The influence of clients on construction health and safety conditions in South Africa

Abstract
The South African construction industry is one of the most hazardous with an unacceptably high level of injuries and fatalities. Construction stakeholders, namely clients, designers, project managers, and quantity surveyors influence project health and safety performance. However, their influence on H&S decreases with project evolution. An investigation of client entities in South Africa examined the influential role that clients potentially play in health and safety outcomes and how this is directly linked to project parameters. A sample of 128 client entities was surveyed, using a questionnaire. It found that clients should be made aware of their ability to influence the H&S of a project earlier during the concept and design phases. Generally health and safety was included as part of the project parameters but more effort is required to afford it the same status as the other project parameters.

Key words: health, safety, construction, clients, influence, project phases

Introduction
The issue of health and safety (H&S) on construction sites is subject to a range of influences, and is therefore a complex matter. Health can be defined as the protection of the bodies and minds of people from illness resulting from the materials, processes or procedures used in the workplace. Safety is the protection of people from physical injury. The borderline between health and safety is ill defined and the two words are normally used together to indicate concern for the physical and mental well-being of the individual at the workplace. This paper excludes discussions on occupational diseases.

Irrespective of the efforts of the Department of Labour (DoL) and other relevant stakeholders to improve H&S conditions, the construction industry in South Africa is one of the most hazardous with an unacceptably high level of injuries and fatalities, resulting in considerable human suffering. In 2001 injuries among construction workers comprised 9.0% of all industrial injuries in South Africa, while fatalities represented 11.9% of all industrial deaths (722). Records of the Federated Employers Mutual Assurance for the period January to April 2008 indicated that 3385 claims and 15 fatalities were registered. However, the accuracy of reported statistics is questionable. For example, when compared with those of the Compensation Commissioner, the figures in Table 1 suggest gross underreporting to the DoL by the construction sector and possible non-compliance with requirements to report.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal</td>
<td>54</td>
<td>81</td>
<td>79</td>
<td>162</td>
</tr>
<tr>
<td>Non-fatal</td>
<td>159</td>
<td>250</td>
<td>245</td>
<td>396</td>
</tr>
<tr>
<td>Non-casualty</td>
<td>11</td>
<td>7</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>224</td>
<td>338</td>
<td>334</td>
<td>578</td>
</tr>
</tbody>
</table>

Table 1. Health and safety statistics report from Department of Labour

Figure 1. Time/safety influence curve

Clients must realise that the influence on H&S decreases with project evolution as indicated in the Time/safety influence curve developed by Szymborski (see Figure 1). The most construction H&S is addressed on their projects. H&S begins with the attitude that accidents are preventable and that requirements for creating healthy and safe work practices must be followed. Although the best site management of H&S cannot prevent all accidents, entities other than those actually performing the work have an important role to play in enforcing proper safety standard measures. With these influences in mind, the promulgation of the Construction Regulations was intended to realise optimum multi-stakeholder contributions to H&S by clients, designers, project managers and quantity surveyors.

Clients must realise that the influence on H&S decreases with project evolution as indicated in the Time/safety influence curve developed by Szymborski (see Figure 1). The most

Literature review
Client influence has an impact on construction H&S. In this paper, a client is defined as ‘any person or organisation for whom a construction project is being carried out’. Architects and design engineers often disavow responsibility for H&S issues associated with the construction of their work. Arguably, this denial will only change if clients insist that
effective time to consider project H&S and eliminate potential hazards is in the design process, during the determination of the project’s feasibility and development of the conceptual design.6

Construction industry stakeholders can either negatively affect construction H&S outcomes or make a contribution to improving the construction work environment.12 Client influence may manifest in the form of project requirements that are clearly defined at tendering.13 Several easily overlooked factors such as lack of pre-planning, inadequate selection of contractors, and laissez faire attitudes are significant contributors to poor H&S.7

Clients do not believe that the H&S of construction site workers is their responsibility,14 often assuming that it is the contractors’ responsibility to comply with the relevant environmental, safety, and health regulations.7 Extensive designer participation is essential for successful implementation of H&S as design professionals influence construction H&S outcomes both directly and indirectly.15 However, some contend that designers cannot be relied on entirely for H&S performance improvement.15 Clients have historically delegated their duties and regarded this as completion of their responsibilities.14 Yet ultimately it is clients that incur the cost of accidents.16 If getting a rock bottom price means that people will be killed or seriously injured, then the price is too low.17 Clients have a vested interest in assuring that an effective construction safety programme is in place on their job sites given that they ultimately pay for all losses.7

