

COMPETENCIES REQUIRED TO MANAGE CONSTRUCTION HEALTH AND SAFETY (H&S)

JJ Smallwood

Department of Construction Management, Nelson Mandela Metropolitan University, PO Box 77000, Port Elizabeth, 6013, South Africa.

Tel: (041) 504 2790 Fax:

(041) 504 2345

E-mail: john.smallwood@nmmu.ac.za

TC Haupt

Faculty of Engineering, Cape Peninsula University of Technology, PO Box 1906, Belville, 7535, South Africa.

Tel: (021) 959 6637

Fax: (021) 959 6870

E-mail: hauptt@cput.ac.za

Abstract

The paper reports on an exploratory study conducted to determine the surface health and safety (H&S) competencies, namely knowledge and skills, that Site Managers, Site H&S Officers, and Client Appointed H&S Agents (CAH&SAs) require to manage construction H&S.

A postal study was conducted among a group of H&S better practice general contractors (GCs) to determine the importance of knowledge areas and skills. Eight composite knowledge areas and seven composite skills areas have been used to categorise the seventy-nine knowledge areas and fifty skills respectively. To date the study has been primarily a descriptive study.

In general the composite knowledge areas of OH&S, project administration, and design, are more important than the other five areas, and the composite skills of leadership, general management, planning, and interpersonal / developmental are more important than the other three skills.

The findings emanate from an exploratory survey, and therefore an expanded study should be conducted. However, the findings do emanate from an eminent sample stratum, and therefore provide a basis for the further research.

Construction Management programmes, which address the streams of economics, management, and science and technology, appear to be the most suitable programmes in terms of the development of the knowledge and skills required by the three occupations which are the subject of the study, particularly those which include a comprehensive subject or component in the form of H&S, and the subjects project management and theory of structures. Furthermore, a construction H&S association should be founded that promotes professionalism and leadership in construction H&S.

Keywords Competencies, construction, health and safety, knowledge, skills

I. Introduction

Competent is when a person is qualified to perform to a requisite standard of the processes of a job. However, competence means the condition or state of being competent – skill and standard of performance reached. Competency in turn, refers to the behaviour by which it is achieved (Singh, 2004). Therefore, competence describes what people can do whereas competency focuses on how they do it. The plural of each word indicates two different meanings. Competences refer to the range of skills, which are satisfactorily performed, while competencies refer to the behaviour adopted in competent performance.

Hogg (in Singh, 2004) elaborates on the characteristics of competencies as follows:

- Competencies are characteristics of a person;
- Competencies lead to the demonstration of skills and abilities;
- Competencies must lead to effective performance. Competency refers to behaviour, differentiating success from merely doing the job, and
- Competency embodies the capacity to transfer skills and abilities to from one area to another i.e. generic vis-à-vis functional competence.

Competencies are components of a job which are reflected in behaviours that are observable in a workplace, the common elements being (Singh, 2004):

- Knowledge;
- Skills;
- Abilities;
- Aptitudes;
- Personal suitability behaviour, and
- Impact on performance at work.

Criteria of performance are superior performance and effective performance, the issue being that only some competencies can predict performance. Thus competencies are divided into two categories (Singh, 2004):

- Surface or threshold: these are required to be minimally effective, namely knowledge and skills, and
- Core or differentiating: these distinguish superior from average performers, namely abilities, aptitudes, personal suitability behaviour, and impact on performance at work.

This paper addresses the surface H&S competencies Site Managers, Site H&S Officers, and Client Appointed H&S Agents (CAH&SAs) require to manage construction H&S. The reason for the inclusion of these occupations being, firstly Site Managers are responsible for the management of construction projects – the physical construction process and activities, which includes H&S, as it is an integral aspect of the construction process and activities. During a study conducted by Smallwood (2006) H&S was ranked joint tenth out of seventy-eight subject areas at Site Management level in terms of the mean frequency of use of subject areas. Secondly, given the promulgation of the Construction Regulations, and the resultant occupations of H&S Officer, and CAH&SA, the study investigated the importance of seventy-nine knowledge areas, and fifty skills relative to the occupations of Site Manager, Site H&S Officer, and CAH&SA.

II. Research

Sample stratum and methodology

Given the objectives of the study it was necessary to select a sample stratum consisting of contractors, which could be presumed to be committed to and which address H&S, and ergonomics related issues, and therefore best able to comment relative to knowledge and skills required to manage or advise regarding H&S. The sample stratum consisted of 26 general contractors (GCs), who had achieved first, second, or third positions in the Building Industries Federation South Africa (BIFSA) / Master Builders South Africa (MBSA) national H&S competition and, or BIFSA / MBSA 4 or 5-Star H&S gradings on one or more of their projects during the period 1995 to 2003 inclusive. 9 Responses were received and included in the analysis of the data, which equates to a response rate of 34.6%.

