CONTENTS

AIMS & SCOPE | 2

ASSESSING STRATEGIES FOR IMPROVING THE SOCIAL SECURITY OF CONSTRUCTION WORKERS IN ZIMBABWE

BY: MOYO, T.1, CRAFFORD, G.J.2 AND EMUZE, F.3 | 4

A MIXED METHOD STUDY ON SOCIAL SUSTAINABILITY CONSIDERATION BY PUBLIC SECTOR ORGANIZATIONS DURING INFRASTRUCTURE PROCUREMENT

N.M.J. DIBA1, B.O. AWUZIE2 C.O. AIGBAVBOA1, T.C. HAUPT4 | 14

COGNITIVE LOADING AND SCHEMA DEVELOPMENT DUE TO COMPLEX QUESTIONS IN STUDENTS OF CONSTRUCTION PROGRAMMES

EPHRAIM ZULU & THEODORE C. HAUPT | 27

INSTRUCTIONS FOR AUTHORS | 38
AIMS AND SCOPE

The Journal Of Construction (JOC) is the official journal of the Association Of Schools Of Construction Southern Africa (ASOCSA). ASOCSA has committed itself to foster excellence in construction communication, scholarship, research, education and practice and the JOC provides the medium to achieve this commitment. JOC is at this stage a bi-annual refereed journal serving all stakeholders and participants in the building construction and civil engineering sectors.

JOC publishes quality papers written in a conversational style aiming to advance knowledge of practice and science of construction while providing a forum for the interchange of information and ideas on current issues. JOC aims to promote the interface between academia and industry, current and topical construction industry research and practical application by disseminating relevant in-depth research papers, reviews of projects and case studies, information on current research projects, comments on previous contributions, research, innovation, technical and practice notes, and developments in construction education policies and strategies. Some issues might be themed by topic.

Topics in JOC include sustainable construction, education focused by topic.

Benefits of open access for authors, include:
- Free access for all users worldwide
- Authors retain copyright to their work
- Increased visibility and readership
- Rapid publication
- No spatial constraints

The Journal of Construction is committed to open access for academic work and is, therefore, an open access journal, which means that all articles are available on the internet to all users immediately from the date of publication. This allows for the reproduction of articles, free of charge, for non-commercial use only and with the appropriate citation information. All authors publishing in the Journal of Construction accept these as the terms of publication. Copyright of the content of all articles and reviews remains with the designated author of the article or review. Copyright of the layout and design of Journal of Construction articles and reviews remains with the Journal of Construction and cannot be used in other publications.
ASSESSING STRATEGIES FOR IMPROVING THE SOCIAL SECURITY OF CONSTRUCTION WORKERS IN ZIMBABWE

Moyo, T.1, Crafford, G.J.2 and Emuze, F.3
1PhD Candidate, Department of Quantity Surveying, Nelson Mandela University, tirivainyomo@gmail.com.
2Department of Quantity Surveying, Nelson Mandela University, Gerrit.Crafford@emandela.ac.za.
3Department of Built Environment, Central University of Technology, femuze@cut.ac.za.

INTRODUCTION
Social responsibility in Zimbabwe is so fundamental that organisational resources may depend mainly on their level of social commitment. This entails undertaking actions that earn trust and respect from all stakeholders[10]. Construction companies need to improve on implementing strategies that address social issues for their employees and the communities in which they operate[11]. While corporate social responsibility strategies in Zimbabwe are confined to an altruistic end (philanthropy) and an ethical obligation, sustainable development activities are preferred as they contribute more to good management practice and societal welfare[2,4,5]. Workforce treatment changes are indeed a result of such strategic organisational improvements in a company[6,7]. Thus, construction companies should maintain favourable relationships with their communities to promote their business interests. However, corporate social responsibility in Zimbabwe has been increasingly used for enhancing corporate images as opposed to ensuring local communities acquire meaningful engagement through bidirectional communication[8,9].

ABSTRACT
PURPOSE OF RESEARCH:
The aim of this research is to propose corporate social responsibility strategies that can improve social security of construction workers in Zimbabwe.

METHOD:
A questionnaire survey obtained perceptions from site/ project managers and skilled and semi-skilled workers from construction companies and thirteen building projects, respectively, in Harare, Bulawayo and Shurugwi.

FINDINGS:
Site and project managers prioritised training workers on effects and the need for minimisation of consumption of natural resources within the communities while the workers considered outplacement services, retraining and severance benefits as most essential to them.

RESEARCH LIMITATIONS:
Responses were generated from site/project managers who may not be owners of construction companies, but have considerable influence on ways to improve the productivity and welfare of workers.

PRACTICAL IMPLICATIONS:
The study encourages inclusive and well-resourced social responsibility programmes for construction workers.

ORIGINALITY/VALUE:
The corporate social responsibility strategies identified will positively enhance the welfare of workers.

KEYWORDS: Construction, Social security, Sustainability, Workers, Zimbabwe

Despite social security systems being fundamental to ensure decent living conditions for workers, their inadequacy in the provision of social protection for the economically active population is evident[13]. The focus of social security within the decent work agenda is widened to include the identification of socio-economic vulnerabilities of workers, linking social security and development, and combining agendas of poverty reduction, human development and social integration[14].

These elements of social security could be promoted with a range of strategies. Therefore, this article sought to determine social responsibility strategies that would significantly enhance the welfare of workers in Zimbabwe, from the perspective of both managers and construction workers. Challenges due to demographics were noted and alluded to, and remain contentious[13]. Negative experiences of employees well-being are borne in untrained individuals[15]. Positive strides taken towards flexible work arrangements for low-level staff and different employees have also been noted[16]. Such demographic connotations require a careful investigation within the Zimbabwean construction industry to unravel any specific inadequacies and differences and inform interventions concerning the designation of the different respondent groups.

The aim of this research is to propose corporate social responsibility strategies that can improve social security of construction workers. Productivity enhancement can be achieved by improving social security and the growth of social justice[12]. Firms that explore how to build corporate social responsibility into strategy are likely to reap rewards of improved competitive advantage that benefit the society[3]. Therefore, to augment the shortcomings of the public social systems, private construction firms can implement social security systems that are propagated through corporate social responsibility strategies. The interrogation of practices that benefit the communities in which the companies operate, ensure decent work for construction workers and maintain positive relationships within those communities is paramount[13].

Succeeding sections of this article address the social security concept and corporate social responsibility strategies. The research method is then revealed through justification of the constructs within which the significance of corporate social responsibility strategies towards enhancing social security was undertaken. The findings from the data collection are subsequently presented, analysed and interpreted, resulting in the extraction of conclusions. Finally, implications for implementation by stakeholders and recommendations for further research and practice are offered.

SOCIAL SECURITY
Social security seeks to protect workers through society’s providing measures against the economic and social distresses that would emanate from the stoppage or substantial reduction of earnings[8,9]. Social security is recognized by the International Labour Organisation (ILO) as the cornerstone of social protection and a key element of the International Labour Organisation constitution. The Social Security Convention 1952 (No. 102) establishes nine classes of benefits: medical care, sickness benefit, unemployment benefit, old-age benefit, employment injury benefit, family benefit, maternity benefit, invalidity benefit and survivor’s benefit[13]. The National Social Security Authority partially caters for construction workers but fails to provide for benefits such as unemployment benefits, family benefits, and maternity benefits[13].

On the other hand, the construction industry has a poorly subscribed pension scheme mostly owing to the nature of intermittent employment structures[8,9]. Failure to adequately cater for construction workers drastically compromises their social protection as destitution and poverty take center stage. This is exacerbated by the lack of adequate capacity of the construction industry pension scheme, which requires reformation to a more inclusive social security system[16]. Therefore, there is a need to operationalise social security systems that care for construction workers in Zimbabwe with regard to accessing these benefits. The interventions can take the form of corporate social responsibility strategies implemented by construction companies to facilitate the realization of essential benefits that are not forthcoming from the established social security schemes.

CORPORATE SOCIAL RESPONSIBILITY STRATEGIES
The vision to attain sustainable communities acknowledges the need for social cohesion and inclusion, but this has its challenges shrouded in ethnicity and poverty[16]. Corporate social responsibility activities cover environmental (covering aspects of energy, water use, emissions, effluents and waste), social (including labour practices, decent work, human rights, society and product responsibility) and economic (the impact of economic conditions and systems) aspects[16]. Entrepreneurs, including construction companies, are generally viewed as part of the problem in the practice of sustainability[18]. While activities in the construction industry are acknowledged to have an injurious effect, increased pressure from stakeholders continues to encourage companies to act in socially responsible ways[9].
The ability of corporates to address these needs sufficiently is also subject to rationalisation and compromises, and these should be properly documented and communicated before and engagement. Various authors have professed corporate social responsibility strategies that can potentially directly or indirectly enhance the welfare of construction workers at the workplace and within their communities, and these are subsequently discussed.

ENVIRONMENTAL ISSUES THAT TRANSFER GOOD PRACTICES TO COMMUNITIES

Employees’ lifestyles are dependent on surrounding economic, social and environmental factors[25]. The interface between community participation and environmental management is paramount for a holistic and consensus-based approach towards achieving sustainable development at the local level[26]. Such training should include the conservation of natural resources during construction work and the safe handling of hazardous substances. Thus, an environmental management culture is established within the communities and this guarantees the welfare of workers, their families and the citizenry.

