

The Performance of Construction Health and Safety Agents (CHSAs)

John Smallwood¹

Abstract

Clients may appoint CHSAs in terms of fulfilling their requirements in terms of the South African Construction Regulations. Previous research findings and anecdotal evidence indicate that CHSAs are lacking in terms of performance. The objectives of the study were to determine the performance of CHSAs, and barriers to CHSAs' contribution to construction and construction H&S. Construction Project Managers (CPMS) constituted the sample stratum, and were subjected to a self-administered questionnaire survey. The salient findings include: CHSAs are generally appointed during Stages 4 and 5; CHSAs have contributed to and impacted on H&S; a range of factors constitute a barrier to CHSAs contributing to H&S, particularly inadequate knowledge and experience; CHSAs are rated poor relative to most composite knowledge areas and composite skills areas; the contribution of CHSAs to H&S could be improved, and a range of interventions could contribute to an improvement in the contribution of CHSAs to H&S. Conclusions include: CHSAs may not be viewed as being able to contribute during Stages 1 to 3; CHSAs have contributed to and impacted on H&S; inadequate knowledge and experience due to a lack of appropriate tertiary education lead to their limited status, exclusion from decision making and management of the project, and not being consulted.

Keywords: construction, Construction Health and Safety Agent, performance.

Introduction

The Construction Industry Development Board (cidb) (2009) industry report 'Construction Health & Safety Status & Recommendations' highlighted the significant number of accidents, fatalities, and other injuries that are prevalent in the construction industry. This is attributed to a lack of compliance with H&S legislative requirements, which is indicative of a deficiency of effective management and supervision of H&S on construction sites as well as in advance planning from the inception / conception of projects within the context of project management. It is also evident that there is a lack of sufficiently skilled, experienced, and knowledgeable persons to manage H&S on construction sites.

The Construction Regulations make provision for the appointment of Construction H&S Agents (CHSAs), and also required the appointment of either part-time or full-time construction H&S Officers (Republic of South Africa, 2014). Furthermore, the size of many contracting organisations and the increased focus on construction H&S, resulted in the appointment of H&S managers, sometimes referred to as co-ordinators. However, the cidb industry report 'Construction Health & Safety Status & Recommendations' highlighted the need for professional registration of construction H&S practitioners due to, among other, the finding that there was a lack of competencies, and no formal registration process. The Council for the Built Environment (CBE) then mandated the South African Council for the Project and Construction Management Professions (SACPCMP) in terms of Act No.48 (Republic of South Africa, 2000) to register construction H&S professionals. This in turn

¹ Professor, Department of Construction Management, Nelson Mandela Metropolitan University, PO Box 77000, Port Elizabeth, 6031, Tel: +27-41-5042790, Fax: +27-41-5042345, E-mail: john.smallwood@nmmu.ac.za.

led to the identification of three such categories of registration, namely Professional Construction Health and Safety Agent (Pr CHSA), Construction Health and Safety Manager (CHSM), and Construction Health and Safety Officer (CHSO). Registration rules were then gazetted for these three categories for commencement 1 June 2013 in the case of Pr CHSA and 1 August 2013 in the case of CHSM and CHSO.

Given the findings in the cidb report 'Construction Health & Safety Status & Recommendations', other ad-hoc research findings, and anecdotal evidence, an exploratory study was conducted to determine, inter alia:

- The performance of CAH&SAs;
- Barriers to CAH&SAs' contribution to construction and construction H&S, and
- Interventions that could contribute to an improvement in the contribution of CHSAs to H&S.

The Literature Review

Legislation and Regulations

The amended Construction Regulations (Republic of South Africa, 2014), lay down important requirements with respect to clients and designers, and obviously contractors.