The questionnaire was based upon knowledge areas and skills included in a Practice of Construction Management study conducted by Smallwood (2006), which in turn were supplemented by further knowledge areas and skills deduced from the requirements of the Construction Regulations.

Findings

Table 1 indicates the importance of seventy-nine knowledge areas relative to the management of H&S in terms of a mean score ranging between 1.00 and 5.00, based upon percentage responses to a scale of 1 (not important) to 5 (very important) relative to the occupations Site Manager, Site H&S Officer, and CAH&SA, and a mean of the three occupations.

Eight composite knowledge areas have been used to categorise the seventy-nine knowledge areas for reasons of brevity and to enable comparisons between the occupations to be drawn: project administration; financial management; design; law; construction technology / technology; OH&S; planning, and management / management of parameters. This categorisation enabled the computation of composite knowledge area mean scores.

Although it is not readily apparent from the table due to the format, it is notable that seventy-five (94.9%) of the mean scores are above the midpoint score of 3.00, which indicates that in general the respondents can be deemed to perceive the knowledge areas as important. However, given that the mean scores for the top thirty-three (41.8%) knowledge areas are $> 4.20 \leq 5.00$, the respondents can be deemed to perceive them to be between more than important to very important / very important. Given that the mean scores for the knowledge areas ranked 34th to joint 69th (46.8%) are $> 3.40 \leq 4.20$, the respondents can be deemed to perceive them to be between important to more than important / more than important. Furthermore, the respondents can be deemed to perceive those knowledge areas ranked 71st to 79th to be between less than important to important / important – mean scores $> 2.60 \leq 3.40$.

Table 1 Importance of knowledge areas relative to the management of H&S.

Knowledge area	Occupation							
	Site Manager (PC)		Site H&S Officer (PC)		Client Appointed H&S Agent		Mean	
	MS	Rank	MS	Rank	MS	Rank	MS	Rank
Project administration:								
Codes of practice / Standards	4.57	26=	4.57	12=	4.71	6=	4.62	10=
Contract administration	4.14	61=	3.71	47=	4.67	10	4.17	37
Contract documentation	4.29	53=	4.43	16=	4.29	19=	4.34	27
Professional practice	4.86	6=	4.29	21=	4.71	6=	4.62	10=
Composite	4.47	5	4.25	2	4.60	2	4.44	2
Financial management:								
Accountancy	3.57	77=	2.50	74=	3.00	72=	3.02	75
Cash flow forecasting	3.43	79	2.43	77=	3.00	72=	2.95	76=
Cost control	4.43	43=	3.14	67=	3.33	64=	3.63	65
Cost engineering	4.29	53=	3.00	69=	3.17	69=	3.49	68
Estimating	4.00	68=	2.17	79	2.67	77	2.95	76=
Financial management	4.29	53=	3.00	69=	3.00	72=	3.43	69=
Final accounts	4.14	61=	2.50	74=	2.83	75	3.16	73
Composite	4.02	8	2.68	8	3.00	8	3.23	8
Design:								
Design (Architectural)	4.57	26=	3.43	59=	4.29	19=	4.10	41
Design (Cantilever platforms)	4.71	17=	4.43	16=	4.14	28=	4.43	16=
Design (Engineering)	4.43	43=	3.50	58	3.86	40=	3.93	56
Design (Process)	4.29	53=	4.00	36=	3.86	40=	4.05	44=
Design (Influence of design on H&S)	4.43	43=	4.29	21=	4.57	11=	4.43	16=
Design (Influence of design on overall performance)	4.29	53=	4.17	31	4.43	17=	4.30	28
Design (Scaffolding)	4.86	6=	4.86	4=	4.57	11=	4.76	5=
Design (Support work)	4.86	6=	4.86	4=	4.57	11=	4.76	5=
Design (Temporary works)	4.86	6=	4.71	8=	4.29	19=	4.62	10=
Structural design	4.71	17=	4.29	21=	4.29	19=	4.43	16=
Drawing (Engineering / Geometric)	4.29	53=	3.29	62=	3.86	40=	3.81	60
Composite	4.57	4	4.17	3	4.25	3	4.33	3
Law:								
Commercial Law	4.57	26=	3.86	42=	4.00	35=	4.14	38=
Company Law	4.57	26=	3.57	55=	4.00	35=	4.05	44=
Labour Law	4.71	17=	4.14	32=	4.29	19=	4.38	23=
Composite	4.62	2	3.86	5	4.10	4	4.19	4
Construction technology / Technology:								
Information technology	4.14	61=	4.00	36=	3.86	40=	4.00	50=
Surveying (land)	4.14	61=	2.50	74=	2.20	79	2.95	76=
Materials	4.57	26=	3.57	55=	3.71	50=	3.95	54=
Mathematics	4.14	61=	3.29	62=	3.83	49	3.75	64
Measuring (quantities)	3.71	73=	2.71	72	3.17	69=	3.20	72
Methods (construction) - Building	4.86	6=	4.29	21=	4.14	28=	4.43	16=
Methods (construction) - Civil	4.86	6=	4.29	21=	4.14	28=	4.43	16=
Methods (construction) - Marine	4.67	25	3.83	46	3.67	53=	4.06	42=
Physics	4.20	60	3.60	53=	3.60	55	3.80	61
Specifications	4.71	17=	4.50	15	4.50	16	4.57	13=
Composite	4.40	7	3.66	7	3.68	6	3.91	7
OH&S:								
Environmental issues	4.43	43=	4.71	8=	4.86	2=	4.67	8=
Ergonomics (construction)	4.57	26=	4.57	12=	4.57	11=	4.57	13=
First aid	4.43	43=	4.86	4=	4.71	6=	4.67	8=
Occupational health	4.86	6=	5.00	1=	5.00	1	4.95	1

