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# Client Involvement and Construction Project Healthy and Safety Performance

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## Abstract

Despite significant effort by business associations, researchers, construction clients and contractors to deal with the unsatisfactory health and safety (H&S) performance in the construction industry, the situation has not improved. Lack of effective involvement by clients has contributed to the construction industry's extremely high number of accidents that occur on a daily basis, resulting in medical treatment cases, lost time incidents, fatalities and damage to property. The objective of this study was to investigate clients attitude towards project healthy and safety performance and the extent to which South African construction clients are involved in projects. A questionnaire was designed for respondents to assess the extent to which construction clients were involved in construction project health and safety in projects they had managed and to evaluate the health and safety performance of those projects. Results from data collected across 135 large-size construction projects in South Africa were analysed using descriptive statistics. Results showed that the attitudes of clients and their involvement before and during construction was unsatisfactory. The results of the study confirmed that involvement by clients throughout the phases of the project could lead to improvement in project health and safety. Future studies should be conducted using a larger sample size to improve the application of the model in the construction industry.

## Keywords

construction clients, construction health and safety, health and safety performance, project performance

## 1 Introduction

The construction industry is one of the sectors that creates the most employment opportunities for unskilled and semi-skilled workers from impoverished local communities due to its relatively labour-intensive nature (Phoya, 2012 ; Musonda, Pretorius and Haupt, 2012). Regardless of its important role and contribution to economic growth, the construction industry remains a risky sector where the most vulnerable (unskilled and semi-skilled) workers are continually involved in serious construction accidents. Although there have been interventions by various stakeholders to deal with this problem, the results remain unacceptable as accidents continue to persist in the construction industry.

Although several programmes have been implemented by government authorities and other relevant stakeholders to improve the standard of health and safety (H&S) at construction project sites, the construction industry in South Africa still has an unacceptably high level of incident rates. This causes extensive human suffering – and despite measures introduced by the contractors themselves,

construction workers continue to be fatally injured and exposed to occupational health hazards (Lopes, Haupt and Fester, 2011; Umar, Egbo, Honnurvali, Saïdani and Al-Bayati, 2019).

Despite significant efforts by industry associations, researchers, construction clients and contractors to improve H&S in the construction industry, overall construction H&S performance has not improved and continues to contribute an unacceptably high level of injuries and fatalities. The construction industry continually fails to comply with construction regulations (CR 2014) in South Africa. To address the unacceptably high level of incident rates in the construction industry, many countries have developed laws and regulations that govern the processes in which construction clients must manage H&S on construction sites.

Client influence in construction projects has been cited by numerous researchers as a lasting solution for reducing the number of H&S accidents on sites (Smallwood, 2004; Votano and Sunindijo, 2004; Kikwasi, 2008). There is a legal and moral responsibility on owners to ensure that their contractors comply with H&S requirements (Huang, 2003). From the construction process perspective, there are three key issues that affect the project owner (The Hartford Loss Control Department, 2002) namely, moral obligation, legal obligation and potential cost savings. In terms moral obligation, employers are generally expected to provide and maintain a safe working environment that is without risk to the health of employees. This moral obligation goes beyond the employees of contractors and includes other stakeholders. In terms of legal obligation employers have a duty to inform and warn their employees, contractors and other stakeholders about any potential hazardous situation on sites. The clients could be held liable for injuries to any of the project stakeholders caused by their failure to enforce strict H&S requirements on a site that is under their control. In terms of potential cost savings, any effort shown by clients for H&S on site has the potential to bring down construction costs as the number of injuries reduce (Chunxianga, 2012).

Jazayeri and Dadi (2017) revealed that various researchers have conducted studies in the construction industry on client influence on construction project H&S performance, identifying factors causing poor performance in construction projects and critical success factors influencing safe programme implementation. Musonda, Pretorius and Haupt (2012) investigated the influence of clients on construction project H&S performance in Botswana and South Africa, and that H&S performance was better when factors associated with client health and safety culture were observed. Musonda et al., (2012) argued that in most instances the role of construction clients is ignored by researchers as they place most of the emphasis on contractors. A study by Huang and Hinze (2006) found that H&S performance is improved when construction clients strictly enforce H&S compliance for contractors. Liu, Jazayeri and Dadi (2017) conducted a study to evaluate the degree to which owners are involved in site safety issues. They developed a model – Owner's Role Rating Model (ORRM) – to test the extent to which construction clients participate in health and safety and presented a survey instrument to assess the level of participation by owners in site safety management. Liu et al., (2017) conducted an evaluation of twenty projects by using ORRM to verify its applicability in the construction environment; the study concluded that owners with little involvement in construction projects could use the ORRM to identify the critical points for better performance.