INVOLVE EMPLOYEES IN DECISIONS THAT AFFECT THEIR WORK ENVIRONMENT

The well-being of employees is negatively affected by poor work environments[27]. The work environment and employee outcomes improve as employees are provided with autonomy in decision making[28]. The workers themselves can contribute towards their work environment by being given opportunities to contribute their innovativeness. When these work environments are sufficient for workers to express themselves fully, their well-being is improved, and this cascades to their immediate families and society.

OUTPLACEMENT SERVICES, RETRAINING AND SEVERENCE BENEFITS

Outplacement is the providing of support to redundant employees through facilitating transition and re-orientation in the job market[29]. Outplacement services are essential as they provide an opportunity for retirees to be skilled in new jobs to enable them to be re-employed[30]. Further to this, the critical humanistic approach is the provision of such an opportunity to do so. However, in times of economic depression, companies may desist from such facilitations as they fear that their workers can end up being their competitors in the industry. This, however, can be circumvented by establishing a symbiotic relationship characterised by trust through such corporate responsibility strategies. However, outplacement does not assist retirees or mitigate the effects of retrenchment through counselling, and it lacks a holistic approach to the retirees’ job loss[31]. Farther to outplacement services, employers offer severance benefits to employees as a social responsibility and a way of maintaining an excellent reputation within the labour market as opposed to compensation for past work performance[32]. Failure to regulate the offering of severance benefits by companies that have affected retrenched workers as they are disadvantaged by either failing to receive their severance packages or to receive these in cash amounts that cannot sustain them and their families.

LIFE MANAGEMENT, FLEXI-TIME AND WORK-LIFE BALANCE POLICIES

Employees and retirees in Nigeria are increasingly calling for more training in retirement planning[33]. While retirement planning can be considered essential, the duty of undertaking it is not regulated by law and construction companies are not inclining to provide for it. This continuous advocacy can, however, comprehensively aid the workers but considering it within social dialogue deliberations could immensely motivate for its widespread implementation. Related to this, childcare provisions are affected owing to lack of training in balancing work and life of most single parents as well as dual-earning parent households[34]. This equips workers for adequate standards of living beyond their active work lives and to appreciate the value of investing in the adequate care of dependents. Work-life balance policies are described as organisational programmes that enhance employees’ performance by reducing work-life conflict through maintaining satisfactory levels of employees’ involvement in their multiple roles in life[35]. They further pronounce flexi-time as an organisational strategy that allows employees to self-determine their working time to enable them to meet both foreseeable and unforeseeable personal and family commitments. Addressing work-life elements through candid interest from managers in the well-being of their employees’ families and their own lives leads to the retaining of most talented staff and contributes to continuity within the organization[36]. The changing socio-economic and environmental pressures are pertinent for employees. To embrace work-life balances, policies that consider flexi-time and work-life balance is pertinent owing to the benefits alluded to. However, this requires an overhaul of the whole construction workers’ policies so that adequate alignment is achieved.

POLICIES THAT ENSURE WELL-BEING OF EMPLOYEES

Well-being has become paramount in recent years with the thrust towards the development of a meaningful and sustainable society[37]. Invariably, both the organisational and workers’ well-being are intricately interconnected towards exploiting return on capital and delivering commercial success. The social context within communities contributes to the personal well-being of workers in the workplace. However, workers look to employers to achieve basic physical and mental needs, physical safety, health and a feeling that they can cope with life[38]. The necessity of employee treatment of respect, dignity and an open-door policy enhances job satisfaction and overall employee well-being within their workplace and community[39]. Owing to the absence of a standard framework for measuring employee well-being, a plethora of concepts has been widespread with no definitive conclusion[40].

DISCRIMINATION, CORRUPTION AND HARASSMENT POLICIES

Management attitudes and organisational climate concerning harassment of employees need to be addressed as these contribute to the financial loss of an organisation[41]. Organisational justice positively affects the well-being of workers through protecting them from corruption, as a victimisation, victimisation and harassment[42]. The existence of legislation on discrimination, harassment and victimisation in Zimbabwe seems sufficient. However, regulation needs to be enhanced, and punitive measures for non-compliance need interrogation. If construction companies improve in terms of regulation, the welfare of the workforce can thus be guaranteed.

ENCOURAGING LOCAL EMPLOYABILITY SCHEMES AND QUALITY WORK EXPERIENCE FOR CONSTRUCTION TRADES STUDENTS

Employees affirm that training through local employability schemes is appropriate to grow them into competent workers[43]. Adequate development of student self-efficacy is greatly achieved through high-quality work experiences[44]. Society must invest in the development of local human capital to cope with prevalent socio-economic and technological changes[45]. However, the need to monitor the quality of these work experiences within the different communities as they must transcend known cultural differences is advocated for[46]. The need for the development of smart policies that enhance students’ self-efficacy through encouraging youth work experiences within these communities is justifiable[47]. The contribution by the various authors of various corporate social responsibility strategies is appropriate to motivating Zimbabwean construction companies towards their implementation.

RESEARCH METHOD

The study followed a deductive approach. The positivist view, explained as ‘the pursuit of natural science’, progressing social science research, was utilised in this study[48]. Thus, a quantitative strategy was adopted through a cross-sectional survey[49]. Insights were obtained from site and project managers from construction companies registered with the Construction Industry Federation of Zimbabwe. Skilled and semi-skilled workers from thirteen building projects in Harare, Bulawayo and Shurugwi were also approached for participation. These construction sites were purposively selected from the National Social Security Authority database. While site/project managers represented the construction companies’ managerial views, the trades of bricklayers, carpenters and painters were selected based on the premise that these are related to the critical path of construction projects.

A total of 135 respondents participated in the study, as shown in Table 1. The samples were computed from a confidence interval of 95%, with the margin of error of 5% [50]. The overall response rate for participation was 78.5%, and this was satisfactory and acceptable according to a suggested response rate of 60% with a standard deviation of 20% as a standard norm for populations of employees, managers or professionals[51].

The nature of the collected data result in descriptive and inferential analysis. The data was analysed through the normality test, the Pearson chi-squared test, ranking, and the Mann-Whitney U test. For normality, the Kolmogorov-Smirnov and Shapiro-Wilk test were used, where a non-significant result (sig value > 0.05) indicates normality[52]. Using the Shapiro-Wilk test results, a sig value of 0.00 indicated that the data was not normally distributed. However, using the Kolmogorov-Smirnov test, a sig value of 0.061 indicated that the data was not normally distributed. In such instances, the Shapiro-Wilk test takes precedent for samples greater than 50, as this test is always more sensitive compared to the K-S test[53]. Therefore, non-parametric tests such as the Pearson Chi-squared test and the Mann-Whitney U test were utilized. The Pearson Chi-squared test was
used for goodness of fit where the divergence between the expected significant outcome and the observed outcome was established, and the significant variables were selected with the parameters set at a 5% level of significance[42]. Cramer’s statistic was utilised to measure the size of the association between the dependent and independent variable[43]. The highest Cramer value, between 0 and 1, was considered to have the highest significance with significance set at 5%. Ranking is described as a product of the respondents’ rating according to numbers that represent their attitudes, opinions, perceptions or preferences[44]. The Mann-Whitney U test is a test for comparing the central tendency of two independent samples, which were perceptions from site/project managers and construction skilled and semi-skilled workers[45]. The statistical significance level for the test was based on a standard value of p < 0.05. A Cronbach alpha reliability test was also undertaken for the thirteen corporate social responsibility strategies within the study with a computed value of 0.807 which was within the “good” range of >0.80[46].

TABLE 1: Response rate

<table>
<thead>
<tr>
<th>Respondent Group</th>
<th>Population</th>
<th>Sample Size</th>
<th>Responses</th>
<th>Response Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Managers/Project Managers</td>
<td>83</td>
<td>68</td>
<td>54</td>
<td>79.4</td>
</tr>
<tr>
<td>Skilled and Semi-Skilled Workers</td>
<td>142</td>
<td>104</td>
<td>81</td>
<td>77.9</td>
</tr>
<tr>
<td>Total</td>
<td>225</td>
<td>172</td>
<td>135</td>
<td>78.5</td>
</tr>
</tbody>
</table>

The questionnaire utilised in the survey consisted of two sections. The first section dealt with demographic issues while the second section dealt with corporate social responsibility strategies extracted from the literature reviewed herein. A five-point Likert scale was used to collect quantitative data on the respondents’ insights on how the strategies would improve construction workers’ social security. Respondents were requested to rate within the parameters of 1 - insignificant, 2 - of little significance, 3 - somewhat significant, 4 - significant, 5 - very significant, U - unsure.

RESULTS AND DISCUSSION

A Pearson chi-squared test was undertaken to ascertain goodness of fit of corporate social responsibility strategies to an expected outcome of significance. Cramer’s values for each corporate social responsibility strategy was ascertainment to show the size of association between the variables. “Zero tolerance for corruption, discrimination, victimisation and harassment through open processes” and “Encourage local employability schemes” for managers and construction workers respectively, were insignificant. However, all other strategies were significant with p < 0.05. This confirms intimations on the need to attain sustainable communities through inclusive sustainability practices utilising company-instituted resolutions[17,18]. It further supports the importance of implementation of social responsibility strategies within the Zimbabwean construction industry.