Occupational hygiene	4.86	6=	5.00	1=	4.86	2=	4.91	2=
Occupational medicine	4.14	61=	4.29	21=	4.17	24=	4.20	34
Occupational safety	4.86	6=	5.00	1=	4.86	2=	4.91	2=
Composite	4.59	3	4.78	1	4.72	1	4.70	1
Planning:								
Planning (Operational)	4.71	17=	3.86	42=	3.50	57=	4.02	47=
Planning (Programming)	4.71	17=	3.29	62=	3.50	57=	3.83	59
Planning (Strategic)	4.57	77=	3.43	59=	3.33	64=	3.78	62
Procedures	4.57	26=	4.33	61	4.17	24=	4.36	26
Composite	4.64	1	3.73	6	3.63	7	4.00	6
Management / Management of parameters:								
Benchmarking	4.50	42	3.60	53=	3.50	57=	3.87	57
Customer service	4.57	26=	4.00	36=	4.17	24=	4.25	31
Economics	3.71	73=	3.00	69=	3.14	71	3.28	71
Ethics	4.57	26=	4.14	32=	4.83	5	4.51	15
Facilities management	4.57	26=	4.29	21=	4.00	35=	4.29	29=
Human resources	4.43	43=	4.14	32=	3.57	56	4.05	44=
Industrial psychology	4.43	43=	4.43	16=	3.86	40=	4.24	32=
Industrial relations	4.43	43=	4.43	16=	3.86	40=	4.24	32=
International contracting	4.14	61=	4.14	32=	4.14	28=	4.14	38=
Management (business)	5.00	1=	3.71	47=	3.86	40=	4.19	35=
Marketing	3.71	73=	3.29	62=	3.67	53=	3.56	67
Materials management	4.71	17=	3.71	47=	3.50	57=	3.97	53
Negotiating	4.57	26=	3.86	42=	4.00	35=	4.14	38=
Plant and equipment management	4.86	6=	3.71	47=	3.50	57=	4.02	47=
Procurement	4.57	26=	3.67	52	3.33	64=	3.86	58
Productivity	4.86	6=	3.86	42=	3.29	67=	4.00	50=
Project management	4.57	26=	3.33	61	4.14	28=	4.01	49
Public relations	4.29	53=	3.57	55=	4.14	28=	4.00	50=
Purchasing	4.00	68=	2.43	77=	2.33	78	2.92	79
Quality management	4.57	26=	4.29	21=	4.00	35=	4.29	29=
Re-engineering	4.43	43=	3.14	67=	3.29	67=	3.62	66
Remuneration	3.71	73=	2.67	73	2.75	76	3.04	74
Research	3.57	77=	3.29	62=	3.43	63	3.43	69=
Risk management	5.00	1=	4.86	4=	4.71	6=	4.86	4
Service management	4.43	43=	4.00	36=	4.14	28=	4.19	35=
Sociology	3.86	72	3.71	47=	3.71	50=	3.76	63
Statistics	4.00	68=	4.00	36=	4.17	24=	4.06	42=
Subcontractor management	5.00	1=	4.29	21=	3.86	40=	4.38	23=
Total Quality Management	5.00	1=	4.57	12=	4.57	11=	4.71	7
Training	4.71	17=	4.71	8=	3.71	50=	4.38	23=
Value management	4.57	26=	4.29	21=	4.43	17=	4.43	16=
Worker participation	5.00	1=	4.71	8=	3.50	57=	4.40	22
Work study	4.00	68=	4.00	36=	3.86	40=	3.95	54=
Composite	4.43	6	3.87	4	3.79	5	4.03	5

Table 2 indicates the importance of the eight composite knowledge areas relative to the management of H&S in terms of a mean score ranging between 1.00 and 5.00, relative to the occupations of Site Manager, Site H&S Officer, and CAH&SA, and the mean of the three occupations.