Clients are required to, inter alia: prepare a baseline risk assessment (BRA); prepare an H&S specification based on the BRA; provide the designer with the H&S specification; ensure that the designer takes the H&S specification into account during design; ensure that the designer carries out the duties in Regulation 6 'Duties of designers', and include the H&S specification in the tender documents. In theory, the H&S specification should schedule the residual hazards on projects. Contractor related client requirements include: ensure that potential PCs have made provision for the cost of H&S in their tenders; ensure that the PC to be appointed has the necessary competencies and resources; take reasonable steps to ensure cooperation between all contractors appointed by the client; ensure that every PC is registered for workers' compensation insurance cover and in good standing; appoint every PC in writing; discuss and negotiate with the PC the contents of the PC's H&S plan and thereafter approve it; ensure that a copy of the PC's H&S plan is available; take reasonable steps to ensure that each contractor's H&S plan is implemented and maintained; ensure that periodic H&S audits and documentation verification are conducted at agreed intervals, but at least once every 30 days; ensure that a copy of the H&S audit report is provided by the PC within seven days of the audit; stop any contractor from executing an activity which posed a threat to the H&S of persons, which is not in accordance with the H&S specification and H&S plan; when changes are made to the design or construction work provide sufficient H&S information and resources available to the PC; ensure that the H&S file is kept and maintained by the PC; when additional work is required the client must ensure that sufficient H&S information and appropriate additional resources are available to execute the work safely; in the case of a fatality or permanent disabling injury the client must ensure that the contractor provides the provincial director with a report that includes the measures that the contractor intends to implement to ensure a healthy and safe construction site, and must ensure co-operation between all principal contractors and contractors. Furthermore, where a construction work permit is required a client must appoint a competent person in writing as an agent, and also where notification of construction work is required the client may appoint a competent person in writing as an agent. However, an agent must manage the H&S on a construction project, and be registered with a statutory body. Clearly the requirements of clients are onerous given that they are invariably not built environment professionals or H&S professionals.

Then, in terms of the Construction Regulations, designers are required to, inter alia: ensure that the H&S standards incorporated into the regulations are complied with in the design; take the H&S specification into consideration; include in a report to the client before tender stage all relevant H&S information about the design that may affect the pricing of the work, the geotechnical-science aspects, and the loading that the structure is designed to withstand; inform the client of any known or anticipated dangers or hazards relating to the construction work, and make available all relevant information required for the safe execution of the work upon being designed or when the design is changed; modify the design or make use of substitute materials where the design necessitates the use of dangerous procedures or materials hazardous to H&S, and consider hazards relating to subsequent maintenance of the structure and make provision in the design for that work to be performed to minimize the risk. Therefore hazard identification (HIRA) is of particular relevance in terms of the aforementioned requirement to modify the design or make use of substitute materials where the design necessitates the use of dangerous procedures or materials hazardous to H&S. Furthermore, the report that is required to be submitted to the client should schedule the residual hazards on projects, which in turn should be included in the H&S specification.

Given the requirements of clients and designers and the indirect requirements of clients as a result of the designer requirements, CHSAs require a range of knowledge and skills.

Knowledge and Skills Areas

The SACPCMP requires a report upon application to register as a CHSA that addresses the following nine knowledge areas: Procurement Management; Cost Management; Hazard Identification Management; Risk Management; Accident or Incident Investigation Management; Legislation and Regulations; Health, Hygiene and Environmental Management; Communication Management, and Emergency Preparedness Management (SACPCMP, 2013a).

The CHSA Scope of Services in turn states that CHSAs are expected to be experienced and knowledgeable relative to the following areas: construction project H&S management systems; construction H&S management; construction H&S performance measurement and monitoring, and construction H&S continual improvement (SACPCMP, 2013b).

However, a study conducted prior to the registration of CHSAs initiative by Smallwood and Haupt (2008) investigated the importance of 79 knowledge areas and 50 skills to CHSAs. These were then consolidated in terms of 8 and 7 composite areas respectively as presented in Tables 1 and 2 below.

All the composite knowledge areas have MSs > 3.00, which indicates that they are more than important as opposed to limited importance. However, it is notable that 3 / 8 (37.5%) of the composite knowledge areas have MSs $> 4.20 \leq 5.00$, which indicates that they are between more than important to very / very important.