Managers had higher Cramer’s values, as compared to construction workers, for all the environmental-related strategies that included training staff on strategies to reduce the emission of hazardous substances and to encourage implementation in communities, training staff on ways to reduce environmental footprint, and training staff on the effects of and need for minimisation of consumption of natural resources within their communities. Managers have a better understanding that employees’ lifestyles are dependent on surrounding environmental factors that include the reduction of the environmental footprint[19]. Managers perceive that provision of such training assists the workers in protecting themselves from exposure to sickness and health issues at the workplace first, before permeating to the communities. In addition, such training is paramount for a holistic and consensus-based approach towards achieving sustainable development within the communities[20].

Workers potentially need environmental sustainability training to be able to enhance their appreciation of benefits that can accrue from such training. Utilising construction workers through adequately equiping them is an invaluable approach to enhancing sustainability within communities and also safeguarding them within the workplace.

As shown in Table 2 and 3, construction workers had higher Cramer’s values for the strategies on extending training to life management, retirement planning and care of dependents and offering outplacement services, retraining and severance benefits when closures and retrenchments are imminent, as compared to managers. Managers are likely to view these strategies as a cost to the company, which they are not prepared to meet, and beyond that, they do not seem to appreciate that the human resource is worth the effort. This conforms with the view that construction companies are part of the problem in the practice of sustainability[14].

TABLE 2: Ranking of corporate social responsibility strategies by site management

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Site and Project Managers</th>
<th>Cramer’s value</th>
<th>Asymp. Sig.</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Train staff on the effects and the need for minimisation of consumption of natural resources within their communities</td>
<td>0.825</td>
<td>0.000</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Offer quality work experience for construction students on apprentices within local communities</td>
<td>0.816</td>
<td>0.000</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Encourage local employability schemes</td>
<td>0.814</td>
<td>0.000</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Train staff on ways to reduce the environmental footprint of construction activities</td>
<td>0.813</td>
<td>0.000</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Offer outplacement services, retraining and severance benefits, when closures and retrenchments are imminent</td>
<td>0.789</td>
<td>0.000</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Encourage employee volunteering in the community with financial contributions and help in kind</td>
<td>0.780</td>
<td>0.000</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Establish policies to ensure the well-being of all employees and the public</td>
<td>0.761</td>
<td>0.001</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Train staff on strategies to reduce the emission of hazardous substances</td>
<td>0.752</td>
<td>0.001</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Establish an environmental management system that transfers good practices to the communities</td>
<td>0.743</td>
<td>0.000</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Be open to flex-time and other work-life balance policies for construction workers</td>
<td>0.719</td>
<td>0.001</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Extend training to life management, retirement planning and care of dependents</td>
<td>0.711</td>
<td>0.001</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Involve employees in business decisions that affect them and improve the work environment security</td>
<td>0.673</td>
<td>0.041</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Zero tolerance for corruption, discrimination, victimisation and harassment through open policies</td>
<td>0.617</td>
<td>0.222</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>
Workers are the most affected by closures and retrenchments and thus prefer strategies that assist them to be re-engaged elsewhere or re-trained, or allow them to receive financial benefits. Provision of up-skilling facilities, opportunities for acquiring new skills and job centres within the Zimbabwean construction industry would be beneficial in this regard. These help positive advantages for workers as they can be skilled for new jobs and their economic sustainability can be ensured [24, 25]. Unfortunately, workers’ training does not extend to social aspects such as life management, retirement planning and care of dependents. However, its importance has been revealed. This training need conforms with the nature of the industry in terms of stability of work, the physicality of work, mobility and short-term labour contracts and emanates from a desire for self-sustainance and the ability to care effectively for others [9, 16]. Construction workers’ need to secure social benefits is evident and construction companies can satisfy this need and consequently benefit through enhanced performance from a contented workforce [11, 14].

Furthermore, managers are more in support of developing policies that enhance students’ self-efficacy through encouraging work experiences within their communities [33]. These strategies, hypothetically, solidify construction companies’ human resources bases [9, 20]. Though the strategies’ size of significance varies between managers and workers, it is evident that their implementation will benefit both parties and the communities in which they operate. Construction workers in Zimbabwe have focused on fundamental aspects that affect their social security, even beyond their working life. Thus, social security systems are necessary to ensure decent living conditions for workers and include identifying socio-economic vulnerabilities of workers, linking social security and development, and combining agendas of poverty reduction, human development and social integration [7, 8].

TABLE 3: Ranking of corporate social responsibility strategies by the construction workers

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Cramer’s value</th>
<th>Asym. Sig.</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offer outplacement services, retaining and severance benefits, when closures and retrenchments are imminent</td>
<td>0.837</td>
<td>0.000</td>
<td>1</td>
</tr>
<tr>
<td>Encourage employee volunteering in the community with financial contributions and help in kind</td>
<td>0.820</td>
<td>0.000</td>
<td>2</td>
</tr>
<tr>
<td>Train staff on the effects and the need for minimisation of consumption of natural resources within their communities</td>
<td>0.818</td>
<td>0.000</td>
<td>3</td>
</tr>
<tr>
<td>Train staff on ways to reduce the environmental footprint of construction activities</td>
<td>0.805</td>
<td>0.000</td>
<td>4</td>
</tr>
<tr>
<td>Extend training to life management, retirement planning and care of dependents</td>
<td>0.778</td>
<td>0.000</td>
<td>5</td>
</tr>
<tr>
<td>Establish an environmental management system that transfers good practices to the communities</td>
<td>0.773</td>
<td>0.000</td>
<td>6</td>
</tr>
<tr>
<td>Zero tolerance for corruption, discrimination, victimisation and harassment through open policies</td>
<td>0.724</td>
<td>0.000</td>
<td>7</td>
</tr>
<tr>
<td>Establish policies to ensure the well-being of all employees and the public</td>
<td>0.712</td>
<td>0.000</td>
<td>8</td>
</tr>
<tr>
<td>Train staff on strategies to reduce the emission of hazardous substances</td>
<td>0.695</td>
<td>0.001</td>
<td>9</td>
</tr>
<tr>
<td>Be open to flexi-time and other work-life balance policies for construction workers</td>
<td>0.607</td>
<td>0.000</td>
<td>10</td>
</tr>
<tr>
<td>Involve employees in business decisions that affect them and improve the work environment</td>
<td>0.558</td>
<td>0.020</td>
<td>11</td>
</tr>
<tr>
<td>Offer quality work experience for construction trades students on apprenticeships within local communities</td>
<td>0.521</td>
<td>0.043</td>
<td>12</td>
</tr>
<tr>
<td>Encourage local employability schemes</td>
<td>0.469</td>
<td>0.248</td>
<td>13</td>
</tr>
</tbody>
</table>

Managers had higher Cramer’s values for the strategies on establishing policies to ensure the well-being of all employees and the public, to encourage local employability schemes, and to offer quality work experience for construction trades students within local communities higher than construction workers. However, the perception by construction workers on encouraging local employability schemes was important to ensure the well-being of construction workers. The site and project managers identified training staff on the effects and the need for minimisation of consumption of natural resources within their communities as the most significant strategy, which leads to social security of construction workers. Such training assists the workers in protecting themselves and communities from challenges related to environmental degradation and climate change. This also allows them to inculcate such knowledge for enriching their communities. When closures and retrenchments are imminent, the construction workers perceived that offering outplacement services, retaining and severance benefits are the most significant strategy for ensuring social security. The unpredictability of the Zimbabwean construction industry in terms of conditions of contract and availability of work for construction workers supports this strategy. For instance, during periods of unemployment, workers desire the ability to sustain themselves and their dependents. This would also allow them to enhance their skills during times of unemployment.

**REFERENCES**


A MIXED METHOD STUDY ON SOCIAL SUSTAINABILITY CONSIDERATION BY PUBLIC SECTOR ORGANIZATIONS DURING INFRASTRUCTURE PROCUREMENT

N.M.J. Diba¹, B.O. Awuzie², C.O. Aigbavboa³, T.C Haupt⁴
ndiba@cut.ac.za, bawuzie@cut.ac.za, caigbavboa@uj.ac.za, theo.haupt@mut.ac.za

¹,² Department of Built Environment, Faculty of Engineering, Built Environment and Information Technology, Central University of Technology, Bloemfontein, South Africa
³ Department of Construction Management & Quantity Surveying, Professor, University of Johannesburg, Doornfontein Campus, Johannesburg, South Africa
⁴ School of Engineering, Professor, Mangosuthu University of Technology, Durban, South Africa

ABSTRACT

PURPOSE

Although adequate consideration is being accorded to economic and environmental aspects of sustainable development (SD) during infrastructure procurement, the opposite seems to be the case with social sustainability aspects (SSA). This study elicits the perspectives of procurement officials working in public sector infrastructure client organizations (ICOs) as it concerns the factors influencing the incorporation of SSA during infrastructure procurement.

RESEARCH METHOD

A mixed method research design was adopted. Qualitative data was sourced from purposively selected interviewees whilst quantitative data were obtained from respondents within selected ICOs. Qualitative data were analysed thematically and, descriptive statistics was deployed in the analysis of the quantitative data.

FINDINGS

Results indicate a lack of awareness and a knowledge gap concerning social sustainability aspects. Furthermore, the results highlight the influence of the levels of understanding within the ICOs on the degree of incorporation of SSA aspects during infrastructure procurement.

