



FINANCIAL PROVISION FOR CONSTRUCTION HEALTH AND SAFETY

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South African Health and Safety (H&S) legislation and the Construction Regulations require wide ranging H&S interventions on the part of all stakeholders including ensuring that adequate financial allowance is made for H&S. Given the aforementioned, a study was conducted to determine the perceptions of general contractors (GCs) and quantity surveyors (Qs) with respect to financial provision for construction H&S. A survey of literature informed the development of the survey instrument in the form of a questionnaire, which was administered among GCs and Qs. The salient findings include: H&S preliminaries should be included in Bills of Quantities, and the inclusion of thirty-nine items therein is perceived as more than important, as opposed to less than important. It is concluded that a scientific approach through the inclusion of detailed H&S Preliminaries items will: “level the playing fields”; engender scientific calculation of the costs related thereto, and enable clients, with the assistance of Qs, to ensure that principal contractors (PCs) have made adequate financial provision for H&S in their tenders. Recommendations include: H&S preliminaries should be included in the BoQ based on the project specific H&S specification provided by the client, and a CHSA should be appointed in the early stages of projects to assist the QS with respect to interpreting the H&S specification when compiling H&S items for the BoQ.

Keywords: Contract documentation, Construction Industry Development Board (CIDB), Risk assessment, Cost of accidents.

1 INTRODUCTION

The Construction Industry Development Board (CIDB) (2009) report *Construction Health & Safety Status & Recommendations* highlighted the considerable number of accidents, fatalities, and other injuries that occur in the South African construction industry. The report cited the high-level of non-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 planning from the inception / conception of projects within the context of project management.

The CIDB's report indicates the disabling injury incidence rate (DIIR) to be 0.98 i.e. 0.98 disabling injuries per 100 workers, the all industry average being 0.78, and a fatality rate of 25.5 per 100 000 workers, which does not compare favorably with international rates (CIDB 2009). The Australian construction industry fatality rate is 3.29 for all construction (Safe Work Australia, 2017), and 1.94 in the United Kingdom (Health and Safety Executive (HSE) (2016). The severity rate (SR) in turn indicates the number of days lost due to accidents for every 1 000 hours worked.

The South African construction industry SR 1.14 is the fourth highest, after fishing, mining, and transport, the all industry average being 0.59. Given that the average worker works 2000 hours per year, if the SR is multiplied by two, the average number of days lost per worker per year can be computed – the construction industry lost 2.28 working days per worker. This is equivalent to 1.0% of working time.

The CIDB (2009) refer to Smallwood's 2004 findings that the total cost of accidents (COA) could have been between 4.3% and 5.4%, based upon the value of construction work completed in South Africa. The key issue relative to the COA is that ultimately, clients incur the COA as the COA is included in contractors' cost structures in the form of indirect costs, as contractors do not disaggregate costs when preparing tenders.

Given the aforementioned, a study named *The Introduction of H&S Preliminaries in the Eastern Cape Province* was conducted among GCs and Qs to determine perceptions, problems, and practices, and the potential value of introducing H&S preliminaries in order to assist contractors in terms of making adequate financial provision for H&S.

2 REVIEW OF THE LITERATURE

2.1 Legislation and Regulations

The Construction Regulations (Republic of South Africa 2014) state that the client must provide designers with an H&S specification, and the designers need to submit a report to the client before the client provides the H&S specification to the principal contractor (PC) when the project goes out to tender. This report should include, *inter alia*, all relevant H&S information with respect to the design of the relevant structure that may affect the pricing of the construction work. The client who is required to provide the PC with an H&S specification, is also required to ensure that the PC has made adequate financial allowance for H&S. The latter is cascaded down the supply chain, as the PC must ensure that potential contractors submitting tenders have made provision for the cost of health and safety measures during the construction process.

2.2 Challenges with respect to financial provision for H&S

According to Smallwood (2011), due to competitive tendering, contractors need to limit costs, and consequently, the winning tender is unlikely to make adequate provision for H&S equipment, welfare facilities, and a healthy and safe working environment.