Although there is consensus amongst researchers that client participation throughout the phases of construction projects can lead to improvements in the H&S performance of these projects, very few studies have explored this area in the South African context. Lack of effective participation of clients in health and safety has left the construction industry with a very high number of accidents every day, resulting in medical treatment cases, lost time incidents, fatalities and damage to property that occur on construction sites.

This study aims to assist clients to influence contractors in improving the health and safety performance of construction projects effectively.

## **2 Research Methodology**

A quantitative research method was adopted for the study. For the purpose of this study, the target population includes construction clients of building, housing, civil construction, petrochemicals, roads and earthworks, and structural, mechanical, electrical, instrumentation, piping and platework (SMEIPP). The data was gathered directly from clients, professionals representing client health and safety agents, construction managers, construction health and safety managers and officers. A total of 135 projects, with a value of more than R40 million, were targeted for this study. The study was limited to construction projects that started during the period 2014 – 2017 and excluded projects that involve maintenance work.

Descriptive statistics were used to provide an analysis of measures of central tendency. In ensuring that the data is useable, reliable and valid for testing causal theory, the data was screened for any irregularity using SPSS for outliers, extreme values, missing data and disengaged responses before subjecting them to exploratory factor analysis (EFA) to assess the factor structure and reliability and validity of the measures. Exploratory Factor Analysis was used for data reduction and to examine the factor structure of the measurement instrument using SPSS.

## **3 Data Analysis**

### **3.1 Response Rate**

Construction projects (150) with a value of more than R40 million were included in this study. The survey was administered through a combination of emails and follow-up calls. The data was gathered directly from clients, professionals representing client health and safety agents, construction managers, construction health and safety managers and construction health and safety officers. By the cut-off date of the survey, 135 usable responses were received. This represented an approximate ninety per cent usable response rate, with most responses (thirty-four per cent) from building (commercial) projects being the highest.

### **3.2 Exploratory Factor Analysis**

Exploratory Factor Analysis (EFA) was used to test the reliability and validity of the variables assessed in the study. The EFA aims to reduce data by finding the smallest manageable set of common components that will account for the intercorrelations of a set of variables (Pallant, 2011). The steps involved in the EFA include assessment of the suitability of the data for factor analysis, determining numbers for factor extraction, retaining and rotation, interpretation of resulting factors. The analysis included the evaluation of reliability (Cronbach alpha and composite), and discriminate and convergent validity of the survey instrument. To assess the suitability of the respondent data for factor analysis, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA) and Bartlett's test of sphericity were used. Latihan et al., (2017) described KMO MSA as a test of the extent of variance within the data that could be explained by factors. Latihan et al., (2017) stated that as a measure of factorability, a KMO value of 0.5 is poor, 0.6 is acceptable while a value closer to one is better. Neuman (2003) and Tabachnick and Fidell, (2008) suggested that KMO measure of sampling adequacy must be 0.7 and 0.60 respectively. For this present study, the KMO MSA was 0.771, suggesting that the sample size is adequate for EFA.

The Bartlett's test of sphericity needs to be significant for the sample to be deemed to have sufficient variance for EFA. Peri (2012) suggested that for factor analysis to be recommended suitable, the Bartlett's test of sphericity must be less than 0.05. Taking a ninety-five per cent level of significance,  $\alpha = 0.05$  and the p-value (Sig.) of  $.000 < 0.05$ , shows that the factor analysis was valid.

### 3.3 Multivariate Analysis Assessing Client Attitude Towards Health and Safety

Using a Five-point Likert Scale, where 1= Never and 5=Always, respondents were required to evaluate a set of questions pertaining to their attitude towards health and safety performance of their construction projects. The assessment of questions revealed low mean scores ranging from 2.76 to 1.85, indicating that the respondents had a poor attitude towards health and safety on their projects.