It is expected that these findings will contribute to the development of awareness and, subsequent incorporation of SSA by relevant stakeholders during infrastructure procurement in the Free State Province.

VALUE FOR AUTHORS

The findings reveal how procurement personnel of infrastructure client organizations view the concept of sustainability and factors, which influence the approach of various infrastructure client organizations in engaging with the incorporation of SSA during the procurement processes of the infrastructure projects.

KEYWORDS

Procurement, sustainable infrastructure development, procurement methods, public procurement, social sustainability aspects
1. INTRODUCTION

The construction industry plays a salient role in sustainable infrastructure delivery. It contributes towards the economic development especially through the delivery of infrastructure projects. Despite this contribution, the industry has been noted to neglect the pursuit of sustainability during infrastructure development. The concept of sustainability is seen as a most crucial and yet, most misunderstood topic among construction industry professionals. The Brundtland report’s definition remains widely accepted among a plethora of definitions of sustainable development. According to the report, sustainability can be defined as “meeting the needs of the present without compromising the ability of future generations to meet their needs” 1. This definition provides a shift from the ecological aspect of sustainability and explores the social and economic aspects of sustainability, thereby trying to achieve a balance between the three dimensions 2.

Sustainability-oriented practices have been adopted within the South African context since the Agenda 21 era. According to the National Development Plan (NDP) 3, it is stated that, for South Africa to achieve a sustainable economic growth by 2030, it needs to prioritize its economic infrastructure. It is evident that most organizations within the industry are overlooking operations towards sustainability. Therefore, expectations are ripe that considering the multiplicity of emerging innovative practices in the contemporary construction industry, projects will be delivered in a more sustainable manner thereby facilitating to sustainable societies. It is important to take advantage of extant policies and procurement strategies in developing and developed countries to boost the incorporation of sustainable development-related practices during the infrastructure delivery in a manner that contributes towards the resolution of societal challenges 4. One of the biggest problems still facing South Africa is poverty eradication. Undoubtedly, effective incorporation of SD aspects will contribute towards reducing the burgeoning poverty and unemployment rates. However, the attainment of effective SD incorporation remains a mirage in most ICOs as more emphasis is being placed on environmental and economic aspects whilst SSA is seemingly neglected. This observation has culminated in the conduct of this study.

2. LITERATURE REVIEW

2.1. SUSTAINABLE INFRASTRUCTURE

Infrastructure delivery is seen as a driver for the economic growth. It also serves as a platform for the delivery of basic services such as health, education, sanitation, transportation, communication, electricity and clean water amongst others. Nevertheless, public infrastructure delivery is challenged by poor planning, cost overruns, poor quality of work done and project failure. The mandate of government is to deliver services effectively and efficiently, as there are systems, tools and guidelines in place for infrastructure delivery 5. The tools seem inadequate in making provisions for incorporating sustainability aspects to benefit the end users. Berry and McCarthy 6 opine that procurement of these infrastructure projects should generate benefits not only to the organization but also ensure that the procurement processes consider the natural environment and how people move around, work and play, thereby shaping the advent of sustainable communities. Generally, the construction industry’s approach to construction will influence the sustainability outcome of the infrastructure project and affect the ability of the end users to engage in sustainable livelihoods. Byrnea and Glover 7 reiterate the need to engage with the concept of sustainability in a holistic and integrated manner. They maintain the need for the three dominant dimensions of sustainability to be implemented in a manner that allows for trade-offs, based on the situational or contextual peculiarities. In the case of public procurement of infrastructure, the background and nature of sustainability can be two-dimensional, giving insight as to how procurement staff and the end users perceive and understanding the concept of sustainability throughout the delivery of infrastructure projects 8.

The Treasury Department 9 defines the infrastructure as fixed assets that are products of construction operations including:

- Buildings, structures as well as facilities,
- Water supply, sanitation, electricity supply, transportation and storm water drainage systems, and;
- The permanent fixed assets that cannot be economically removed or that may be re-used.

The UNDP 10 described the process of buying sustainably as comprising of the procurement of goods and services that have minimal impact on the environment, with the greatest economic value and having a positive impact on beneficiary communities. They have termed this concept sustainable procurement. Considering the many benefits associated with sustainable procurement, there is a huge shift towards understanding and implementing sustainable infrastructure procurement in public sector IOGs, especially within South Africa.

2.2. Benefits of incorporating sustainable development principles in the infrastructure life cycle

SD involves the process of understanding the aims of environmental management, social responsibility and economic solutions by changing societal thinking 11. Therefore, it is evident that one dimension cannot work without the other as a balance should always be struck between these dimensions. This view is encapsulated in the triple bottom line (TBL) praxis. However, this appears not to be the case. Brummer and Walker 12 highlights that, public sector organizations tend to consider some sustainability dimensions in their procurement whilst neglecting others. The TBL expresses that there should be a constant balance between the three dimensions whenever sustainability incorporation is concerned.

Traditionally, in the public sector, government system processes have been in use to procure the infrastructure projects. Currently, there seems to be a consensus that even though infrastructure development boosts the economy, its negative effect on the environment led to a disruption of social ecosystems. Where scholars have done their research through document reviews, they have noticed that most construction projects have conducted environmental and economic impact analysis during the planning phase in order to mitigate the potential adverse effect that such development may have on the environment. This should be the case with the social sustainability aspect as well 13.

2.3. Identification of SSA during the procurement of infrastructure projects

For effective implementation of sustainable infrastructure procurement and delivery, it is important to identify possible ways in which aspects of sustainability can be considered. It has been noted that during the pre-construction phase of the infrastructure project remains the most convenient phase to incorporate the social sustainability aspects 14. Sustainable performance of infrastructure projects can be assessed by using key assessment indicators, which are able to gauge optimal performance during every stage in the project life cycle 15. The consideration of SSA can have a significant impact during the construction of the project as well as when the project has been delivered. During the consultation with the community members, the ICO is able to appraise the impact of infrastructure projects on the community through the responses obtained from members 16.

To achieve sustainability outcomes during infrastructure procurement, social sustainability considerations cannot be the only aspect to be included to achieve a truly sustainable project. The impact of the project on the surrounding community, the project’s impact on the environment, health & safety, and training and education of the labourers, need to be taken into consideration. When these considerations are integrated across the project’s life cycle, the sustainability performance of the project as well as the quality of life of the end users will be improved 16. The fundamental principles of procurement have been described by Raymond as 1. Value for money, 2. Ethics, 3. Competition, 4. Transparency and Accountability. The practitioners must facilitate the processes from the inception up to the monitoring and evaluation of the infrastructure project and through these processes, they have to consider the culture and the ethical background of other stakeholders that are linked or benefitting to the project whilst abiding by the fundamental principles of procurement. Although there are many noticeable benefits associated with the attainment of sustainable infrastructure, the processes towards reaching that goal seems easily achievable. However, in practice, procurement practitioners are facing challenges in identifying social sustainability aspects during project delivery 17.

2.3.1. Barriers to SSA incorporation

The introduction of new procurement practices in developing countries has been in line with the formulation of regulatory and legal frameworks that advocates transparency and accountability. The adoption of the new procurement practices could serve as a hindrance to the incorporation of SSA 18. For instance, a study, which was conducted by Serpelli, Kort and Vera 19, revealed that most construction projects in Chile began without other stakeholder’s integration and thereby making it impossible for the incorporation of sustainability aspects. Poor stakeholder integration acted as a barrier to the incorporation of the SSA. According to Ahsan, Ho and Khan 20, it was observed that projects managers recruited for construction projects have mostly technical knowledge, skills and abilities (KSA) whilst lacking soft skills required for the incorporation of the SSA in their projects. This challenge alongside the lack of knowledge serves as barriers to incorporation of SSA within the South African public sector ICO context.
2.3.2. Drivers for SSA incorporation

Government procurement relies on the guidelines enforced by the CIDB\(^1\) and therefore for every procurement of goods and services, these guidelines have to be followed and adhered to. All the selected PSO’s for this study complies with these CIDB guidelines. There are more social aspects that can be added according to the guidelines for procurement. The sustainable procurement process encompasses all the dimensions of sustainability always relay the importance of the preferential procurement guidelines to be followed when procuring for goods and services within government. These guidelines are already addressing other socio-economic issues. The Treasury Department\(^2\) enforces the need to adopt sustainable practices during the procurement of goods and services especially at the early stages of the project. The general behaviour of personnel is that they tend to overlook anything that is not mandatory and not binding on them. Therefore, government has emphasized the importance of sustainable practices and the utility thereof its implementation to engender compliance.

Considerable effort is required for raising awareness regarding sustainability as a concept and as well as the sustainable processes through infrastructure development. This is to ensure compliance by relevant stakeholders with updated legislated frameworks. In order to avoid the misapplication of the procurement procedures, rules and regulations, government should make sure personnel is well equipped with the current practice notes as updated at the department of treasury. When organisations implement sustainable practices, it helps in improving the understanding and awareness of the concept of sustainability\(^3\). The personnel’s knowledge and show of willingness to learn about the concept is positive to leverage upon the concept of sustainability and not wait for government to provide training and workshops. They should show the willingness to develop themselves for future projects. More training and workshops offered by government was to make procurement personnel aware of the policies and procedures to enhance the effectiveness of the processes under Supply Chain Management, including procurement. During training, procurement personnel is made aware if there are changes in the policies regarding the procurement procedures. Little is said on what social sustainability aspects to consider during the procurement of the infrastructure. Although some are embedded in the general policies of procurement, some of the procurement staff are not aware that they are SSA and also not aware of the benefits associated with the incorporation of these aspects especially at the procurement phase of the project life cycle. The procurement staff become only limited to policies like Historically Disadvantaged Individuals (HDI), Broad-Based Black Economic Empowerment (BBBEE) redressing the socio-economic challenges faced by the communities and not addressing sustainability agenda.