Smallwood and Emuze (2014) required respondents to a study to indicate their concurrence with respect to a range of statements. A mean score between 1.00 and 5.00 is recorded in parentheses after the statements: Competitive tendering without reference to H&S marginalizes H&S (4.09), contractors are afforded the opportunity to price H&S on an equitable basis (2.36), and contractors are afforded the opportunity to price items included in H&S specifications on an equitable basis (2.36).

2.3 Standard Contract Documentation

The most widely used form of contract for construction in South Africa is the Joint Building Contracts Committee (JBCC) Principal Building Agreement, the latest addition being Edition 6.1 – March 2014. Other forms of contracts include the General Conditions of Contract (GCC), International Federation of Consulting Engineers (FIDIC), and the New Engineering Contract (NEC). The GCC does not make any explicit reference to H&S, other than “reporting of accidents.” The FIDIC and NEC contracts originated overseas, and therefore provide conflicting clauses in terms of the H&S legislation in South Africa.

According to the CIDB (2009), the JBCC does not make any explicit reference to H&S, but does refer to the need for parties to comply with laws and regulations that govern the work that needs to be executed. According to Smallwood and Emuze (2014), scope exists for the standard forms of contract to include more direct reference to construction H&S.

2.4 Form of financial provision for H&S

Wells and Hawkins (2009) state that to avoid misunderstanding of what is required and to facilitate the checking of contractors' financial provision for H&S, it is recommended that H&S items that can be separately priced be listed as prime cost items, provisional sums, or the use of another form of pricing mechanism. They provide examples of items that can be addressed in such a manner, namely the preparation and updating of an H&S plan; provision of temporary works such as scaffolding and hoarding, H&S Officer, H&S training, attendance of H&S Committee meetings, provision of welfare facilities, provision of personal protective equipment (PPE), and medical examinations. Wells and Hawkins (2009) also state that it is possible, and may be considered preferable, to take the cost of meeting the client's H&S requirements out of competition, by pre-pricing H&S items, and they cite the approach adopted in Hong Kong in 1996 under the 'Pay for Safety' scheme.

The study conducted by Smallwood and Emuze (2014) determined the concurrence with respect to a further range of statements as: contract document enabled financial provision for H&S promotes H&S (4.36); a detailed H&S section should be included in the Preliminaries (4.27), and a provisional sum should be provided for H&S in the preliminaries (3.64).

3 RESEARCH

3.1 Research method and sample stratum

The quantitative component of the study reported on, targeted two sample strata, namely members of the Association of South African Quantity Surveyors (ASAQS) East Cape Chapter, Qs, and GC members of the East Cape Master Builders Association (ECMBA). 12 responses were received from the 77 ASAQS sample, which equates to a response rate of 15.6%. 14 responses were received from the 58 ECMBA sample, which equates to a response rate of 24.1%.

92.8% of the GC respondents were male, and 7.2% were female, while 91.6% of the QS respondents were male, and 8.4% were female.

Most of the respondents are over 44 years of age – 61.6% of the GC respondents and 75% of the QS respondents.

In terms of qualifications, 53.8% of GC respondents possess a diploma, and 30.8% an Honors degree. 75% of QS respondents possess an Honors degree, and 25% a Masters or Doctoral degree.

69.2% of GC respondents, and 66.7% of QS respondents have been working in the industry for more than 18 years.

3.2 Research findings

Respondents were required to indicate the extent to which they agreed with the introduction of H&S preliminaries in Bills of Quantities on a scale of 1 (strongly disagree) to 5 (strongly agree). The resultant GC mean score (MS) between 1.00 and 5.00, namely 4.43, indicates that the agreement is between strongly agree to agree / agree. The resultant QS MS, namely 3.75 indicates that the agreement is between neutral to agree / agree.

Table 2 presents the importance of the inclusion of 39 items in an H&S Preliminaries section to contractors and Qs in terms of MS based on percentage responses to a scale of 1 (not at all) to 5 (strongly agree).

7 (extremely). It is notable that all the MSs are > 4.00 , the midpoint of the MS range, which indicates that their inclusion is more than important as opposed to less than important.

