DETERMINANTS OF CONSTRUCTION FIRMS' COMPLIANCE WITH HEALTH AND SAFETY REGULATIONS IN SOUTH AFRICA

Abimbola Windapo[1] and Adebayo Oladapo

[1] *Department of Construction Economics & Management, University of Cape Town, Private Bag, Rondebosch 7701, South Africa*

[2] *School of Built & Natural Environment, University of Central Lancashire, Corporation Street, Preston PR1 2HE, UK*

The management of health and safety issues is very significant in the construction industry in South Africa in terms of accident rates and cost to contractors. The costs arise from both the cost of compliance with regulations and the cost of accidents and injuries. In spite of the fact that available evidence shows that construction-related accidents and injuries are on the increase in South Africa, many designers and contractors regard the cost of complying with regulations as unnecessary additional financial burdens. It is against this background that this study investigated the statutory regulations relating to health and safety in construction in South Africa and the level of compliance with the regulations and motivation for compliance by contractors. Data obtained from contractors in a questionnaire survey the Western Cape Province of South Africa were analysed using percentage scores and mean score analysis with the aid of the SPSS software. Although the validity of the findings is limited by sample size used in the survey, it is hoped that the findings will provide empirical basis for a more inclusive survey of H&S in the construction industry in South Africa.

Keywords: health and safety, regulations, enforcement & compliance, construction industry, South Africa.

INTRODUCTION

Construction industries worldwide are notorious for unacceptably high accident and fatality rates, both of which were noted by Ulang *et al.* (2010) and Sidumedi (2009) to be high in comparison to other industries. According to Odeyinka *et al.* (2005), construction workers are six times more likely to be killed at work than those in other industries. In South Africa, construction industry records show that work related deaths, occupational diseases and injury claims absorb a significant proportion of the

[1] Abimbola.Windapo@uct.ac.za

[2] aaoladapo@uclan.ac.uk

Windapo, A and Oladapo, A (2012) Determinants of construction firms' compliance with health and safety regulations in South Africa *In*: Smith, S.D (Ed) *Procs 28th Annual ARCOM Conference*, 3-5 September 2012, Edinburgh, UK, Association of Researchers in Construction Management, 433-444.

Gross National Product (Benjamin and Greef, 1997) even though there are concerns that the reports in South Africa fail to capture the full number of accidents (van Huyssteen *et al.* 2009; Sidumedi, 2009). Construction health and safety has long been the focus of attention of many industry stakeholders and role players in South Africa. While it is acknowledged that many industry associations, professional bodies, contracting organisations and others have made significant efforts to improve health and safety within the construction industry, the Construction Industry Development Board (cidb) (2009a) noted that, overall, H&S is not improving commensurately and this has been a major challenge for building construction management. In addition, the Department of Labour (DoL) (2007) noted that even though H&S issues have seen some improvement over the years, the numbers of people that get injured or die are still high.

Warwick (2011), Baxendale and Owain (2000) attributed the accidents and fatalities associated with and reported in the construction industry to the non-compliance by contractors with H&S regulations on construction sites. The Occupational Health and Safety Act (OHSA) 85 of 1993 stipulate the steps to be taken in order to ensure a safe and healthy work environment for all employees on a construction site in South Africa (Hermanus, 2001) and contractors are obliged to comply with the requirements of the Act. In general, compliance means conforming to or being in accord with a rule/established guidelines, such as a specification, policy, legislation, standard or law, or the process of becoming so (Sarbanes-Oxley Act, 2002). Windapo (2011), Bettesworth (2011), MBAWC (2011) and cidb (2009b) noted that building contractors in South Africa do not comply fully with H&S regulations. It emerged from the MBAWC construction site survey conducted from 2007 to 2010 that the overall combined Health and Safety legislation compliance levels of the sites surveyed ranged from 91.9% to 93.77%. (MBAWC, 2011). Plausible reasons given for non-compliance with H&S legislation on construction sites are that some individuals are ignorant of the law, and in other cases they take chances, aware of the small likelihood that they may get caught or of the minor severity of the penalties when they are caught (Bettesworth, 2011). Other reasons are lack of knowledge and inadequate training of site workers (Smallwood, 2002; and Haupt and Smallwood, 1999); and the fact that contractors regard the cost of complying with regulations as an unnecessary financial burden (Windapo, 2011; Hinze, 1997).