3. RESEARCH METHOD

A sequential mixed method research design was adopted for this study. This design is used to explore and understand a phenomenon, make themes from the data collected, design an instrument and test it\(^4\). In order to successfully explore the factors influencing the incorporation of SSA during the procurement of public sector infrastructure in the Free State, South Africa, the study will be structured into three different facets; firstly to elicit the ICO’s views on their understanding in their own context, as well as an identification of the aspects that they incorporate during project procurement. Secondly, to test the information emanating from this exercise to determine the order of priority accorded to the identified aspects.

Finally, the researcher expects to revert to these respondents to these individuals in the form of semi-structured interviews to gain an insight into the rationale for the ranking of these aspects as deciphered from the second stage of the study.

3.1. Data Collection Procedure

Two different set of questions were asked to the chosen sample at two different intervals using two different techniques. The first phase of the data collection, interviews were conducted to elicit the level of knowledge of the interviewees concerning SSA and its subsequent incorporation during the procurement of infrastructure. This phase facilitated the identification of SSA as applicable within the FS context and national as well. The interviewees were asked to provide a history of when they began to use the questionnaire to assess the factors identified in the former stage. Efforts were made to use the questionnaires to rank the identified SSA in order of prominence during procurement. In addition, this data collection technique enabled the assessment of the factors influencing the prioritization of certain SS aspects above others.

The interview questions sought to find answers to the objectives of the research and the questions were themed as follows:

1. Level of understanding and knowledge of the concept of social sustainability
2. Identification of aspects of the social sustainability dimensions considered during the procurement of public-sector infrastructure in Free State
3. Assessment of the aspects identified in (2)
4. Factors influencing the prioritization of these aspects as provided in (3)

4. DATA ANALYSIS

4.1 THEMATIC ANALYSIS

4.1.1 Understanding and Knowledge of the Concept of Sustainability and Social Sustainability Dimension

The findings from the interviews across the cases revealed that the staff were knowledgeable about the concept of sustainability. They attributed the level of awareness to the workshops, which had been given to all government staff to achieve the national mandate of the public sector: the provision of basic needs and services to the people. This mandate cascades from the national government, through provincial down to local government. Sustainability and Sustainable Development have been mentioned in the attainment of sustainable infrastructure delivery. It is also mentioned in the national documents like policy guides, regulations and integrated development plans and other strategic plans replete within the public sector. In these policy documents, supply chain management policies and treasury regulations explain how best procurement officials when procuring goods and services in their respective organizations can adopt practices. Throughout the cases, there is a general understanding of the concept of sustainability and sustainable development as the respondents across all the cases have confirmed that workshops and training had been conducted for them. They also affirmed that they had been urged to implement sustainability-oriented practices in the services that they offer. This explanation is not always mentioned in the policy documents, it is not clear how and when the implementation of these practices should take place during the procurement phase.

3.1.2 Questionnaires

The questionnaires were distributed to different ICO’s in the Free State. The questionnaires comprised of two sections. The first section of the questionnaires outlined the demographics of the respondents from the adjudication committee. The idea of the demographics section described the position that the respondents occupied, how long have they occupied it. The second section was to answer the research questions. The section was broken down into three questions, which explored the ICO’s perception of what sustainability is, which social sustainability aspects are identified and considered to be integrated during the procurement process, which of those aspects are prioritized and finally what factors influence the prioritization of these aspects.
“Sustainability has become a policy issue, and therefore requires a better understanding,” said one of the respondents who has worked for over 11 years at ICO (DOH). Although there have been different levels of understanding about sustainability, the interpretation of the concept has been well understood from the workshops conducted. The implementation of the related concepts of sustainability and sustainable development can be realized by following the existing systems in place like the treasury regulations, the supply chain management practices, the IDP and the SDF as well as any specialised programmes from the national office.

### 4.1.2 Identification of Social Sustainability Aspects

From what they have understood about the concept of sustainability and sustainable development, most interviewees across the ICOs could relate to the community as a greater part of social sustainability. Because the ICOs are under the national government, there are policies already in place to make sure of the integration of the social sustainability aspects, one of these policies is Preferential Procurement Policy Framework, of which its aim is to advance the development of small, macro and medium enterprises (SMMEs) and historically disadvantaged individual (HDI), promoting women and the physically challenged and creating employment amongst others. Procurement also realises supply chain management (SCM) policy, and other practices notes as clearly indicated in the guidelines for procurement that is updated by treasury department and this includes HDI. Although there are SSA that can be observed in the national office, the systems in place provide for an effective running of these organisations and therefore it is important that social sustainability aspects are to be integrated in such processes for the greater sustainable outcome of the project, factors influencing the choice for the particular project should be established at the outset.

Because of the need to comply with set policies, there are specialized or prioritised programmes from the national government office of the public sector that are ideally set for empowering the youth, gender equity as well as to curb the unemployment rate in the communities. These can be seen in document such as IDP’s and Strategic Plans. The policies influencing the prioritisation of SSA include the National Youth Plan 2020, which encourages youth innovation, entrepreneurship development and skills development; these policies can be implemented during the design phase of the infrastructure project. These policies are regarded as factors for enabling social sustainability aspects to be considered.

### 4.1.3 Prioritisation of Social Sustainability Aspects

The interviewees reviewed their day-to-day activities and the procedures they have to follow when adjudicating for a tender award. Most of the committee members approve what has been agreed upon from the demand or planning phase of the project. The set social sustainability aspects as per procurement policies are considered during the planning phase and, the adjudicating committee has to approve these, subject to the set specifications of the project. The prioritization of social sustainability aspects is driven by the adherence to the policies, following the practice notes according to the supply chain management policies. “It is imperative that we adhere to the SCM policies and treasury regulations set for procurement of projects,” said one of the directors from the ICO (PMM).

Not only can the stakeholders who are involved with planning, developing and designing the project and local community members use policies to prioritize the social sustainability aspects but also to monitor and engender effective measurement. One of the reasons for prioritising certain social sustainable aspects can be related to the set criteria on the specifications of the infrastructure project during the planning phase. The specification can include that, during the construction of the project, that local labourers be trained and employed by the contractor who will be awarded a tender. Other specifications included that the contractor must use local suppliers when procuring construction materials. If a set of criteria is used at the planning phase of the project, then the criteria can be used as a tool to broaden the specification to consider more SSA.

### 4.1.4 Factors influencing the prioritisation of these Sustainability Aspects

The systems in place provide for an effective running of these organisations and therefore it is important that social sustainability aspects are to be integrated in such processes for the greater sustainable outcome of the project, factors influencing the choice for the particular project should be established at the outset.

Because of the need to comply with set policies, there are specialized or prioritised programmes from the national government office of the public sector that are ideally set out for empowering the youth, gender equity as well as to curb the unemployment rate in the communities. These can be seen in document such as IDP’s and Strategic Plans. The policies influencing the prioritisation of SSA include the National Youth Plan 2020, which encourages youth innovation, entrepreneurship development and skills development; these policies can be implemented during the design phase of the infrastructure project. These policies are regarded as factors for enabling social sustainability aspects to be considered.

These aspects are seen as a need for the community for sustainability outcomes.

### 4.2 Descriptive Analysis

Information from the questionnaire is summarised by using descriptive analysis. The descriptive data were analysed using the mean calculation and standard deviation. The statistical information was summarised using the ANOVA table. A one-way analysis of variance (ANOVA) is used to compare more than two groups. For the purpose of this study, only five highest-ranking variables were used for each theme and will be used for the reporting and analysis of the results.

In the table below, 5(five) ICO’s were compared based on the calculation from their variables using the mean and standard deviation to see which one had the highest mean amongst the others. The highest mean among the others meant that the ranking of the variable was high.

#### Table 1: Mean and Standard Deviation values from ICO’s - ANOVA table

<table>
<thead>
<tr>
<th>Variables</th>
<th>DOH</th>
<th>DOE</th>
<th>PW</th>
<th>DOT</th>
<th>PMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key concepts of Sustainability &amp; sustainable developments</td>
<td>44.23 ± 9.001 *</td>
<td>47.25 ± 5.396 *</td>
<td>42.50 ± 6.681 *</td>
<td>44.33 ± 5.297 *</td>
<td>44.54 ± 4.737 *</td>
</tr>
<tr>
<td>Consideration of Social Sustainability Aspects</td>
<td>76.77 ± 3.468 a</td>
<td>75.42 ± 5.664 a</td>
<td>72.58 ± 7.489 a</td>
<td>73.83 ± 5.458 a</td>
<td>73.31 ± 4.906 a</td>
</tr>
<tr>
<td>Factors influencing prioritization of social sustainability aspects</td>
<td>27.77 ± 0.927 a</td>
<td>28.25 ± 1.658 a</td>
<td>27.67 ± 1.497 a</td>
<td>27.58 ± 2.234 a</td>
<td>27.69 ± 1.888 a</td>
</tr>
</tbody>
</table>

#### 4.2.1 The level of understanding and the respondents’ perception on key concepts of sustainability and sustainable development

Table 2 reports the information of the number of respondents (N) for the DOE ICO, only five (5) variables out of thirty (30) that has been ranked highest (in this case 1*) to the lowest, (in this case 5*), the mean and the standard deviation.