Successful construction projects are the result of effective planning and execution.7 Consideration of H&S aspects at the initial stages of building projects is vital to ensure that H&S are built in, rather than bolted on.18 The root causes of accidents are due to design decisions, lack of planning and construction methods and procedures.19 A study found that 63% of fatalities were traceable to pre-construction activities.19

Construction industry stakeholders can either negatively affect or make a positive contribution to improving the construction work environment.12 Construction H&S can be successfully influenced by clients.20 The South African Construction Regulations 20039 require clients to take health and safety into account at every project stage, including planning, design, construction, maintenance and demolition.9 However, little has been written about client influence on H&S in the South African context and the literature is largely silent on client influence on H&S during the later phases of a project. Therefore, a study was undertaken to examine the influential role that clients potentially play in health and safety outcomes and how this is directly linked to project parameters. The study objectives were to:

- measure the extent to which clients understand their role in H&S on site and accept it as their responsibility from inception phase through to the maintenance phase;
- establish to what extent clients actively influence construction H&S on their projects; and
- determine whether clients address H&S in all phases of their construction projects.

**Methodology**

A descriptive survey, using a questionnaire, was used as this allowed a larger sample and was less costly than other methods. The study was aimed at established large client organisations. The University of Johannesburg gave ethical approval. The sampling frame of 197 client entities in South Africa was developed from the databases of the Construction Industry Development Board (CIDB) and Investment Property Databank (IPD). Other client entities associated with the researcher’s employer together with governmental parastatals and all the four major banks in South Africa were also included. The sample selected was 128, derived through systematic sampling (every second entity) of the CIDB clients, all clients on the IPD database, and all the governmental parastatal entities that could be identified. The latter constituted a convenience sample as there may have been others.

The structured questionnaire, based on the literature, was developed and piloted by the researcher. A series of statements was used to determine various aspects of client involvement in H&S across the six phases of a project: Phase A: Project initiation and briefing phase; Phase B: Concept/feasibility phase; Phase C: Design development phase; Phase D: Procurement/tender documentation phase; Phase E: Construction phase; and Phase F: Post-construction and maintenance phase.

All the questions used 5-point Likert scales. For importance the scale was: very important (1), important (2), neutral (3), slightly important (4) and not important (5). Agreement categories were: strongly disagree (1), disagree (2), neutral (3), agree (4) and strongly agree (5). Finally, frequency was graded as: never (1), seldom (2), sometimes (3), often (4) and never (5).
The questionnaire was issued to senior officials in the health and safety divisions in each of the 128 selected organisations, who collectively completed them on behalf of the organisation. The response rate of questionnaires received was 64% (82). Data was analysed using the Statistical Package for the Social Sciences (SPSS) and factor analysis was used for data reduction. The reliability for internal consistency of the H&S performance indicators was determined using Cronbach’s alpha test. The research concentrated on clients registered with the CIDB and the IPD, possibly introducing sample selection bias. Key performance/influence areas identified in the literature may not have emerged during the data reduction process.

**RESULTS**

The responses from the questionnaires are presented in Tables 2 to 5.

**DISCUSSION OF RESULTS**

Clients regarded themselves as most influential in the post-construction and maintenance phases and least influential in the design development phase (Table 2). This is a concern since 63% of fatalities have been traced to pre-construction activities.19 All other means suggested that clients recognise their responsibility but not necessarily strongly so. With respect to whether clients should bear responsibility for H&S, clients reported that they should mostly be responsible during the maintenance and the concept/feasibility phases, and least responsible during the construction phase. It is possible that clients regarded contractors and consultants as the responsible entities for H&S. (In the context of this study, a consultant means any person who acts as a representative for a client in managing the overall construction works.) The differences in the responses suggest that while clients acknowledge their responsibility for H&S probably to comply with legislation they would prefer it to be different and in specific phases. One likely reason for poor H&S is that clients see themselves as being responsible for and addressing H&S in the later phases of a project. It is nearly impossible for contractors to form a comprehensive construction H&S safety management system all by themselves.21

Clients reported that consultants should take responsibility for H&S mostly during the construction and design development phases and least during the post-construction and maintenance phases. Contractors should not take responsibility for H&S during any phases other than the construction phase and post-construction and maintenance phases. However, the responsibility for H&S working conditions belongs to the client,1 and working conditions should be enhanced when construction clients address H&S in the early phases of a project.22