Table 1. Importance of composite knowledge areas to the management of H&S by CHSAs

Composite knowledge area	MS	Rank
OH&S	4.72	1
Project administration	4.60	2
Design	4.25	3
Law	4.10	4
Management / Management of parameters	3.79	5
Construction technology / Technology	3.68	6
Planning	3.63	7
Financial management	3.00	8
Mean	3.97	

All the composite skills areas have MSs > 3.00, which indicates that they are more than important as opposed to of limited importance, albeit in the case of ‘negotiating’ marginally so. However, it is notable that of the composite skills areas have MSs > 4.20 ≤ 5.00 (between more than important to very / very important). 5 / 7 (71.4%) have MSs > 3.40 ≤ 4.20, which indicates that they are between important more than important / more than important.

Table 2. Importance of composite skills areas to the management of H&S by CHSAs

Composite skills area	MS	Rank
Interpersonal / Developmental	3.96	1
General management	3.95	2
Leadership	3.94	3
Technical	3.84	4
Planning	3.81	5
Financial	3.28	6
Negotiating	3.02	7
Mean	3.69	

Performance of CHSAs

A study conducted among general contractors who had achieved first, second, or third positions in the Master Builders South Africa (MBSA) national H&S competition and, or MBSA 4 or 5-Star H&S gradings on one or more of their projects required the respondents to rate CHSAs in terms of, inter alia, four competencies (Smallwood, 2009). Table 3 indicates that all the competencies have MSs > 3.00, which indicates that they are rated good as opposed to poor, albeit marginally so in the case of ‘Design’ (MS = 3.13) and ‘Construction management’ (MS = 3.11). ‘Construction H&S’ and ‘Project management’ have MSs > 3.40 ≤ 4.20, which indicates the rating is between average to good / good, whereas ‘Design’ and ‘Construction management’ have MSs > 2.60 ≤ 3.40, which indicates the rating is between poor to average / average.

However, respondents were also required to indicate their degree of concurrence relative to a number of statements. The degree of concurrence relative to ‘CHSAs lack built environment competencies’ (MS = 3.80) and ‘CHSAs lack construction management competencies’ (MS = 3.70) is such that it constitutes agreement as opposed to disagreement. However, the MSs were > 3.40 ≤ 4.20, which indicates the concurrence is between neutral to agree / agree. The study concluded that CHSAs are generally rated poor to average / average in terms of perceived competencies. Therefore, it can be concluded that in all likelihood they are not appropriately educated and trained, and that clients do not ensure that CHSAs are competent.

Table 3. Rating of CHSAs in terms of competencies

Competency	Response (%)						MS	Rank
	Un sure	Very poor.....	Very good					
		1	2	3	4	5		
Construction H&S	10.0	0.0	0.0	30.0	50.0	10.0	3.78	1
Project management	10.0	0.0	10.0	40.0	30.0	10.0	3.44	2
Design	20.0	0.0	20.0	30.0	30.0	0.0	3.13	3
Construction management	10.0	0.0	10.0	60.0	20.0	0.0	3.11	4

Research

Research Method

The descriptive survey method was adopted to gather the data obtained through an e-mail delivered self-administered questionnaire circulated to the national membership of the Association of Construction Project Managers (ACPM). The questionnaire consisted of 18

questions, 17 of which were close ended, one being open ended. Furthermore, 10 of the 17 close ended were five or six point Likert scale type questions. 14 Questionnaires were returned out of an approximate 250 and included in the analysis of the data, which equates to a response rate of 5.6%. The initial circulation allowed a two-week response period. Despite an attempt to enhance the response rate after a second circulation 31 calendar days later, no further questionnaires were received. The length of the questionnaire probably militated against a healthy response rate. A measure of central tendency in the form of a mean score (MS) was computed to enable ranking and comparisons. The weightings relative to the five point scale were as per the scale i.e. 1 relative to one, 2 relative to 2, and thereafter accordingly, resulting in a MS between 1.00 and 5.00. Certain questions required a sixth point due to either a 'have not', 'does not', or 'will not', which was weighted 0, resulting in a MS between 0.00 and 5.00.

Research Findings

Table 4 indicates the frequency at which CHSAs are appointed relative to the six stages of projects as per the respective statutory councils in South Africa. Stage 4 'Tender documentation and procurement' (42.9%) and Stage 5 'Construction documentation and management' (28.6%) predominate, followed by three of the other six. Ideally CHSAs should be appointed at Stage 1 'Project initiation and briefing', or at the latest Stage 2.