#### Table 2: Key concepts of sustainability and sustainable development for DOE

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equitable provision of basic needs</td>
<td>12</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Best practices</td>
<td>12</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Research and Development</td>
<td>12</td>
<td>1.92</td>
<td>0.289</td>
<td>3</td>
</tr>
<tr>
<td>Training workshops on sustainable project alignment with government basic needs</td>
<td>12</td>
<td>1.92</td>
<td>0.289</td>
<td>3</td>
</tr>
<tr>
<td>Enforcement of sustainable practices</td>
<td>12</td>
<td>1.83</td>
<td>0.577</td>
<td>5</td>
</tr>
</tbody>
</table>
Table 2 shows the results of the variables that were highly ranked which represented their level of understanding on sustainability. From the information given on the questionnaire, these top five variables are interrelated to how they understand the concept of sustainability. The results reveal that ‘Equitable provision of basic needs’ and ‘sustainability and sustainable development mean best practices’ were ranked first with a mean score of 2.00 and (SD) = 0.00 each. ‘Research and Development’ and ‘Training workshops on sustainable project alignment’ were ranked third with a mean score of 1.92 and (SD) = 0.289 each. ‘Enforcement of sustainable practices’ was ranked fifth with a mean score of 1.83 and (SD) = 0.577.

Table 3: Excerpt from the ANOVA table

<table>
<thead>
<tr>
<th>Variables</th>
<th>DOH</th>
<th>DOE</th>
<th>PW</th>
<th>DOT</th>
<th>PMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key concepts of Sustainability &amp; sustainable development</td>
<td>44.23 ± 9.001*</td>
<td>47.25 ± 5.396*</td>
<td>42.50 ± 6.681*</td>
<td>44.33 ± 5.297*</td>
<td>44.54 ± 4.737*</td>
</tr>
</tbody>
</table>

Table 3 shows calculations of the overall mean and standard deviation of all the ICO’s rating their level of understanding and the respondents’ perception on key concepts of sustainability and sustainable development. The results from this table reveal DOH ranked highest with a mean score of 4.25 and (SD) = 5.396. The respondents from this ICO (DOE) seem to be well engaged in the procurement practices as “best practices” ranked first, they show the highest level of understanding of sustainability amongst the other ICO’s. Not only are they aware and understand this concept, but it means that they the respondents have enabling platform that can allow them to integrate any sustainability aspect they can be aware of and related to the procurement of the infrastructure delivery.

4.2.2 The extent of identification and consideration of social sustainability aspects

Table 4 reports the information of the number of respondents (N) for the DOH ICO, only five (5) variables out of seventeen (17) that has been ranked highest (in this case 1*) to the lowest, (in this case 5*), the mean and the standard deviation.

The results reveals that ‘Community Engagement’ is ranked first with a mean score of 5.00 and (SD) = 0.000. ‘Training and skills development’ and ‘Empowerment and Participation’ were ranked second with a mean score of 4.92 and (SD) = 0.289. ‘Employment of the affected stakeholders’ ranked fourth with a mean score of 4.67 and (SD) = 0.492. ‘Gender Balance’ ranked fifth with a mean score of 4.58 and (SD) = 0.515.

Table 5: Extent of identification and consideration of social sustainability aspects

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Engagement</td>
<td>12</td>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Training and skills development</td>
<td>12</td>
<td>4.92</td>
<td>0.289</td>
<td>2</td>
</tr>
<tr>
<td>Empowerment and Participation</td>
<td>12</td>
<td>4.92</td>
<td>0.289</td>
<td>2</td>
</tr>
<tr>
<td>Employment of the affected stakeholders</td>
<td>12</td>
<td>4.67</td>
<td>0.492</td>
<td>4</td>
</tr>
<tr>
<td>Gender Balance</td>
<td>12</td>
<td>4.58</td>
<td>0.515</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 5 shows calculations of the overall mean and standard deviation of all the ICO’s rating on the extent of identification and consideration of social sustainability aspects. The results from this table reveal DOH ranked highest with a mean score of 76.77 and (SD) = 3.468. Although the respondents from this ICO (DOH) scored slightly lower with understanding the concept of sustainability, they were able to identify aspects relating to social sustainability more because they continually engage with the community and enforcing the employment of the local community for their infrastructure projects.

4.2.3 The degree to which some selected factors influence the prioritization of the aspects of sustainability

Table 6 below reports the information of the number of respondents (N) for the DOE ICO, only five (5) variables out of six (6) that has been ranked highest (in this case 1*) to the lowest, (in this case 5*), the mean and the standard deviation.

<table>
<thead>
<tr>
<th>Variables</th>
<th>DOH</th>
<th>DOE</th>
<th>PW</th>
<th>DOT</th>
<th>PMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consideration of Social Sustainability Aspects</td>
<td>76.77 ± 3.468*</td>
<td>75.42 ± 5.664*</td>
<td>72.58 ± 7.489*</td>
<td>73.83 ± 5.458*</td>
<td>73.31 ± 4.906*</td>
</tr>
</tbody>
</table>
Table 6: Factors influencing the prioritization of Social Sustainability Aspects.

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treasury Regulations</td>
<td>12</td>
<td>5.00</td>
<td>0.00</td>
<td>1</td>
</tr>
<tr>
<td>Prioritized Community projects</td>
<td>12</td>
<td>4.92</td>
<td>0.289</td>
<td>2</td>
</tr>
<tr>
<td>Alignment with IDP and SDF</td>
<td>12</td>
<td>4.67</td>
<td>0.492</td>
<td>3</td>
</tr>
<tr>
<td>Supply Chain Management Policies</td>
<td>12</td>
<td>4.67</td>
<td>0.492</td>
<td></td>
</tr>
<tr>
<td>Specialized programmes</td>
<td>12</td>
<td>4.58</td>
<td>0.515</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 7: Degree to which some selected factors influence the prioritization of the aspects of sustainability

<table>
<thead>
<tr>
<th>Variables</th>
<th>DOH</th>
<th>DOE</th>
<th>PW</th>
<th>DOT</th>
<th>PMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors influencing prioritization of social sustainability aspects</td>
<td>27.77 ± 0.927*</td>
<td>28.25 ± 1.658*</td>
<td>27.67 ± 1.497*</td>
<td>27.58 ± 2.234*</td>
<td>27.69 ± 1.888*</td>
</tr>
</tbody>
</table>

The table above shows calculations of the overall mean and standard deviation of all the ICO's, rating on the degree to which some selected factors influence the prioritization of the aspects of sustainability. The results from this table reveal DOE ranked highest with a mean score of 28.25 and (SD) = 1.658. Although the respondents from this ICO (DOE) scored slightly lower with the identification of social sustainability aspects, but higher with adhering to the set policies and guidelines set for procurement activities. Government policies in place are the ones that drive the implementation of public infrastructure projects. These might be projects that are identified specifically for an area within the community to solve an existing challenge in that area. Factors driving these procurement processes include treasury regulations, labour regulations, and adherence to health and safety regulations in line with supply chain management practices.

5. DISCUSSION OF FINDINGS

5.1 The Understanding and Knowledge of Sustainability and Social Sustainability Dimensions

Findings reveal that the staff are aware and knowledgeable of the concept of sustainability and have learnt other dimensions of sustainability by mentioning other aspects related to it. Through training and workshops offered to the procurement staff from the national office, some of the staff were able to understand the notion behind it and to explore the different dimensions of sustainability. This was because some of the management staff were working directly with the national office and had to do reports that had to include sustainability report in their final reporting.

5.3 Prioritisation of Social Sustainability Aspects

The respondents related their day-to-day activities and the procedures they have to follow when in different committees for a tender award. The prioritization of the social sustainability aspects is driven by the adherence to the policies, following the practice notes according to the supply chain management policies. In the committees, the staff makes sure that all their decisions and relevant policies are considered and adhered to, before an award can be tendered. Through these committees, one can take an advantage of using a score card to check if the staff has included all the SSA that are needed to be considered for a particular project. It is also emphasized that one of the reasons for prioritizing certain social sustainable aspects can be related to the set criteria on the specifications of the infrastructure project during the planning phase. The specification can include that, during the construction of the project, the local labourers be trained and employed by the successful contractor to do the project. Whereas other specifications can include that, the contractor must use local suppliers when procuring construction materials. The procurement staff can leverage on using early stages of project lifecycle for incorporating SSA.