This study was prompted by the prevalence of accidents and the lack of consensus among researchers on the key factors responsible for the level of compliance with H&S regulations in the South African construction industry. It examines the factors that affect the levels of contractors' compliance or non-compliance with OHSA regulatory requirements on construction projects. It also evaluates the perceived benefits of compliance with the regulations and its impact on construction project performance. The study is significant because knowledge of factors that affect contractors' compliance with OHSA requirements, perceived benefits of the OHSA regulatory requirements will help H&S policy makers in developing achievable and effective regulatory requirements.

FACTORS AFFECTING LEVEL OF COMPLIANCE

The factors affecting the level of contractors' compliance with H&S legislation have been identified by various authors. They are discussed in the following sections.

Management Commitment and Attitude to Health & Safety

According to Smallwood (2002), workers' actions are influenced by the workers' own mentalities, immediate supervisors, and by the site, middle and top management. Haupt and Smallwood (1999) determined that the most common issues with regards to non-compliance with regulations were that workers were never consulted about health and safety by management; when an instruction to perform a task is given there is no reference made to health and safety; the workers are seldom provided with personal protective equipment (PPE); programme, policy and rules are non-existent; there is no appointment of H&S representatives; inspections and meetings are never conducted; and the workers perceive the supervisors not to prioritise health and safety. Bailey (1997) found that the perception of employees about management's commitment to H&S has a significant impact on the safety outcomes.

Knowledge and Training

Haupt and Smallwood (1999) noted that lack of training is a major cause of non-compliance by workers with H&S legislation on construction sites. Workers that are not trained would not be knowledgeable or aware, and are consequently unable to properly comply with requirements (Smallwood, 2002); and will underestimate the inherent risks/hazards in their work (Haupt and Smallwood, 1999; McLeod, 2007). While Smallwood (2002) noted the widespread lack of understanding by workers when it comes to regulations and the requirements thereof, Haupt and Smallwood (1999) established that very few workers are actually aware of the requirements of OHSA. Smallwood (2002) opined that managers are unlikely to be committed to H&S legislation if their level of knowledge and awareness of H&S regulatory requirements are minimal.

Penalties for non-compliance

According to cidb (2009a), if potential losses relative to labour, materials, plant and equipment as a result of non-compliance with H&S regulations are cited by regulatory authorities, contractors will address H&S issues. However, corruption enables contractors to get away with minor and major misdemeanors and escape severe penalties.

Cost of compliance

Compliance with H&S regulations, according to Smallwood (2004), is an enabler and catalyst for enhanced performance relative to cost. Contractors are more willing to spend money on compliance where the financial costs of non-compliance (i.e. cost of accidents) are likely to be high. According to Windapo (2011), it is not surprising that contractors perceive regulations as an additional burden, which they have to conform with and which gives rise to unnecessary costs as Hinze (1997) views compliance with the OHSA regulations as costly. In an attempt to avoid these perceived additional costs, contractors tend not to comply fully with H&S regulations. Smallwood (2004) estimated that the cost of implementing H&S systems within a company is between 0.5% and 3% of total project costs, confirming the international literature which indicates that the total cost of implementing H&S systems is estimated to be around 5% of the value of completed construction, which is less than the total cost of accidents (CoA) on a project. Baxendale & Owain (2000) established that the costs of implementation of health and safety on small construction sites are higher than that of larger sites.