Table 4. Stage at which CHSAs are generally appointed

Stage	Yes (%)
4. Tender documentation and procurement	42.9
5. Construction documentation and management	28.6
1. Project initiation and briefing	14.3
2. Concept and feasibility	7.1
3. Design development	7.1
6. Project close out	0.0

Table 5 indicates the extent to which CHSAs have contributed to and impacted on H&S in terms of percentage responses to a scale of have not, and 1 (minor) to 5 (major), and a mean score (MS) between 0.00 and 5.00. Given that the MSs are > 2.50, the contribution and impact is major as opposed to minor. However, in terms of MS ranges, the MSs are $3.34 \leq 4.17$, therefore the contribution and impact is between moderate to near major / near major.

Table 5. Extent to which CHSAs have contributed to and impacted on H&S

Aspect	Unsure	Have not	MinorMajor					MS
			1	2	3	4	5	
Contributed	0.0	0.0	0.0	14.3	35.7	35.7	14.3	3.50
Impacted	7.1	0.0	0.0	0.0	42.9	35.7	14.3	3.69

Table 6 indicates the extent to which factors constitute a barrier to CHSAs contributing to H&S in terms of percentage responses to a scale of does not, and 1 (minor) to 5 (major), and MSs between 0.00 and 5.00. It is notable that all factors have MSs > 2.50, which indicates that all the factors constitute a major as opposed to a minor barrier.

It is notable that no MSs are $> 4.17 \leq 5.00$ i.e. near major to major / major barrier.

However, 7 / 15 (46.7%) factors have MSs $> 3.33 \leq 4.17$, which indicates they constitute a barrier to CHSAs contributing to H&S between some extent to a near major / near major extent. 'Late participation in the project' is ranked first, which relates to the stage at which CHSAs are appointed. 'Inadequate construction management knowledge' (2nd), 'Inadequate

construction management experience’ (5th), and ‘Inadequate knowledge of construction activities’ (7th) are related, and are underscored by the literature (cidb, 2009). They also probably contribute to ‘Non-consultation by project management / principal agent’ (3rd), ‘Status level’ (4th), and ‘Lack of authority’ (6th).

Table 6. Extent to which factors constitute a barrier to CHSAs contributing to H&S

Factor	Response (%)							MS	Rank
	Un sure	Does not	Minor						
			Major						
1	2	3	4	5					
Late participation in the project	0.0	7.7	0.0	7.7	23.1	53.8	15.4	3.77	1
Inadequate construction management knowledge	0.0	7.7	7.7	7.7	23.1	38.5	23.1	3.62	2
Non-consultation by project management / principal agent	0.0	7.7	7.7	7.7	23.1	38.5	23.1	3.62	3
Status level	0.0	16.7	0.0	8.3	50.0	25.0	16.7	3.50	4
Inadequate construction management experience	0.0	0.0	7.1	14.3	28.6	28.6	21.4	3.43	5
Lack of authority	0.0	7.7	7.7	7.7	46.2	15.4	23.1	3.38	6
Inadequate knowledge of construction activities	0.0	0.0	7.1	14.3	28.6	35.7	14.3	3.36	7
Inadequate construction activities experience	0.0	7.7	7.7	15.4	30.8	30.8	15.4	3.31	8
Exclusion from decision making	0.0	0.0	7.1	7.1	50.0	21.4	14.3	3.29	9
Inadequate construction process experience	0.0	0.0	7.1	14.3	35.7	28.6	14.3	3.29	10
Inadequate construction H&S experience	0.0	0.0	7.1	21.4	35.7	14.3	21.4	3.21	11
Inadequate resources	0.0	0.0	14.3	7.1	57.1	7.1	14.3	3.00	12
Exclusion from management of project	0.0	7.7	7.7	23.1	46.2	7.7	15.4	3.00	13
Inadequate knowledge of the construction process	0.0	7.7	15.4	23.1	23.1	23.1	15.4	3.00	14
Inadequate construction H&S knowledge	0.0	0.0	14.3	28.6	28.6	7.1	21.4	2.93	15