5.4 Factors influencing the prioritisation of these aspects

Any public procurement process has to align itself with regulations and guidelines of supply chain management. These are of great influence to the processes the procurement staff need to consider during the procurement of infrastructure projects. There are projects already identified for solving specific problems in an area, and these prioritized projects are already planned and budgeted for at the national office. These projects are placed in the five-year plan for Integrated Development Plan of a local government. These kinds of projects would precede the ones not in the IDP. Adhering to policies only during procurement, can also limit consideration of other aspects that are closely related to the policies but of different dimensions of sustainability. Procurement staff can opt to have a sustainable procurement approach that will see to it that it assesses and monitors any sustainability aspects that needs to be in the planning of a project. Specialized programmes would encourage more social sustainability aspects to be considered in the process of procuring them. These social sustainability aspects can be seen as a need for the community which when explained by Lee and Chan, are seen as indicators for social sustainability aspect.
6. CONCLUSION AND FURTHER RESEARCH

The objective of the study was to look at how the procurement staff perceive the social sustainability aspects embedded during the procurement of infrastructure project. The study was able to explore the perceptions of the ICO’s about sustainability and sustainable development. The literature explored the different definitions of the concept of sustainability and sustainable development, the dimensions of sustainability with a focus on social sustainability. It also explored the different drivers and barriers of considering social sustainability aspects during the procurement of infrastructure delivery. Despite the extensive definitions from the literature, there is still a knowledge gap of understanding and identifying these aspects amongst the ICO’s across all cases, as there are limitations to the identification of the SSA. Treasury regulations and policies govern public procurements and are directing the staff on how and what to consider during the process of procurement.

There are vast SSA to consider during the planning phase of a project and if the procurement staff are not given the platform to explore ways to enable them to consider SSA and be able to assess and monitor them, they will be limited to the policies and guidelines only. The drivers of considering the social sustainability aspects might not be motivating enough to enhance the level of commitment to sustainable practices. There is a huge opportunity to integrate SSA during the early phases of the project, especially where staff are enablers of accelerating this move. The procurement staff need to adopt and deploy a proper approach for considering the incorporation of all the sustainability aspects and be able to know what to consider as an aspect of each of the three dimensions. Top management also need to enhance their top-bottom communication and education, about the sustainability agenda and the level of impact it can make on the processes of procurement and to the stakeholders of the project. Sustainable procurement is a cross function concept and therefore the staff needs to be innovative, engaged and informed in sustainability matters.

1. REFERENCES

Cognitive Loading and Schema Development due to Complex Questions in Students of Construction Programmes

Ephraim Zulu, Copperbelt University, School of Built Environment, Jambo Drive Campus, Riverside, Kitwe, Zambia, Email: ephrainzulu2000@yahoo.co.uk, orcid.org/0000-0002-5999-7808

Theodore C. Haupt, Research Professor: Engineering, Mangosuthu University of Technology, 511 Mangosuthu Highway, Umlazi, Durban, 4031, South Africa, Email: theo.haupt@mut.ac.za, orcid.org/0000-0002-2531-3789

ABSTRACT

PURPOSE OF THE PAPER:
The research aimed to assess the extent of cognitive loading and schema development which can be attributed to complex questions. The research also assessed whether cognitive loading mediates the relationship between complex questions and schema construction.

VALUE:
The findings inform both literature and education practice about the effect of complex questions on cognitive load and schema development.

KEYWORDS:
Cognitive Load, Complex Questions, Schema Construction, Construction Education

1. INTRODUCTION

Research evidence from cognitive science shows that when complex questions are administered to students who have little prior subject knowledge, the complex questions lead to high levels of cognitive load [1,2,3]. Research evidence also shows that when students are exposed to high levels of cognitive load, their ability to learn effectively is hampered [2,3,4]. Conversely, it follows that administering complex questions to students with little subject prior knowledge will hamper effective learning. However, there are no empirical studies which show that complex questions impede learning.

Also, considering that complex questions are criticised for not attaining sufficient levels of learning or schema construction and also lead to high levels of cognitive load and since high levels of cognitive load impede learning, it is very probable that cognitive load mediates the relationship between complex questions and schema construction. Therefore, this study sought to provide empirical evidence that complex questions impede learning and also assess whether cognitive load mediates the relationship between complex questions and schema construction. The study also assessed the relationships between complex questions and cognitive load and between cognitive load and schema construction which are already fairly well reported in literature but are conceptualised and operationalised differently in this study.

The students were drawn from three public universities in South Africa studying towards undergraduate degrees in construction studies. The data were analysed using structural equation modelling.

2. COGNITIVE LOAD THEORY

The architecture of human memory is comprised of a long-term memory (LTM) and a short-term memory also known as working memory. Working memory is what is used for conscious activity in organizing, contrasting, comparing and working on information. Its capacity is limited to about seven items at a single time but it can only process about two or three items simultaneously [8,9]. It is also the only memory which can be monitored [9,10]. In contrast, the capacity of LTM is unlimited but its contents cannot be monitored directly unless they are loaded onto working memory. Because the capacity of working memory is very limited, it easily gets overloaded and overwhelmed [11].

Based on this conceptualisation of the human memory architecture, the cognitive load theory (CLT) posits that ignoring the working memory limits of students in instructional design and delivery leads to high levels of cognitive load which impede learning [11,12,13]. Cognitive load is the mental load exerted on working memory when performing cognitive functions such as perceiving, thinking and learning [11]. Students with lower levels of cognitive load will achieve more effective learning than students whose memory limits are ignored and the cognitive load in working memory is left to exceed the working memory limit.

The resulting conceptual model for the research is shown in Figure 1.

Figure 1: Conceptual Model of the Mediating Role of Cognitive Loading on the Relationship between Complex Questions and Schema Construction

Legend: COMPQ = Complex Questions; COGLD = Cognitive Load; SCMCON = Schema Construction

Research on whether or how complex questions impede learning is important because literature from cognitive science and from inquiry based learning (IBL) is diametrically opposed on the matter [14,15]. Cognitive scientists insist that complex questions impede learning [1,2,3,16] while proponents of IBL mostly ignore this criticism [1,2,3,16] or argue that the scaffolding in IBL mitigates against the effect of cognitive load from complex questions [17]. Also, the mediating role of cognitive loading on the relationship between complex questions and schema construction is important because it is not reported in extant literature.

A significant moderating role by cognitive load in the relationship between complex questions and schema construction could suggest that cognitive load is in fact the raison d’etre why complex questions stifle schema construction. While the association between complex questions and cognitive load and between cognitive load and schema construction are fairly well reported in literature, the different conceptualisation and operationalisation of these variables in this study could provide validation from a different perspective.

An understanding of the relationships highlighted above also has the potential to inform educational practice. At present, cognitive scientist educators insist that complex questions impede learning while constructivist educationalists largely ignore ascertion by cognitive scientists. A better understanding of the associations among the variables could inform education practice by providing empirical evidence to either support or refute the ascertain that complex questions impede learning.

The assessment of the mediating role of cognitive load on the association between complex questions and schema construction could also inform educational practice on the extent to which cognitive load affects learning and so highlight the importance of managing cognitive load in students especially when complex questions are administered.

[1,2,3]
3. HYPOTHESIS DEVELOPMENT

3.1 Cognitive Load and Schema Construction

While cognitive functions take place in working memory, knowledge is stored in LTM. The information processing theory suggests that knowledge is stored in LTM as schemata. A schema is a cluster of anything that is learnt and treated as a single entity by working memory. A schema can comprise of a large and complex amount of information treated as a single entity in memory. A schema can also combine elements of information and become automated thereby requiring less storage capacity and processing since it is treated as a single entity in memory. Subsequently, based on the CLT, effective learning takes place when the cognitive load in working memory is focused on the construction and automation of schemata. For this reason, it was hypothesised that, H1: Cognitive load has a negative significant association with schema construction.

3.2 Complex Questions, Cognitive Load and Schema Construction

In order to achieve learning or schema construction, students are often administered complex questions. Questions are considered to be complex when their solutions have to be obtained from information spread in different documents or from different disciplines. It is argued that using complex questions will challenge students to acquire knowledge they previously did not possess and therefore achieve schema construction. However, based on the CLT, it is argued that complex questions induce large amounts of cognitive load and so impede learning. Based on this argument, it was hypothesised that, H2: Complex questions have a positive significant association with cognitive load and H3: Complex questions have a negative significant association with schema construction.

3.3 Mediating Role of Cognitive Load

Since it is expected that complex questions would lead to high levels of cognitive load and also expected that high levels of cognitive load would impede schema development as would complex questions, it was further hypothesised that, H4: Cognitive load would mediate the association between complex questions and schema development.

4. RESEARCH METHODOLOGY

4.1 Research Design, Strategy and Procedures

The research used a qualitative research design and a positivist philosophy with a deductive approach to test hypothesized relationships among the research constructs. Data collection was through a cross sectional questionnaire survey which was favoured because of the objectivity and low cost associated with its' use compared to other methods of data collection. Non probability sampling was used for convenience and economy. The research population was all students undertaking construction programmes at public universities in South Africa. The sample was drawn from three public universities in the KwaZulu-Natal province which were conveniently selected for economy. All the students present during data collection were sampled. Students were informed of their right to not participate in the study and to withdraw at any time for whatever reason in tandem with ethical research conduct. Students were assured of confidentiality and anonymity if they chose to participate. A sample of 543 students studying towards bachelor’s degrees in either Construction Management, Quantity Surveying, Property Studies or Architecture at the three public universities was obtained.