Regarding how frequently they address H&S (Table 3),

**Table 2. Client involvement in the different project phases (N = 82)**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Phase A</th>
<th>Phase B</th>
<th>Phase C</th>
<th>Phase D</th>
<th>Phase E</th>
<th>Phase F</th>
</tr>
</thead>
<tbody>
<tr>
<td>The client is responsible for H&amp;S</td>
<td>3.94</td>
<td>1.21</td>
<td>3.84</td>
<td>1.10</td>
<td>3.77</td>
<td>1.17</td>
</tr>
<tr>
<td>Clients should bear the responsibility for H&amp;S</td>
<td>3.90</td>
<td>1.18</td>
<td>3.96</td>
<td>1.08</td>
<td>3.72</td>
<td>1.23</td>
</tr>
<tr>
<td>Most effective phase to consider project H&amp;S</td>
<td>3.65</td>
<td>1.32</td>
<td>3.73</td>
<td>1.10</td>
<td>4.16</td>
<td>1.07</td>
</tr>
<tr>
<td>and eliminate potential hazard</td>
<td>– –</td>
<td>– –</td>
<td>3.40</td>
<td>1.20</td>
<td>3.65</td>
<td>1.18</td>
</tr>
<tr>
<td>Consultants should bear the responsibility for H&amp;S</td>
<td>– –</td>
<td>– –</td>
<td>– –</td>
<td>– –</td>
<td>– –</td>
<td>– –</td>
</tr>
<tr>
<td>Contractors should bear the responsibility for H&amp;S</td>
<td>– –</td>
<td>– –</td>
<td>– –</td>
<td>– –</td>
<td>– –</td>
<td>– –</td>
</tr>
</tbody>
</table>

Key: M = mean; SD = standard deviation; – = project phases prior to the appointment/involvement of the consultant/contractor

"Client influence has an impact on construction H&S."
Table 4. Clients’ level of agreement on the causation of accidents during all phases of a project (N = 82)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Phase A</th>
<th>Phase B</th>
<th>Phase C</th>
<th>Phase D</th>
<th>Phase E</th>
<th>Phase F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give information about the site and/or premises in advance</td>
<td>3.85</td>
<td>3.90</td>
<td>3.79</td>
<td>3.84</td>
<td>3.41</td>
<td></td>
</tr>
<tr>
<td>Set H&amp;S culture for a project</td>
<td>3.80</td>
<td>3.85</td>
<td>3.86</td>
<td>3.85</td>
<td>3.51</td>
<td></td>
</tr>
<tr>
<td>Include H&amp;S as a pre-qualification criterion to design approval</td>
<td>3.68</td>
<td>3.79</td>
<td>3.86</td>
<td>3.85</td>
<td>3.51</td>
<td></td>
</tr>
<tr>
<td>Schedule and prioritise H&amp;S requirements</td>
<td>3.62</td>
<td>3.79</td>
<td>3.96</td>
<td>4.27</td>
<td>3.84</td>
<td></td>
</tr>
<tr>
<td>Ensure information about what has been built is issued to enable to manage</td>
<td>3.60</td>
<td>3.65</td>
<td>3.69</td>
<td>4.11</td>
<td>3.89</td>
<td></td>
</tr>
<tr>
<td>Insist on being involved/play a role with regards to H&amp;S</td>
<td>3.60</td>
<td>3.63</td>
<td>3.79</td>
<td>4.09</td>
<td>3.73</td>
<td></td>
</tr>
<tr>
<td>Input adequate resources in construction H&amp;S</td>
<td>3.54</td>
<td>3.59</td>
<td>3.72</td>
<td>4.28</td>
<td>3.82</td>
<td></td>
</tr>
<tr>
<td>Afford H&amp;S same status as other project parameters</td>
<td>3.52</td>
<td>3.65</td>
<td>3.73</td>
<td>3.95</td>
<td>3.66</td>
<td></td>
</tr>
<tr>
<td>Set goals for construction H&amp;S</td>
<td>3.52</td>
<td>3.68</td>
<td>3.68</td>
<td>4.00</td>
<td>3.57</td>
<td></td>
</tr>
<tr>
<td>Provide consultants with special H&amp;S requirements/guidelines</td>
<td>3.50</td>
<td>3.61</td>
<td>3.89</td>
<td>3.93</td>
<td>3.56</td>
<td></td>
</tr>
</tbody>
</table>