The MSs of the remaining 8 factors (53.3%) are $> 2.50 \leq 3.33$, which indicates the factors constitute a barrier to CHSAs contributing to H&S between a near minor extent to some extent / some extent. Inadequate experience and knowledge feature frequently in the form of ‘Inadequate construction activities experience’ (8th), ‘Inadequate construction process experience’ (10th), ‘Inadequate construction H&S experience’ (11th), ‘Inadequate knowledge of the construction process’ (14th), and ‘Inadequate construction H&S knowledge’ (15th). The aforementioned probably contribute to ‘Exclusion from decision making’ (9th), ‘Exclusion from management of project’ (13th), ‘Non-consultation by project management / principal agent’ (3rd), ‘Status level’ (4th), and ‘Lack of authority’ (6th). ‘Inadequate resources’ ranked 12th is also a notable factor as it impacts on the level of service provided.

Table 7 indicates the CPMs’ rating of their CHSAs in terms of twelve aspects on a scale of 1 (very poor) to 5 (very good), and a MS between 1.00 and 5.00. 7 / 12 (58.3%) of the MSs are > 3.00 , which indicates the rating is good as opposed to poor. The MSs of the top three / highest rated aspects are $> 3.40 \leq 4.20$, which indicates the rating is average to good / good - ‘Understand and appreciate construction H&S’; ‘Construction H&S competencies’, and ‘Understand and appreciate construction activities’. The MSs of the aspects ranked fourth to eleventh are $> 2.60 \leq 3.40$, which indicates the rating is between poor to average / average – ‘Understand and appreciate construction management’, ‘Understand and

appreciate the construction process’, ‘Resources’, ‘Project management competencies’, ‘Understand and appreciate project management’, ‘Designing for construction H&S competencies’, ‘Construction management competencies’, and ‘Understand and appreciate design’. Given that ideally CHSAs should contribute during Stages 1 to 3, the project management, and design related ratings are notable. Similarly relative to construction and construction management, as traditionally CHSAs contribute primarily during Stages 4 and 5. The MS of ‘Design competencies’ is $> 1.80 \leq 2.60$, which indicates the rating is between very poor to poor / poor. However, it should be noted that the 2.57 MS is close to the lower limit of the upper range.

Table 7. Rating of CHSAs in terms of twelve aspects according to CPMs

Aspects	Response (%)						MS	Rank
	Un sure	Very poor 1	2	3	4	Very good 5		
Understand and appreciate construction H&S	0.0	0.0	14.3	21.4	42.9	21.4	3.71	1
Construction H&S competencies	7.1	0.0	7.1	28.6	42.9	14.3	3.69	2
Understand and appreciate construction activities	0.0	0.0	7.1	28.6	57.1	7.1	3.64	3
Understand and appreciate construction management	0.0	0.0	14.3	42.9	35.7	7.1	3.36	4
Understand and appreciate the construction process	0.0	0.0	21.4	35.7	35.7	7.1	3.29	5
Resources	0.0	0.0	28.6	28.6	35.7	7.1	3.21	6
Project management competencies	0.0	7.1	21.4	35.7	28.6	7.1	3.07	7
Understand and appreciate project management	0.0	0.0	42.9	21.4	28.6	7.1	3.00	8
Designing for construction H&S competencies	0.0	14.3	21.4	35.7	7.1	21.4	3.00	9
Construction management competencies	0.0	14.3	21.4	28.6	28.6	7.1	2.93	10
Understand and appreciate design	0.0	7.1	35.7	35.7	14.3	7.1	2.79	11
Design competencies	0.0	21.4	28.6	28.6	14.3	7.1	2.57	12

Table 8 indicates the CPMs’ rating of their CHSAs in terms of eight composite knowledge areas on a scale of 1 (very poor) to 5 (very good), and a MS between 1.00 and 5.00. It is notable that only 3 / 8 (37.5%) of the composite knowledge areas have MSs > 3.00 , which indicates the rating is good as opposed to poor. Only one composite knowledge area MS is $> 3.40 \leq 4.20$, which indicates the rating is average to good / good - Health & Safety. Those ranked second to sixth (62.5%) have MSs $> 2.60 \leq 3.40$, which indicates the rating is between poor to average / average – Law, Project administration, Construction technology / Technology, Planning, and Management / Management of parameters. The MSs of the last two ranked composite knowledge areas (25%) are $> 1.80 \leq 2.60$, which indicates the rating is between very poor to poor / poor - Financial management, and Design. It is notable that all the MSs are substantially lower than those relative to the importance of the knowledge areas as presented in Table 1 above.