4.2 Respondent Profile

The profile of the respondents is shown in Table 1. First year students accounted for the highest number (34.10%) followed by fourth year students (23.00%) and then second year students (23.20%). First year students accounted for the highest number because subsequent years of study always reduce due to attrition from failure or having to repeat a whole year of study. Fourth year students accounted for the second largest group because the fourth year is a post-graduate year and so accepts graduates who opted to work after the bachelors degree which increases the size of the cohort relative to the third year of study. Therefore, the sample distribution of the academic year of study is representative of a typical four years’ university program in South Africa. The gender distribution has more males (59.80%) than females which is consistent with the gender distribution at public universities in South Africa.

Even though Architecture was offered at all three universities sampled, it was the second smallest because class sizes in Architecture are generally smaller than in other construction related programmes to accommodate the studio mode of instruction in Architecture.

4.3 Questionnaire Design

The scales in the questionnaire were developed by the authors because no suitable measure were found. The resulting questionnaire is shown in Table 2. Cognitive loading was conceptualised and operationalised as the extent to which students were overwhelmed by the amount of work assigned to them and the extent to which they were expected to rely on remembering a lot of information which they considered complex, difficult and confusing to understand. This conception is supported by research evidence which shows that attempting to remember a lot of information leads to high levels of cognitive load and to students being overwhelmed.
I was expected to remember too many things from each lecture.

I was overwhelmed with the amount of information I was expected to remember.

I was given too much information during the lectures.

The information I was given during lectures was confusing.

The information I was given in class was complicated and difficult to understand.

I was given assignments and tests which were difficult to understand and solve.

I was given problems which did not have enough information for me to solve them.

I was required to solve questions which were not clear as to what I was expected to do.

I was given questions which could be interpreted in more than one way.

I was given problems which were not easy to understand clearly.

I was given questions which were not expressed clearly.

My lecturers concentrated on making me understand the basic concepts and principles (points) of a module/subject.

My lecturers concentrated on making me connect new concepts and principles (points) with what I already knew.

I connected points that I already knew with what I was being taught in class.

I organised, categorised or connected anything new that I learnt with what I already knew.

My lecturers clearly highlighted the main concepts and principles.
MEDIATION

For mediation to exist, there must be significant association between the independent variable and the dependent variable, between the independent variable and the moderator variable and between the moderator variable and the dependent variable \(^{(23)}\). Results from the SEM analysis in Table 5 show that only two out of three of these associations are statistically significant. Therefore, based on the results from this study, cognitive loading does not mediate the association between complex questions and schema construction.

Therefore, based on the Cronbach’s alpha and the CR, the research constructs exhibited good reliability. For validity, Fornell and Larcker \(^{(18)}\) recommended that AVE values should be greater than 0.50 which all the constructs exceeded. Therefore, based on the reported measures and recommended thresholds, the measurement instrument is both reliable and valid.

The structural relationships from the SEM analysis in Figure 2 are tabulated in Table 5 and show that COMPQ is significantly negatively associated with SCMCON \((R^2 = -0.207, p = 0.005)\) consistent with hypothesis 3. COMPQ is also significantly positively associated with COGLD \((R^2 = 0.651, p = 0.0001)\) consistent with hypothesis 2. While COGLD shows a negative association with SCMCON, the relationship is not statistically significant \((p = 0.714)\).

The results therefore do not support hypothesis 1.
This study, on the other hand, used a correlation design with new measures for schema construction and cognitive load. Therefore, one reason for the departure from accepted findings could be that the self-report measures for schema construction and cognitive load may not wholly and validly capture the target phenomenon. Notwithstanding, based on results from this study, cognitive load is not a mediator of the association between complex questions and schema construction. Therefore, when complex questions are administered to students, attempts to improve the level of schema construction by initiating measures to reduce cognitive load are unlikely to be effective. This is because the results suggest that cognitive loading in itself does not necessarily hinder learning since the association is not statistically significant. It was expected, based on other studies, that cognitive loading would be significantly negatively associated with schema construction.

7. CONCLUSION

Cognitive scientists argue that complex questions impede learning due to the consequent cognitive load associated with complex questions while proponents of constructivism mostly ignore this criticism or argue that the scaffolding in constructivist pedagogy mitigates the effect of cognitive load from complex questions. The relationship between complex questions and learning is important because students are frequently subjected to assessment questions which they perceive as being complex in contemporary constructivist pedagogy. Consistent with other findings, it was found that complex questions lead to high levels of cognitive load and at the same time impede effective learning. However, in this study, the negative effect of complex questions on learning cannot be attributed to cognitive loading because the negative association between cognitive loading and schema construction was not statistically significant. Subsequently, cognitive load does not mediate the relationship between complex questions and learning.

Therefore, attempts to improve learning by managing subsequent cognitive load when complex questions are administered to students are unlikely to be effective. While these findings corroborate other findings on the relationship between complex questions and learning and with cognitive load, more research is needed to establish whether cognitive load does not mediate the relationship between complex questions and learning especially considering this study has some limitations which may have affected the validity of the results.

Notwithstanding, the findings contribute to the fairly new body of knowledge on cognitive loading. The findings also have practical implications for educational practice. Questions which are perceived as being complex by students should be avoided as they lead to high levels of cognitive load and also impede effective learning.

8. LIMITATIONS

While this study makes contributions to the body of knowledge and to educational practice, it has some limitations. Firstly, the data were purposively collected using instruments which have not been extensively tested. Therefore, future studies may validate the instruments used in this study or use other established instruments for the constructs under study to test the validity of the results and conclusions arrived at by this study. Future studies could also test to establish whether cognitive load has a moderating effect on the relationship between complex questions and schema construction.

9. ACKNOWLEDGEMENTS

The authors gratefully acknowledge the financial support of the South African National Research Fund (NRF) through the Knowledge Interchange and Collaboration (KIC) grant. The authors also thank the universities which gave gatekeeper permission for the study and the students who responded to the questionnaire.

10. REFERENCES

INSTRUCTIONS FOR AUTHORS

1. Submission of manuscripts

Authors should submit their papers electronically to The Editor at joc@asocsa.org.

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.

Manuscripts must be submitted in English and must be original, unpublished work not under consideration for publication elsewhere. It will be assumed that authors will keep a copy of their manuscript. Manuscripts are not returned to the author(s).

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.

2. Elective communication

The paper should be written and arranged in a style that is succinct and easily followed. An informative but short title, a concise abstract and keywords and a well-written introduction will help achieve this. Simple language, short sentences and a good use of headings all help to communicate information more effectively. Discursive treatments of the subject matter are discouraged. Figures should be used to aid the clarity of the paper. The reader should be carefully guided through the paper.

3. Publication Fees

The Journal of Construction is an Open Access Journal, and all accepted articles carry a publication fee of Ten Thousand Rands (R 10,000).

4. Preparation of the manuscript

Length: Although there is no length limitation, papers should preferably be between 3,000 and 6,000 words in length (8 to 12 pages). Longer papers will only be accepted in exceptional cases and might be subject to serialization at the discretion of the editor.

Layout: The manuscript must be in English, typed and 1.5 line-spaced 10-pt Arial font type on one side of A4 paper only, with a3cm margin on the left-hand side. All other margins are to be 2 cm. All text should be linked to the left and right margins i.e. paragraphs should not be indented and text should be justAligned. 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 5 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 on 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 10 pt bold capitals and the keywords themselves should be in 10 pt 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 emphasize 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. The figure identification and accompanying description and any reference should be one line space immediately below the figure and linked to the left margin.

Illustrations should be submitted in a form ready for reproduction, preferably as high-resolution .jpg files. Diagrams and drawings should be drawn in black ink on white paper. Alternatively they should be high quality laser computer printouts from reputable computer software drawing packages.

Drawings and diagrams must not exceed 140mm in width and all dimensions must be in mm. Annotation must be in upper and lower case lettering, the capital of which should be 3 mm high.

Figures will normally be reduced in size on reproduction and authors should draw with this in mind. With a reduction of 2:1 in mind the authors should use lines not less than 0.225mm thick and upper and lower case lettering, the capitals of which should be 4mm high. Typewritten annotations are not acceptable.

Tables: Tables must be located close to the first reference to them in the text and must be referred to as Table 1, Table 2, etc. and be numbered in the order in which they are referred to in the text. The table identification and accompanying informative description and any reference should be one line space immediately above the table and linked to the left margin.

The table identification should be in bold. Identify all statistical methods and sources of data.

Tables should only have horizontal lines, the heading and bottom lines being in bold.

All words should be in upper and lower case lettering. The headings should be aligned to the left of their column, start with an initial capital and be in bold. Units should be included in the heading. Any explanations should be given at the foot of the table, not within the table itself.

Symbols, abbreviations and conventions: Symbols, abbreviations and conventions in papers must follow the recommended SI units. Where non-standard abbreviations are used, the words(s) to be abbreviated should be written out in full on the first mention in the text, followed by the abbreviation in parentheses.

References: The numbered superscript reference system must be used. References in the text should be numbered consecutively [1], etc. References should be collected at the end of the paper as they appeared in the manuscript. The style should follow the examples below:


If no person is named as the author the body should be used (for example: Royal Institution of Chartered Surveyors (1980) Report on Urban Planning Methods, London.

Endnotes: A limited number of explanatory notes is permissible. These should be numbered 1, 2, 3, consecutively in the text and denoted by superscripts. They should be typed on a separate sheet of paper at the end of the text. Endnotes should not be used for academic or project citations.

Copyright: Submission of a paper to JOC is taken to imply that it represents original, unpublished work, not under consideration for publication elsewhere.