td>
<td>14.3</td>
<td>-</td>
<td>85.7</td>
</tr>
<tr>
<td>Industry and academics should meet –‘bosberaad’ – leaders in industry and ACOCS to develop vision</td>
<td>12.5</td>
<td>-</td>
<td>87.5</td>
</tr>
<tr>
<td>Preparatory work for the ‘bosberaad’ is necessary</td>
<td>12.5</td>
<td>-</td>
<td>87.5</td>
</tr>
<tr>
<td>A national intervention is necessary</td>
<td>14.3</td>
<td>-</td>
<td>85.7</td>
</tr>
<tr>
<td>SAFCEC and the MBSA should drive the ‘bosberaad’ initiative</td>
<td>25.0</td>
<td>-</td>
<td>75.0</td>
</tr>
<tr>
<td>Industry must participate at ASOCSA academic heads meetings</td>
<td>25.0</td>
<td>-</td>
<td>75.0</td>
</tr>
<tr>
<td>Industry-academia structures are needed on regional basis</td>
<td>14.3</td>
<td>-</td>
<td>85.7</td>
</tr>
</tbody>
</table>

academia jointly should be responsible for improving the interface between industry and academia. Further, joint responsibility should be taken for regular scheduled meetings between industry and academia (87.5%). Similarly, most respondents (87.5%) agreed that joint responsibility should be taken for the preparation for and arranging of a ‘bosberaad’ between leaders of industry and academia to develop a vision for the industry. Marginally fewer respondents (85.7%) agreed that there should be joint responsibility for a national intervention, establishment of regional industry-academia structures, regular meetings between MBSA and HODs and involvement by MBSA of HODs in their national congress.

CONCLUSION

The preliminary findings of the industry-academia survey suggest multiple opportunities for joint action by academia facilitated by ASOCSA and the construction industry facilitated by the MBSA. These include, inter alia, the following:
- Government related issues: increasing involvement in the National Construction Week; pressurising government to create more technical schools; and get government to address issues of quality rather than just numbers.
- Industry related issues: reversing the negative image of the industry; and the lack of concern by construction professional bodies about what type of graduate is produced at universities.
- Marketing issues: using the ASOCSA website for forum discussions and as a marketing and promotional tool; developing a promotional DVD; and arranging an annual function to honour achievements relative to skills development and training.
- Research related issues: reviewing the industry-academia form at the annual ASOCSA conference, which this year will be at the Victoria Falls in Zambia from May 17-19; increasing the distribution of the Journal of Construction; and the identifying the research needs of the industry.
- General issues: improving the interface between industry and academia through more regular and scheduled regional liaison meetings and participation in each other’s forums; and convening a national ‘bosberaad’ between leaders of industry and academia to develop a vision for the industry.

It is recommended that a high level meeting between ASOCSA and the MBSA be arranged to develop an agenda and accompanying action plan to address the issues that have been identified in this study on a structured basis with the goal of bringing about incremental improvement. Further, ASOCSA will increase the sample size to further validate the findings of this phase of the study.

ACKNOWLEDGEMENT

The author acknowledges the role of Master Builders South Africa (MBSA) in facilitating various meetings in the regions and in most cases providing the venues and refreshments. Funding by the National Research Foundation (NRF), under a research grant to investigate the state of construction education in South Africa, ASOCSA and the Southern African Built Environment Research Centre (SABERC) at the Cape Peninsula University of Technology (CPUT), is also acknowledged. The author acknowledges the data encoding and analysis by Ruben Ndihokubwayo, Research Associate at SABERC.
1. Submission of manuscripts
Authors should submit their papers electronically to hauptt@cput.ac.za or mayc@cput.ac.za provided that the paper is attached as a separate file using the recommended MS Word software format. All electronic submissions containing viruses will be deleted without opening them.

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Manuscripts are blind peer reviewed by acknowledged experts. Revisions may be required before a decision is made to accept or reject the paper. If an author is uncertain about whether a paper is suitable for publication in JOC, it is acceptable to submit a synopsis first.

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Length: Although there is no length limitation, papers should preferably be between 3 000 and 6 000 words in length. Longer papers will only be accepted in exceptional cases and might be subject to serialisation at the discretion of the editor.

Layout: The manuscript must be in English, typed and double-spaced 10pt type on one side of A4 paper only, with a 4cm margin on the left-hand side. All other margins are to be 3cm. All text should be linked to the left and right margins i.e. paragraphs should not be indented and text should be justified. One-line spacing should be left between paragraphs and double line spacing before a new heading. Leave one line space between a heading and the following paragraphs. All headings should be in 12pt bold capitals. Paragraphs and sub-paragraphs should not be numbered.

The pages should be numbered consecutively. There should be no loose addenda or notes or other explanatory material. The manuscript should be arranged under headings and sub-headings.

Title page (page 1): The first page of the manuscript must contain a concise and informative title, a secondary running title of not more than 75 characters and spaces, the name(s), the affiliation(s) and address(es) of the author(s) and the name, address, telephone, fax and email of the author who will be responsible for correspondence and corrections. The title should be in 12pt bold capitals, the name(s) of the author(s) in 10pt bold upper and lower case and the affiliation(s) and address(es) in 10pt upper and lower case with a single line space between each.

Abstract and keywords (page 2): To produce a structured abstract, complete the following fields about the paper. There are four fields which are obligatory (Purpose, Design, Findings and Value); the other two (Research limitations/implications and Practical implications) may be omitted if they are not applicable to the paper. Abstracts should contain no more than 150 words. Write concisely and clearly. The abstract should reflect only what appears in the original paper. Provide no more than five keywords.

Purpose of this paper
What are the reason(s) for writing the paper or the aims of the research?

Design/methodology/approach
How are the objectives achieved? Include the main method(s) used for the research. What is the approach to the topic and what is the theoretical or subject scope of the paper?

Findings
What was found in the course of the work? This will refer to analysis, discussion, or results.

Research limitations/implications (if applicable)
If research is reported in the paper, this section must be completed and should include suggestions for future research and any identified limitations in the research process.

Practical implications (if applicable)
What outcomes and implications for practice, applications and consequences are identified? Not all papers will have practical implications but most will. What changes to practice should be made as a result of this research/paper?

What is original/value of paper?
What is new in the paper? State the value of the paper and to whom.

All headings and sub-headings should be in 10pt bold capitals and the keywords themselves should be in 10pt bold upper and lower case.

Introduction (page 3):
The introduction should clearly state the purpose (aims and objectives) of the paper. It should include key references to appropriate work, but is NOT the place for a comprehensive historical or literature review.

Discussion:
The discussion should emphasise the implications and practical significance of research findings, their limitations, and relevance to previous studies.

Acknowledgements:
A short acknowledgement section of one paragraph is permissible at the end of the text.

Conclusions:
Conclusions should state concisely the most important propositions of the paper, as well as the recommendations of the authors based on the propositions.

Illustrations:
Illustrations must accompany the manuscript and should be included in the text. Photographs, standard forms and charts must be referred to as Figure 1, Figure 2, etc. They should be numbered in the order in which they are referred to in the text.