Table 8. Rating of CHSAs in terms of composite knowledge areas according to CPMs

Composite knowledge area	Response (%)						MS	Rank
	Un sure	Very poor.....	Very good	1	2	3		
Health & Safety	0.0	0.0	14.3	21.4	42.9	21.4	3.71	1
Law	0.0	0.0	28.6	28.6	42.9	0.0	3.14	2
Project administration	0.0	7.1	28.6	28.6	14.3	21.4	3.14	3
Construction technology / Technology	0.0	7.1	21.4	42.9	28.6	0.0	2.93	4
Planning	0.0	0.0	42.9	42.9	14.3	0.0	2.71	5
Management / Management of parameters	0.0	7.1	35.7	42.9	14.3	0.0	2.64	6
Financial management	0.0	14.3	57.1	7.1	14.3	7.1	2.43	7
Design	0.0	14.3	50.0	28.6	7.1	0.0	2.29	8

Table 9 indicates the CPMs' rating of their CHSAs in terms of seven composite skills areas on a scale of 1 (very poor) to 5 (very good), and a MS between 1.00 and 5.00. It is notable that only 3 / 7 (42.9%) of the composite skills areas have MSs > 3.00, which indicates the rating is good as opposed to poor. More significantly, 6 / 7 (85.7%) of the MSs > 2.60 ≤ 3.40, which indicates the rating is between poor to average / average. The MS of last ranked 'Financial' is > 1.80 ≤ 2.60, which indicates the rating is between very poor to poor / poor. It is notable that all the MSs are substantially lower than those relative to the importance of the skills areas as presented in Table 2 above.

Table 9. Rating of CHSAs in terms of composite skills areas according to CPMs

Composite skills area	Response (%)						MS	Rank
	Un sure	Very poor.....	Very good	1	2	3		
Interpersonal / Developmental	0.0	0.0	7.1	57.1	28.6	7.1	3.36	1
General management	0.0	0.0	7.1	71.4	14.3	7.1	3.21	2
Technical	0.0	7.1	14.3	50.0	21.4	7.1	3.07	3
Leadership	0.0	0.0	35.7	35.7	28.6	0.0	2.93	4
Negotiating	7.1	0.0	42.9	21.4	21.4	7.1	2.92	5
Planning	0.0	7.1	50.0	21.4	14.3	7.1	2.64	6
Financial	0.0	7.1	64.3	21.4	7.1	0.0	2.29	7

Respondents were required to indicate the extent to which the contribution of CHSAs to H&S could be improved on a scale of 1 (minor) to 5 (major), and a MS between 1.00 and 5.00. The MS (3.50), which is > 3.40 ≤ 4.20, indicates the extent to which the contribution could be improved is between some extent to a near major extent / near major extent.

Table 10 indicates the extent to which interventions could contribute to an improvement in the contribution of CHSAs to H&S in terms of percentage responses to a scale of will not, and 1 (minor) to 5 (major), and MSs between 0.00 and 5.00. It is notable that all the interventions have MSs > 2.50, which indicates that all the interventions have the potential to contribute to a major as opposed to a minor extent.

It is notable that only one MS is > 4.17 ≤ 5.00 i.e. between a near major to major / major extent, namely 'Formal CHSA qualification'.