It is notable that with the exception of financial management relative to the occupations of Site H&S Officer, and CAH&SA, all the mean scores are above the midpoint score of 3.00, which indicates that in general the composite knowledge areas can be deemed to be important.

In terms of the mean, OH&S predominates followed by project administration, and design. These are followed by a 'group' consisting of construction technology /

technology, management / management of parameters, planning, and law, the absolute difference between fourth ranked construction technology / technology and seventh ranked law being 0.11. Financial management is ranked eighth.

In terms of Site Manager, planning, law, OH&S, design, project administration, management / management of parameters, and construction technology / technology predominate, followed by financial management, ranked eighth.

In terms of Site H&S Officer, OH&S predominates followed by project administration, design, management / management of parameters, law, planning, and construction technology / technology. There is an absolute difference of 0.98 between construction technology / technology and eighth ranked financial management.

In terms of CAH&SA, OH&S and project administration predominate, followed by design, law, management / management of parameters, construction technology / technology, and planning. There is an absolute difference of 0.63 between planning and eighth ranked financial management.

To summarise, in general the composite knowledge areas of OH&S, project administration, and design, are more important than the other areas.

Table 2 Importance of composite knowledge areas relative to the management of H&S.

Composite knowledge area	Occupation							
	Site Manager (PC)		Site H&S Officer (PC)		Client Appointed H&S Agent		Mean	
	MS	Rank	MS	Rank	MS	Rank	MS	Rank
Project administration	4.47	5	4.25	2	4.60	2	4.44	2
Financial management	4.02	8	2.68	8	3.00	8	3.23	8
Design	4.57	4	4.17	3	4.25	3	4.33	3
Law	4.62	2	3.86	5	4.10	4	4.10	4
Construction technology / Technology	4.40	7	3.66	7	3.68	6	3.91	7
OH&S	4.59	3	4.78	1	4.72	1	4.70	1
Planning	4.64	1	3.73	6	3.63	7	4.00	6
Management / Management of parameters	4.43	6	3.87	4	3.79	5	4.03	5
Occupation	4.47	1	3.88	3	3.97	2	4.09	

Table 3 indicates the importance of fifty skills relative to the management of H&S in terms of a mean score ranging between 1.00 and 5.00, based upon percentage responses to a scale of 1 (not important) to 5 (very important) in terms of the occupations Site Manager, Site H&S Officer, and CAH&SA, and a mean of the three occupations.

Seven composite skills areas have been used to categorise the fifty skills for reasons of brevity and to enable comparisons to be drawn between the occupations: interpersonal / development; general management; financial; leadership; negotiating; planning, and technical.

Although it is not readily apparent from the table due to the format, it is notable that all the mean scores are above the midpoint score of 3.00, which indicates that in general the respondents can be deemed to perceive the skills as important. However, given that the mean scores for the top twenty-two (44%) skills are $> 4.20 \leq 5.00$, the respondents can be deemed to perceive them to be between more than important to

very important / very important. Given that the mean scores for the skills ranked twenty-third to forty-ninth (48%) are $3.40 \leq 4.20$, the respondents can be deemed to perceive them to be between important to more than important / more than important. Furthermore, the respondents can be deemed to perceive the skill ranked fiftieth to be between less than important to important / important – a mean score $> 2.60 \leq 3.40$.

Table 3 Importance of skills relative to the management of H&S.