COMPLIANCE WITH HEALTH & SAFETY REGULATIONS

Perception is the way information is picked up to influence behaviour (Bridgeman and Hoover, 2008), and it is unique to individuals (McDonald, 2012). Thus, different people will have different perceptions of a given situation. Mcleod (2007) notes that there are a number of factors that influence the perceptual set and thus influence perception, and those factors are made up of expectations, emotion, motivation and culture. Therefore peoples' experiences and knowledge will influence their perceptions (Mcleod, 2007). A general underlying belief is that the majority of accidents are not caused by the carelessness of workers, but by failures in control, which is ultimately the responsibility of construction site management (Baxendale & Owain, 2000). The extent of this control depends largely on management's perceptions of the risks involved in the works. Risk perception is generally influenced by individuals' beliefs, attitudes, judgments and feelings (Akintoye & MacLeod, 1997).

The Benefits of Compliance

Higgins (2011**)** viewed compliance with H&S regulations as an investment in the light of the costs it can save. Lack of compliance with OHSA regulations, according to Sidumedi (2009), could result in increased project costs due to reworking as well as time overruns, while the injuries caused by accidents lead to additional unbudgeted costs (Sidumedi, 2009: Higgins, 2011). Bentil (1992) noted that firms which make safety a priority are able to reduce lost workday accidents. Smallwood (2002) opined that contractors gain more than reductions in workers' compensation (WC) and liability insurance premiums, workers' compensation rebates, and reductions in the indirect costs of accidents. Other benefits enumerated by him include enhanced morale of supervisors and workers, and increased attractiveness to clients as a result of perceived holistic quality.

Levels of Compliance

The level of contractors' compliance with H&S regulations is influenced by management/worker attitudes, knowledge and training, cost of compliance, severity of the penalties for non-compliance and the benefits of compliance (Bettesworth, 2011; Windapo, 2022; Smallwood, 2002; Haupt and Smallwood, 1999). MBAWC designed a system of grading the compliance of construction projects with the OHSA regulations in South Africa using elements of OHSA and the total points achieved on a project (Warwick, 2011). The system classifies the basic requirements of the OHSA regulations into 19 different elements ranging from Education, training and promotion to Plant and storage yards/site workshop specifics. The compliance levels achieved are classified into >95% (Comply with regulations), 90% - 95% (Acceptable but needs attention in the near future) and <90% (Unacceptable standards, needs urgent attention). A site must achieve an overall score of over 90% and have a disabling injury frequency rate (DIFR) of one or less in order to be awarded a five star grading.

Construction Project Performance and Compliance with H&S Regulations

Time, cost and quality are widely known measures of performance in the construction industry. However, in recent years, other indicators such as H & S, sustainability and client satisfaction have been included (Hapanova *et al.* 2006). In South Africa, standard performance with regards to H&S is generally deemed to be the mitigation of fatalities, lost time incidents, recordable incidents, doctor cases and near-miss accidents (CURT, 2005). According to Sidumedi (2009), H&S violations resulting in

accidents slow down the construction process and lead to poor time and cost performance.

RESEARCH METHODOLOGY, DATA ANALYSIS AND RESULTS

An internet-based questionnaire survey was conducted in the Western Cape Province of South Africa between May and September 2011 using the SurveyMonkey© . A combination of convenience and snowball sampling was used to obtain data from 53 contractors who agreed to participate in the survey, out of a total of 678 registered by cidb in the province. In addition, case studies of 4 construction sites were conducted using face-to-face and telephone interviews, and secondary data were also collected from MBAWC records. The case study sites chosen were from among those surveyed by the MBAWC for Occupational Health and Safety compliance grading and auditing. This allowed for drawing of links from perceptions and costs of compliance to the data collected by MBAWC. The study examined the main sub-clauses of the OHSA legislation that govern H&S in the South African construction industry. The data collected from the survey were analysed using frequency analysis, percentage scores and mean score analysis. The mean score was used to rank the factors that promote non-compliance with H&S rules and regulations. The mean score (MS) is given as follows (after Odeyinka *et al.* 2011):

$$MS = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{(n_5 + n_4 + n_3 + n_2 + n_1)},$$

where n_1 = number of respondents who answered "Very low"

n_2 = number of respondents who answered "Low"

n_3 = number of respondents who answered "Average"

n_4 = number of respondents who answered "High"

n_5 = number of respondents who answered "Very high"

Respondents' Distributions and Profiles

The background profile of the companies and respondents from which information was obtained is presented in Table 1.