Key: M = mean; SD = standard deviation; – = project phases prior to the appointment/involvement of the consultant/contractor

Table 3. Frequency of client actions during all phases of a project (N = 82)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Phase A</th>
<th>Phase B</th>
<th>Phase C</th>
<th>Phase D</th>
<th>Phase E</th>
<th>Phase F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give information about the site and/or premises in advance</td>
<td>3.85</td>
<td>3.90</td>
<td>3.79</td>
<td>3.84</td>
<td>3.41</td>
<td></td>
</tr>
<tr>
<td>Set H&amp;S culture for a project</td>
<td>3.80</td>
<td>3.85</td>
<td>3.86</td>
<td>3.85</td>
<td>3.51</td>
<td></td>
</tr>
<tr>
<td>Include H&amp;S as a pre-qualification criterion to design approval</td>
<td>3.68</td>
<td>3.79</td>
<td>3.86</td>
<td>3.85</td>
<td>3.51</td>
<td></td>
</tr>
<tr>
<td>Schedule and prioritise H&amp;S requirements</td>
<td>3.62</td>
<td>3.79</td>
<td>3.96</td>
<td>4.27</td>
<td>3.84</td>
<td></td>
</tr>
<tr>
<td>Ensure information about what has been built is issued to enable to manage</td>
<td>3.60</td>
<td>3.65</td>
<td>3.69</td>
<td>4.11</td>
<td>3.89</td>
<td></td>
</tr>
<tr>
<td>Insist on being involved/play a role with regards to H&amp;S</td>
<td>3.60</td>
<td>3.63</td>
<td>3.79</td>
<td>4.09</td>
<td>3.73</td>
<td></td>
</tr>
<tr>
<td>Input adequate resources in construction H&amp;S</td>
<td>3.54</td>
<td>3.59</td>
<td>3.72</td>
<td>4.28</td>
<td>3.82</td>
<td></td>
</tr>
<tr>
<td>Afford H&amp;S same status as other project parameters</td>
<td>3.52</td>
<td>3.65</td>
<td>3.73</td>
<td>3.95</td>
<td>3.66</td>
<td></td>
</tr>
<tr>
<td>Set goals for construction H&amp;S</td>
<td>3.52</td>
<td>3.68</td>
<td>3.68</td>
<td>4.00</td>
<td>3.57</td>
<td></td>
</tr>
<tr>
<td>Provide consultants with special H&amp;S requirements/guidelines</td>
<td>3.50</td>
<td>3.61</td>
<td>3.89</td>
<td>3.93</td>
<td>3.56</td>
<td></td>
</tr>
</tbody>
</table>

Key: M = mean; SD = standard deviation; – = project phases prior to the appointment/involvement of the consultant/contractor

clients agreed that they mostly give H&S information during the procurement/tender documentation and design development phases and least during the post-construction and maintenance phase. They mostly set the project H&S culture during the construction and procurement/tender documentation phases and least during the concept/feasibility phase. H&S was mostly included as a pre-qualification criterion to design approval during the procurement/tender documentation and construction phases and least during the post-construction and maintenance phase. They mostly scheduled and prioritised H&S requirements during the construction and procurement/tender documentation phases and least during the concept/feasibility phase. This again is a concern since a significant number of injuries and accidents originate from conditions upstream of the construction process during the planning, scheduling, and design phases – aspects of the construction process that involved clients
both directly and indirectly.\textsuperscript{11} If H&S on construction sites is to be improved all the parties involved must make a serious commitment to the field of occupational H&S with clients taking the lead.\textsuperscript{23}

The Construction Regulations\textsuperscript{9} require the client to ensure that the contractor has made adequate financial provision for H&S. Despite the documented benefits of increased H&S performance in relation to such provision, clients did not seem to be aware of the benefits of insisting on the inclusion of H&S in the early stages of a project that will prevent the downstream occurrence of injuries and ultimately reduce construction costs.\textsuperscript{7,15} The construction and the procurement/tender documentation phases were regarded as the most influential to provide financial support to the contractors H&S efforts and the initiation and briefing phase as the least appropriate/influential. Early assessment of H&S requirements would enable their cost implications to be made explicit and funds set aside to cover these.\textsuperscript{24} Clients should pre-qualify their appointed contractors on the basis of construction H&S performance and afford H&S the same status as other project parameters, however they did not appear to be doing this.