Table 1. Client involvement in health and health and safety before construction

	Mean	SD
Does the client address health and safety issues in the feasibility study and conceptual design phases?	2.76	1.63
Does the client require designers to consider construction health and safety during constructability/buildability reviews?	2.40	1.54
Does the client conduct a review of the design for health and safety?	2.33	0.73
Does the client prefer to award the contract to a design- build contractor to promote health and safety performance?	2.33	1.82
Does the client conduct the preconstruction meeting with contractor for health and safety issues?	1.90	1.43
Does the client require designers to conduct a review of the design for construction health and safety for this project?	1.85	0.77

### 3.4 Multivariate Analysis Assessing Client Involvement in Construction Health and Safety

Using a Five-point Likert Scale, where 1= Never and 5=Always, respondents were required to evaluate a set of questions pertaining to their involvement in health and safety performance of their construction projects. The results from Table 2 show mean scores ranging from 3.22 to 1.43. The understanding of clients contribution to health and safety performance (mean score= 3.22) was ranked highest.

Table 2. Client involvement in health and health and safety before construction

	Mean	SD
Does the client understand that their involvement contributes to health and safety performance?	3.22	0.95
Does the client set zero harm, injury or incidents as the objectives for the project?	3.16	0.97
Does the client go beyond a regulatory compliance approach to prevent injuries or incidents?	2.54	1.36

Does the client through include all requisite information such as outcomes of baseline H&S hazard identification and risk assessment (HIRA) in the form of H&S specifications as part of tender documentation?	2.20	1.64
Does the client have specific health and safety goals for each project?	1.43	1.25

## 4 Findings and Discussion

Liu (2017) pointed out that there are many activities before construction commences that could affect the health and safety performance. Huang (2003) stated that owners could impact designers and contractors through their proactive participation in construction safety issues. In South Africa, the Construction Regulation (CR) 2014 imposes a clear obligation to clients to provide the designers with the health and safety specification and ensure that designers consider safety specification during the design stage. The results from the questionnaire survey show that client involvement in H&S before construction is not common in the South African construction industry. Respondents indicated that clients are not consistent with the legal obligation of being involved before construction. Further, it was found that there was almost no client involvement in H&S before construction of the projects. The fact that the client is rarely involved in health and safety before and during construction in the industry is a cause for concern.

The results from the questionnaire show that the client attitude towards H&S was perceived to be negative in the construction industry. Respondents indicated that the client attitude towards H&S was not consistent in the construction industry. This means that these clients never show commitment to H&S. The client attitude towards health and safety starts with their understanding that their involvement could contribute to project health and safety performance. According to Musonda et al., (2009), client attitude can be explained by the extent of the client involvement in the management of H&S. This could be achieved by the clients setting zero harm, injury or incidents as the objectives for the project. Liu (2017) stated that the client attitude towards H&S determines the effort the client is willing to make towards ensuring that H&S is not compromised on project sites. One of the efforts the client could make is to go beyond a regulatory compliance approach to prevent injuries or incidents on site.

## 5 Conclusions and Further Study

The study reported on the extent to which clients attitudes towards health and safety performance in construction projects in South Africa. More specifically, the involvement of clients in the practice of health safety on their projects. Findings from the survey were that construction client attitude towards H&S is critical to the performance of all stakeholders in the projects. The study further revealed that once the construction client sets the H&S tone then their attitude can exert a great influence not only on the performance of H&S but also on other project Key Performance Indicators (KPIs). Unfortunately some construction clients still leave the H&S issue to the contractors. The finding that most construction clients are not involved with H&S before the project is a cause for concern especially since the construction client is legally required to provide the designer with the health and safety specifications contemplated and ensure that the designer takes the prepared health and safety specification into consideration. Consequently, an appropriate intervention in terms of

policies, procedures and active monitoring could be formulated that seek to enforce construction client compliance to H&S legal requirements.

Finally, given that the sample was limited to 135 large construction projects, a larger sample size could have benefited considering the importance of this study. The survey indicator variables may be refined to suit specific project environments.

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