Table 1: Profile of companies/respondents

Profile	Frequency	Percentage
Business Type (N=53)		
Private Company	24	45%
Close Corporation	21	40%
Public Liability Company	3	6%
Sole Proprietorship	3	6%
Multi-National Company	2	3%
Geographical spread of firms (N=53)		
Local	16	30%
Provincial	6	11%
Regional (located in more than one province)	11	21%
National	9	17%
International	11	21%
Age of company (N=53)		
5 year and below	5	9%
6-10 years	10	19%
11-15 years	12	23%
16-20 years	5	9%
21 years and above	21	40%
Number of Employees (N=53)		
Small (Less than 20)	12	23%
Medium (21-100)	19	36%
Large (More than 100)	22	41%
Position of respondent in the company (N=53)		
Owner	21	40%
Director cadre	11	21%
Managerial staff	16	30%
Technical staff	5	9%

Table 1 reveals that 45% of the companies surveyed were private companies, 30% and 21% are local and multinational companies respectively, 40% are more than 21 years and above in the construction business, 41% are large companies and 40% of the respondents are owners. The type of business, geographical spread, age and size of the companies surveyed and the status of the respondents is of relevance to the study because, the higher the position of the respondent, the older the organisation, its operational base and size, the more the respondents would have the necessary experience to be able to provide credible and reliable information.

Ranking of the Factors that Contribute to the Level of Contractor's Non-compliance with OHSA Regulatory Requirements

The study sought to find out the key factors perceived by contractors to contribute to the level of non-compliance with OHSA regulatory requirements.

Table 2:Factors contributing to level of non-compliance with OHSA regulatory requirements

Factors	Perception of impact*					No	Mean Item Score	Rank	Level of Contribution
	1	2	3	4	5				
Negligent attitudes of management	3	3	8	8	7	29	3.43	1	Average
Lack of knowledge	6	6	7	6	11	36	3.28	2	Average
Lack of training	1	5	8	5	4	23	3.26	3	Average
Cutting cost	2	12	4	7	5	30	3.03	4	Average
Non-severe penalties for non-compliance	17	3	3	4	5	32	2.22	5	Low

*1= very low, 2 = low, 3= average, 4= high, 5= very high

As shown in Table 2, the major perceived contributor to the level of non-compliance with OHSA regulations by contractors is the negligent attitude to H&S by management of construction companies. The H&S attitude of top management is particularly critical as it drives the overall attitude and H&S culture of the organisation. The least contributor is the non-severity of penalties for non-compliance. This implies that the severity and enforcement of penalties aid compliance.

Perceived Benefits of Compliance with OSHA Regulatory Requirements

The respondents were asked to indicate the perceived benefits that compliance with nine OHSA regulatory requirements (based on the average level of compliance attained in the MBAWC site audits) provides onsite. Table 3 shows that 70.3% of the respondents perceived that the major benefit of compliance with the OHSA regulatory requirements is a safe work environment.Only 30% and 29.3% perceive the benefits of compliance to be improved project performance (productivity and time) and reduction in costs of accidents (wages and medical expenses) respectively. 8.6% of the respondents perceive that there are no benefits in complying with the OHSA requirements.