Those interventions ranked 2nd to 13th (80%) have MSs > 3.33 ≤ 4.17, which indicates they have the potential to contribute between some extent to a near major / near major extent. Education / Training relative to: Construction H&S (2nd); Construction activities (6th); Design process (7th); Project management (8th); Construction process (9th), and Construction management (10th) feature in this range. Other interventions in this range include: 'Optimum resources' (3rd); 'Participation in the early stages of the project' (4th); 'Increased consultation

by project management / principal agent' (5th); 'Optimum resources' (11th); 'Participation in the early stages of the project', and 'Increased consultation by project management / principal agent' (13th).

Table 10. Extent to which interventions contribute to an improvement in the contribution of CHSAs to H&S

Intervention	Response (%)							MS	Rank	
	Un sure	Will not	Minor							Major
			1	2	3	4	5			
Formal CHSA qualification	0.0	0.0	0.0	0.0	14.3	21.4	64.3	4.50	1	
Education / Training relative to Construction H&S	0.0	0.0	0.0	7.1	14.3	35.7	42.9	4.14	2	
Optimum resources	0.0	0.0	0.0	0.0	28.6	35.7	35.7	4.07	3	
Participation in the early stages of the project	0.0	0.0	0.0	21.4	7.1	50.0	21.4	3.71	4	
Increased consultation by project management / principal agent	0.0	0.0	0.0	21.4	7.1	50.0	21.4	3.71	5	
Education / Training relative to:										
• Construction activities	0.0	0.0	0.0	7.1	35.7	42.9	14.3	3.64	6	
• The design process	0.0	0.0	0.0	7.1	42.9	35.7	14.3	3.57	7	
• Project management	0.0	0.0	0.0	7.1	42.9	35.7	14.3	3.57	8	
• The construction process	0.0	0.0	0.0	7.1	42.9	35.7	14.3	3.57	9	
• Construction management	0.0	0.0	0.0	0.0	57.1	28.6	14.3	3.57	10	
Optimum resources	0.0	0.0	0.0	21.4	21.4	50.0	7.1	3.43	11	
Participation in the early stages of the project	0.0	0.0	0.0	14.3	42.9	35.7	7.1	3.36	12	
Increased consultation by project management / principal agent	0.0	0.0	7.1	14.3	28.6	35.7	14.3	3.36	13	
Increased authority	0.0	0.0	0.0	21.4	28.6	50.0	0.0	3.29	14	
Inclusion in decision making	0.0	0.0	0.0	42.9	14.3	35.7	7.1	3.07	15	

Conclusions

CHSAs are generally appointed during Stages 4 and 5, which does not enable them to influence construction H&S through design. This leads to the conclusion that they may not be viewed as being able to contribute during these stages, which the other findings underscore. Furthermore, clients and / or principal agents may not view consideration of H&S during the earlier stages as necessary or of value.

CHSAs have contributed to and impacted on H&S, which leads to the conclusion that they have a role to play relative to construction H&S, and that their creation courtesy of the Construction Regulations is vindicated.

A range of factors constitute a barrier to CHSAs contributing to H&S, in particular inadequate knowledge and experience, which in turn lead to their limited status, exclusion from decision making and management of the project, and not being consulted all of which are also barriers.

CHSAs are rated quite high relative to construction H&S, then they are rated quite high in terms of only one of eight composite knowledge areas, namely H&S, and similarly in terms of only one of seven composite skills areas, namely 'Interpersonal / Developmental'.

The finding that the contribution of CHSAs to H&S could be improved, and that a range of interventions could contribute to an improvement in the contribution of CHSAs to H&S underscores the other findings.

Recommendations

Given the 'gap' between the rating of CHSAs and the importance of composite knowledge areas and skills areas, CHSAs should register for and complete formal tertiary education programmes that empower them in terms of construction economics, management, H&S, and science and technology as well as design management, procurement management, and project management. Continuing professional development (CPD) courses should be evolved relative to the aforementioned subject areas.

CHSAs should be appointed at Stage 1 'Project initiation and briefing' and obviously during Stage 2 'Concept and feasibility', and Stage 3 'Design development'. The completion of appropriate tertiary education programmes, and CPD will enable CHSAs to contribute during the aforementioned stages.

The SACPCMP must take note of the ratings relative to the composite knowledge areas and composite skills areas, and review their knowledge areas and required competencies in terms of registration as a CHSA.

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