However, a summary of the MS ranges in the form of Table 2 provides further insight. MSs $> 6.14 \leq 7.00$ indicate that the inclusion is between very to extremely / extremely important: contractors (20 No. = 51.3%); QSs (5 No. = 12.9%), and mean (9 No. = 23.1%). MSs $> 5.28 \leq 6.14$ indicate that the inclusion is between more than important to very / very important: contractors (17 No. = 43.6%); QSs (22 No. = 56.4%), and mean (22 No. = 56.4%). MSs $> 4.42 \leq 5.28$ indicate that the inclusion is between important to more than important / more than important: contractors (2 No. = 5.1 %); QSs (10 No. = 25.6 %), and mean (8 No. = 20.5%). MSs $> 3.56 \leq 4.42$ indicate that the inclusion is between less than important to important / important: contractors (0 No. = 0.0%); QSs (2 No. = 5.1%), and mean (0 No. = 0.0%). Based upon the GCs rating, 37 of the items are in the upper two ranges, whereas in the case of the QSs, 27 are. Furthermore, the mean MS for the 39 items is 6.05 in the case of the GCs, and 5.48 in the case of the QSs.

Table 1. Summary of the perceived importance of the inclusion of items in an H&S Preliminaries section.

Range	GCs		QSs		Mean	
	No.	%	No.	%	No.	%
$> 6.14 \leq 7.00$	20	51.3	5	12.9	9	23.1
$> 5.28 \leq 6.14$	17	43.6	22	56.4	22	56.4
$> 4.42 \leq 5.28$	2	5.1	10	25.6	8	20.5
$> 3.56 \leq 4.42$	0	0.0	2	5.1	0	0.0
Total	39	100.0	39	100.0	39	100.0

It is now appropriate to discuss the individual items in Table 2. In terms of the MS range $> 6.14 \leq 7.00$ (very to extremely / extremely important), which includes nine items, it is notable that first aid is ranked joint first with H&S plan. First aid is primarily a labor cost in that a first aider is invariably required on most projects. The development of a H&S plan is a time-consuming activity, and may require the engagement of a consultant. PPE (3rd) is a major cost, especially personal fall arrest equipment, and special respiratory equipment. Hoarding and / or public walkways (joint 4th), and guarding and barricading (joint 7th) are related, and invariably entail major cost. Storage for flammable goods – Regulation 27 (b) (joint 4th) and fire precautions (joint 7th) also entail major cost, and in the case of the latter, servicing. Risk assessment (6th) is an integral part of managing construction and construction H&S, however, contractors may engage consultants to assist.

The MS range $> 5.28 \leq 6.14$ (important to very / very important) includes twenty-two items. Both temporary electrical installations (10th) and special scaffolding (11th) entail major cost. However, special scaffolding, engineering design and / or certification (joint 12th), suspended scaffolding (joint 14th), design of temporary works (joint 18th), and design of permanent structures (joint 24th) invariably require specialist designer contributions and thus entail major expense. Allowance for H&S Audits (joint twelfth) may have been ranked such due to contractors engaging consultants to assist, even though H&S audits are a client function. H&S Representatives (joint 14th) are elected from the workforce, and therefore when they conduct inspections, attend meetings, and participate in investigations. WCs (joint 14th) are a key welfare facility and a major cost, and are linked to WHBs (20th), and showers joint 30th. The H&S file (17th), which must be handed over to the client by the principal contractor or GC, entails a range of H&S documentation, and therefore there are labor and printing costs related thereto. SWPs and method

statements (joint 18th) may require contractors to engage consultants to assist. Access and catch platforms ranked joint 21st entail substantial cost. Signage (23rd), education and training (joint 24th), meetings (26th), and inspections (27th) are legal requirements. Medicals (28th) may be required due to varying circumstances, including regulations, and are a major cost item. A full-time H&S Officer (29th) has financial implications, and transport of workers (joint 30th) is an issue as inappropriate transport contributes to the high motor vehicle accident (MVA) fatality rate.

Table 2. Perceived importance of the inclusion of items in an H&S Preliminaries section.