Table 3: Perceived benefits of compliance with OHSA regulatory requirements

OHSA Requirements	Level of Compliance (%)*	Benefits						Total response
		None	No Penalties	Safe Work Environment	Reduction in COA**	Reduction in Admin Costs	Improved Productivity	
Cranes (Tower, Mobile & Gantry)	99.4	5	8	35	14	8	19	49
Demolition Work (Safety Requirements)	97.4	5	8	38	14	6	16	50
Transport & Material Handling (safety in use)	96.9	6	10	33	17	3	15	51
Admin Structure & Legal Requirements for H&S	94.3	5	17	31	11	9	11	50
Scaffolding, Formwork & Support (safety in use)	90.0	3	6	37	16	6	19	51
Site Plant & Machinery	89.9	2	5	33	16	5	14	50
Work Place Environment Health & Hygiene	88.8	6	8	37	8	2	13	51
Personal Protective Health & Clothing	88.1	3	5	39	19	4	15	51
Excavation (adequacy of side support, etc.)	82.5	4	6	36	18	7	14	51
TOTAL		**39**	**73**	**319**	**133**	**50**	**136**	**454**

*Source: MBAWC (2011)

**COA-cost of accidents

Case Study Results

Four case studies - referred to below as Site A, Site B, Site C and Site D in Table 4- were undertaken. The stakeholders interviewed were contractors, quantity surveyors and health and safety consultants. The type and size of construction projects on the sites ranged from housing projects with a budget of less than R20mil (Site C and D, to a hospital project of R500m budget (Site B) as well as a multi-billion rand power station site (Site A). The interviewees were asked questions pertaining to the requirements of the OHSA and the effects they have on project performance. A few project specific questions were also asked on each site in order to establish whether the level of compliance with OHS requirements had an impact on health and safety performance and other performance parameters on a particular site. The interviewees were then requested to give their opinions on how the regulations in the OHSA Act could be improved.

Table 4: Summary of Case Study Interviews

Questions Posed	Site A	Site B	Site C	Site D
Is OHSA implemented on site?	Yes	Yes	Yes	Yes
Level of compliance with OSHA	High	High	High	High
Is the project running within time?	No	No	Yes	No
Is the project running within budget?	No	No	Yes	Yes
Has there been any report of accidents/ injuries?	Yes – Fatalities, accidents and injuries	Yes - Accidents and injuries	Yes – Minor injuries	Yes – Minor injuries
Reasons for non-compliance	Lack of knowledge; Cost mitigation – profit maximisation; Time consuming	Cost mitigation	Lack of knowledge; Cost mitigation	Lack of knowledge; Cost mitigation; Attitude/negligence
Effects of OSHA compliance on performance	Less accidents	H&S is costly but cost is justified; overall performance is improved	OHSA compliance is unnecessarily costly and time consuming	Quality is improved; time and cost are compromised
Benefits of complying with OHSA legislation	Competing on international standards; Penalties & loss in production due to accidents are avoided;	Increased productivity	Safe working environment	Workplace is safe and thus more productive; reduces accidents
Any improvements to existing OHSA legislation?	None	Adapt to suit individual project requirements	Adapt to suit individual project requirements	Adapt to suit individual project requirements, which is not practicable

DISCUSSION OF FINDINGS

The results of the questionnaire survey have given some indications of the main causes of noncompliance with H&S regulations and the perceived benefits of compliance. However, these results are based on a rather small sample size (about 8%), which limits the generalisability of the findings. To make these findings more meaningful, the four case studies were conducted to reinforce the survey findings. The case study results are discussed below.

Factors that affect the level of contractors' compliance with OHSA Legislation

The interview results (Table 4) show that negligent attitudes, lack of knowledge (ignorance) and/or understating of H&S regulations by construction site employees and the profit motive are the main causes of non-compliance. This is widely supported by the literature The interviewees believed that non-compliance because of cost mitigation is due to small contractors not including allowances for H&S requirements in their tenders as a deliberate strategy to win tenders.