Concerning accident causation (Table 4), clients regarded themselves as the most influential cause of accidents due to lack of technical resources during the construction and maintenance phases and least influential in the initiation and briefing phase. All other means suggested that clients recognised their responsibility for and influence on the causes of accidents but not necessarily strongly so. Clients acknowledged that lack of control and supervision on their part caused accidents mostly during the construction and maintenance phases and least during the concept/feasibility phase. They regarded care and attention by themselves as being responsible for accidents mostly during the maintenance and construction phases and least during the concept/feasibility phase. The clients reported their lack of skill and experience as the cause of accidents mostly during the construction and the maintenance phases and least during the initiation and briefing phase. As noted earlier, entities other than those actually performing the work have an important role to play in enforcing proper safety standard measures.\textsuperscript{8}

In regard to the importance of H&S on a project, clients to varying degrees regarded H&S as being important across all the project phases with means below the midpoint mean score of 3.00 (Table 5). The construction and the post construction and maintenance phases were the

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|c|c|c|c|c|c|c|c|}
\hline
 & Not important & Slightly important & Neutral & Important & Very important & Total & Mean score & SD \\
\hline
 & N & % & n & % & n & % & n & % & n & % & n & % \\
\hline
Phase B & 23 & 27.6 & 10 & 11.8 & 7 & 9.2 & 13 & 15.8 & 29 & 35.5 & 82 & 2.80 & 1.69 \\
Phase A & 22 & 26.3 & 13 & 15.8 & 5 & 6.6 & 11 & 13.2 & 31 & 38.2 & 82 & 2.79 & 1.70 \\
Phase C & 18 & 21.1 & 10 & 11.8 & 4 & 5.3 & 17 & 21.1 & 33 & 40.8 & 82 & 2.51 & 1.61 \\
Phase D & 18 & 22.4 & 5 & 6.6 & 11 & 13.2 & 11 & 13.2 & 37 & 44.7 & 82 & 2.49 & 1.63 \\
Phase F & 19 & 22.5 & 6 & 7.5 & 6 & 7.5 & 7 & 8.8 & 44 & 53.8 & 82 & 2.36 & 1.69 \\
Phase E & 21 & 25.0 & 4 & 5.0 & 3 & 3.8 & 1 & 1.2 & 53 & 65.0 & 82 & 2.25 & 1.77 \\
\hline
\end{tabular}
\caption{Importance of health and safety (N = 82)}
\label{tab:importance}
\end{table}

Note: project phases have been ranked according to the level of importance.

“clients did not seem to be aware of the benefits of insisting on the inclusion of H&S in the early stages of a project...”
most important to address H&S and the least important during the concept/feasibility phase. Clients need to be made aware of the importance of H&S during the initial phases of a project as client influence reduces with project evolution.11 The findings are also in contrast with the literature1,5,6,13 as clients regarded the construction phase (65%) as the most important to address H&S.

**CONCLUSION AND RECOMMENDATIONS**

The findings suggest that clients should be made aware of their ability to influence the H&S of a project earlier during the concept and design phases. This could enhance the prospects of an improved allocation of resources and importance to H&S that could eliminate or significantly reduce the hazards associated with construction and accidents. Although clients were generally aware of the importance of H&S throughout all the project phases, they did not seem to be sufficiently involved in the earlier project phases given that these are the phases where they can have the optimum influence. Clients tended to regard themselves as most influential in the later phases of a project. This situation is exacerbated by clients delegating H&S responsibilities to the consultants and contractors and regarding this as completion of their duties. This was an important finding since little has been written about client influence on H&S conditions, particularly during the later phases of a project. Increased client involvement in H&S in all phases of projects would result in reduction in incidents and accidents. It could also result in more successful projects as proper planning and addressing of H&S complements other project parameters.

Clients should be role models in affording H&S same status as other project parameters. This would only happen if clients were completely aware of their role and influence on H&S. Further, studies should attempt to understand why H&S was not afforded the same status as other project parameters.

**LESSONS LEARNED**

1. Clients resist addressing health and safety in the earlier phases of a project.
2. Clients do not afford health and safety the same status as other project parameters.
3. Increased client involvement in all the project phases with emphases on the earlier phases would result in reduction in incidents and accidents on sites.

**REFERENCES**