Item	GCs		Qs		Mean	
	MS	Rank	MS	Rank	MS	Rank
First aid	6.77	1	6.44	1	6.61	1=
H&S plan	6.69	2	6.33	2	6.51	1=
Personal protective equipment (PPE)	6.62	3	6.33	2	6.48	3
Hoarding and / or public walkways	6.54	4	6.22	4	6.38	4=
Storage for flammable goods – Regulation 27 (b)	6.54	4	6.22	4	6.38	4=
Risk assessment	6.46	6	6.11	6	6.29	6
Fire precautions	6.46	6	6.00	7	6.23	7=
Guarding and barricading	6.46	6	6.00	7	6.23	7=
Scaffolding	6.46	6	5.89	9	6.18	9
Temporary electrical installations	6.38	10	5.78	10	6.08	10
Special scaffolding	6.31	11	5.78	10	6.05	11
Allowance for H&S Audits	6.31	11	5.67	12	5.99	12=
Engineering design and / or certification	6.31	11	5.67	12	5.99	12=
H&S Representatives	6.23	14	5.67	12	5.95	14=
Suspended scaffolding	6.23	14	5.67	12	5.95	14=
WCs	6.23	14	5.67	12	5.95	14=
H&S file	6.17	17	5.56	17	5.87	17
Design of temporary works	6.15	18	5.56	17	5.86	18=
SWPs and method statements	6.15	18	5.56	17	5.86	18=
WHBs	6.15	18	5.56	17	5.86	20
Access	6.08	21	5.56	17	5.82	21=
Catch platforms	6.08	21	5.56	17	5.82	21=
Signage	6.00	23	5.56	17	5.78	23
Design of permanent structures	6.00	23	5.33	24	5.67	24=
Education and training	6.00	23	5.33	24	5.67	24=
Meetings	5.85	27	5.33	24	5.59	26
Inspections	5.83	28	5.33	24	5.58	27
Medicals	5.82	29	5.22	28	5.52	28
Full-time H&S Officer	6.00	23	5.00	31	5.50	29
Showers	5.69	30	5.22	28	5.46	30=
Transport of workers	5.69	30	5.22	28	5.46	30=
Housekeeping	5.62	32	4.89	32	5.26	32=
Maintenance	5.62	32	4.89	32	5.26	32=
General administration	5.62	32	4.78	34	5.20	34
Storage	5.38	35	4.78	34	5.08	35
Environmental measurement	5.38	35	4.67	36	5.03	36
Mess room	5.31	37	4.67	36	4.99	37
Biological monitoring	5.23	38	4.33	38	4.78	38
Living accommodation	5.08	39	4.22	39	4.65	39
	6.05		5.48		5.76	

4 CONCLUSIONS

Based upon the extent to which GCs and QSs agree with the introduction of H&S preliminaries in Bills of Quantities, it can be concluded that the support therefore is not constrained to the contracting sector of the industry. Given the degree of importance of the inclusion of thirty-nine items in an H&S Preliminaries section it can be concluded that such a section should be comprehensive, and that a provisional sum or a single item will not suffice.

Furthermore, a scientific approach through the inclusion of detailed H&S Preliminaries items will: 'level the playing fields'; engender scientific calculation of the costs related thereto, and enable clients, with the assistance of QSs, to ensure that principal contractors (PCs) have made adequate financial provision for H&S in their tenders.

5 RECOMMENDATIONS

H&S preliminaries should be included in the BoQ based on the project specific H&S specification provided by the client. A CHSA should be appointed at the first stage (project initiation and briefing), or at the latest, the second stage (concept and feasibility) of a project to assist the QS with respect to interpreting the H&S specification when compiling H&S items for the BoQ. The relevant associations, and more specifically the JBCC committee, need to consider the inclusion of H&S preliminaries to keep abreast with regulations relating to H&S. Associations representing each profession, namely the MBAs and ASAQS, need to inform members of their responsibilities with respect to the Construction Regulations 2014.

Comprehensive research should be conducted by the ASAQS at national level to determine current QS practices relative to facilitating financial provision for H&S by contractors. Furthermore, such research should determine the percentage such financial provision constitutes of project value for the various sectors and types of construction taking a range of characteristics such as stories, and floor area per story into account.

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