Two of the interviewees stated that they did not comply with some of the requirements of the OHSA Act because they perceived them as unnecessarily expensive, time-consuming and unjustified for their particular site (housing projects). They added that most of the requirements of the OHSA regulations are more applicable to larger projects and would be better complied with if they were more project-specific.. Other interviewees stated that non-compliance by site operatives can be significantly attributed to negligence/worker attitude which is a product a risk-taking cultural background.

Perceived Benefits of Compliance with OHSA Regulatory Requirements

In addition to providing a safe work environment, the interviewees stated that compliance with H&S regulations also gives the firm a competitive advantage. This implies that increased level of compliance with OHSA requirements is an investment by contractors in the pursuit of corporate growth and profitability.

CONCLUSION

The health and safety regulations in the construction industry were enacted to safeguard lives and to improve the quality of construction products, including construction processes. However, contractors have been reported to be non-compliant with these regulations. This study examined the levels of compliance by construction firms with the OHSA regulatory requirements, the reasons for compliance and/or non-compliance, and how these affect the cost and performance of building/construction projects. The main reasons for non-compliance with health and safety regulations are the lack of knowledge and/or understanding of health and safety legislation requirements by lower management, smaller and sub-contractors and site operatives. Other significant reasons for non-compliance are the profit maximisation motive driven by the competitive nature of the construction industry, as well as negligence/attitude of the contractor. It emerged from the study that contractors benefit from a safe work environment, reduction in COA and improved productivity with increased level of compliance with OHSA requirements. This suggests that, although complying with the OHSA regulations involves upfront costs, the costs saved in the long run in preventing potential accidents outweigh the cost of compliance.

These findings are based on a survey using a relatively small sample size selected through convenience and snowball sampling. This limits the validity of the results. It is, however, hoped that this study will form the basis of a more inclusive survey of H&S in the South African construction industry in future.

REFERENCES

Akintoye, S. and MacLeod, J. (1997) Risk analysis and management in construction project management , *International Journal of Project Management*, **15** (1),31-38.

Bailey, C. (1997). Managerial factors related to safety program effectiveness: an update on the Minnesota Perception Survey. *Professional Safety*, **8**, 33–5.

Baxendale, T. and Owain, J. (2000) Construction design and management safety regulations in practice-progress on implementation. *International Journal of Project Management*, **18** (1), 33-40.

Benjamin, P. and Greef, J. (1997) Report of the Committee of Inquiry into a National Health and Safety Council in South Africa, (Pretoria: Department of Labour

Bentil, K K (1992). Construction site safety: the silent profit centre. *Construction Business Review*, September/October:,52–54.

Bettesworth, D. (2011). The compliance debate.(Online). Available at http://dbtownplanner.co.za/2011/02/21/the-compliance-debate/[Accessed: 15 April 2011]

Bridgeman, M. and Hoover, M. (2008) Processing spatial layout by perception and sensorimotor interaction, *The Quarterly Journal of Experimental Psychology*, **61** (6), 851–859

Centre for Construction Innovation (CCI) (2011) Key performance indicators for construction. (Online) Available at http://www.bre.co.uk/page.jsp?id=1478[Accessed: 6 July 2011]

Construction Industry Development Board (cidb) (2009a) Construction Health and Safety in South Africa: Status and Recommendations. (Online) Available at http://www.cidb.co.za/knowledge/publications/industry reports/[Accessed: 10 May 2011]

Construction Industry Development Board (cidb) (2009b) Construction indicators and survey results 2008.(Online). Available at http://www.cidb.org.za/Documents/KC/cidb_Publications/Ind_Reps_Other/ind_reps_CII_Full_Report_2010.pdf [Accessed: 13 April 2011]

Construction Users Roundabout (CURT) (2005) Construction measures: key performance indicators**.** (Online) Available at http://www.nwoglca.org/PDF_Files/Construction%20Measures_Key%20Performance%20Indicators.pdf[Accessed: 28 June 2011]

Department of Labour (DoL) (2007) Online Resource. Available at http://www.labour.gov.za [Accessed: 17 October 2009]

Hapanova, T. Al-Jibouri, L. and Reymen, I. (2006) Process Performance Indicators in Project Pre-design Stage. (Online) Available at http://doc.utwente.nl/58079/1/06_Haponava.pdf[Accessed: 13 April 2011]

Haupt, T and Smallwood, J. (1999) Health and safety practices on community projects: the South African experience. In A. Singh, J. Hinze and R. Coble (eds.) *Implementation of safety and health on construction sites*. Rotterdam, A.A Balkema. 47-54

Hermanus, M N. (2001) Trends in occupational health and safety policy and regulation – issues and challenges for South Africa. Institute of Development and Labour Law, University of Cape Town.

Higgins, N. (2011) The costs of accidents at work. (Online) Available at http://www.websafety.com/Exchange/Downloads/AccidentCosts.ppt[Accessed: 6 July 2011]

Hinze, J W 1997. *Construction safety*. Prentice Hall, Englewood Cliffs, NJ

MBAWC (2011) Analysis of occupational health and safety audits conducted in the Western Cape for the period 2007 to 2010. Cape Town: MBAWC

McDonald, S.M. (2012) Perception: a concept analysis, *International Journal of Nursing Knowledge*, **23**(1), 2-9

McLeod, S. (2007) Visual perception theory. (Online) Available at http://www.simplypsychology.org/perception-theories.html [Accessed: 22 April 2011]

Odeyinka, H., Davison, C. and Olomolaiye, P. (2005) An assessment of factors inhibiting designers from complying with health and safety regulations in their design, *Proc.* of 21st*Annual ARCOM Conference*, 7-9September, SOAS, University of London, **2**, 905-913.

Odeyinka, H., Larkin, K., Cunningham, G., McKane, M., Bogle, G. and Weatherup, R. (2011) Development of models for assessing risk impacts on the variability between contract sum and final account.*Proc.* of 27th*Annual ARCOM Conference*, 12-13September, School of the Built Environment, University of Salford,London, 614-623.

Sarbanes-Oxley Act (2002).Regulatory compliance definition. (Online) Available at http://www.consult2comply.com/main/challenges/regulatory-compliance[Accessed: 10 May 2011]

Sidumedi, K S. (2009) An investigation into the Relationship between the corporate culture of South African construction firms and performance**.**(Online) Available at http://wiredspace.wits.ac.za/handle/10539/7942[Accessed: 28 June 2011]

Smallwood, J J (2002) The influence of health and safety (H&S) culture on H&S performance. *In:*

Greenwood, D (Ed.) *Proc. of the18th Annual ARCOM Conference*, University of Northumbria, 2-4 September 2002, **1**, 217-26.

Smallwood, J. (2004). The influence of engineering designers on health and safety during construction. *Journal of the South African Institution of Civil Engineering*, **46**(1), 217-226.

Ulang, N.M., Gibb, A.G.F. and Anumba, C.J. (2010) The communication of health and safety information in construction. *Proc. of Cib World Congress, [Cib W099 Special Track], Manchester*, 1 May 2010

Van Huyssteen, S. Van Heerden, L. Perkins, P. and Gyimah, O. (2002). The identification and measurement of performance indicators for the South African construction industry. (Online) Available at http://buildnet.csir.co.za/cdcproc/docs/3rd/vanhuyssteen%20_vanheerden.pdf[Accessed: 28 June 2011]

Warwick, J. (2011) Building industry safety needs to be of stellar standard [online]. Available from http://www.crown.co.za/news/2011/July/building_industry_safety_needs_to_be_of_stellar_standard.htm [Accessed: 23 July 2011]

Windapo A. (2011) Investigation into the Level of Compliance to Construction Health and Safety Requirements within the South African Construction Industry. *In: Proceedings of the CIB W099 Conference*, Washington D. C., 23-25 August