Skill	Occupation							
	Site Manager (PC)		Site H&S Officer (PC)		Client Appointed H&S Agent		Mean	
	MS	Rank	MS	Rank	MS	Rank	MS	Rank
Interpersonal / Developmental:								
Communicating (Graphic)	4.00	40=	4.57	7=	4.29	8	4.29	15
Communicating (Oral)	4.43	23=	4.57	7=	4.43	6	4.48	4
Communicating (Written)	4.57	13=	4.57	7=	4.57	3=	4.57	2
Conceptual	4.14	32=	4.43	16=	4.20	9	4.26	17
Conflict resolution	4.57	13=	4.14	24=	4.33	7	4.35	13
Creative	4.00	40=	3.71	40=	3.00	45=	3.57	44
Initiating	4.80	6	4.17	23	3.40	36	4.12	25=
Interpersonal	4.57	13=	4.14	24=	4.00	15=	4.24	19=
Intuitive	4.33	29	3.67	42	3.60	30=	3.87	37
Social	4.00	40=	3.83	39	4.00	15=	3.94	36
Team building	4.86	1=	4.43	16=	4.00	15=	4.43	6=
Training	4.57	13=	4.57	7=	3.67	26=	4.27	16
Composite	4.40	4	4.23	4	3.96	1	4.20	4
General management:								
Administrative	4.14	32=	4.71	2=	4.71	1=	4.52	3
Controlling	4.43	23=	4.14	24=	4.17	10=	4.25	18
Coordinating	4.71	7=	4.29	18=	4.17	10=	4.39	9
Organising	4.57	13=	4.29	18=	3.14	42=	4.00	30=
Supervisory	4.71	7=	4.14	24=	3.50	34=	4.12	25=
Systems development	4.43	23=	4.29	18=	4.00	15=	4.24	19=
Composite	4.50	3	4.31	2	3.95	2	4.25	2
Financial:								
Costing	4.14	32=	3.43	44=	3.33	37=	3.63	43
Estimating	4.14	32=	3.00	48	3.33	37=	3.49	46
Financial	4.29	30=	3.14	46=	3.17	41	3.53	45
Composite	4.19	6	3.19	7	3.28	6	3.55	7
Leadership:								
Decision making	4.71	7=	4.14	24=	3.83	24=	4.23	22
Leadership	4.86	1=	4.29	18=	4.00	15=	4.38	10=
Motivating	4.57	13=	4.71	40=	4.00	15=	4.43	6=
Composite	4.71	1	4.38	1	3.94	3	4.35	1
Negotiating:								
Negotiating with clients	4.43	23=	4.29	18=	3.57	32=	4.10	27
Negotiating with material manufacturers	4.00	40=	3.86	34=	2.57	49=	3.48	47=
Negotiating with material suppliers	4.00	40=	3.86	34=	2.57	49=	3.48	47=
Negotiating with plant hire organisations	4.14	32=	4.14	24=	2.86	47	3.71	39=
Negotiating with subcontractors	4.71	7=	4.57	7=	3.14	42=	4.14	23
Negotiating with unions	4.57	13=	4.57	7=	3.14	42=	4.09	28
Negotiating with workers	4.86	1=	4.57	7=	3.29	39=	4.24	19=
Composite	4.39	5	4.27	3	3.02	7	3.89	6

Planning:								
Planning (Forecasting e.g. labour, weather)	4.57	13=	3.57	43	3.00	45=	3.71	39=
Planning (Programming)	4.86	1=	3.43	44=	3.60	30=	3.96	33=
Planning (Preparing generic method statements)	4.57	13=	4.71	2=	4.14	14	4.47	5
Planning (Preparing H&S method statements)	4.86	1=	4.86	1	4.57	3=	4.76	1
Planning (Preparing Site Layouts)	4.43	23=	3.86	34=	3.57	32=	3.95	35
Procedures development	4.43	23=	4.71	2=	4.00	15=	4.38	10=
Composite	4.62	2	4.19	5	3.81	5	4.21	3
Technical:								
Auditing	3.57	49	4.71	2=	4.71	1=	4.33	14
Computer	3.29	50	4.00	31=	4.17	10=	3.82	38
Design (support / formwork)	4.57	13=	4.57	7=	4.00	15=	4.38	10=
Measuring productivity	4.29	30=	3.14	46=	3.67	26=	3.70	41
Measuring quantities	4.14	32=	2.71	50	3.50	34=	3.45	49
Numerical (maths)	4.00	40=	3.71	40=	3.29	39=	3.67	42
Plan reading	4.71	7=	3.86	34=	3.67	26=	4.08	29
Report writing	4.14	32=	4.57	7=	4.57	3=	4.43	6=
Research	3.71	48	4.00	31=	4.17	10=	3.96	33=
Statistical	4.14	32=	4.14	24=	3.67	26=	3.98	32
Surveying (land)	3.86	47	2.86	49	2.67	48	3.13	50
Technical	4.71	7=	3.86	34=	3.83	24=	4.13	24
Work study	4.00	40=	4.00	31=	4.00	15=	4.00	30=
Composite	4.09	7	3.86	6	3.84	4	3.93	5

Table 4 indicates the importance of the seven composite skills relative to the management of H&S in terms of a mean score ranging between 1.00 and 5.00, relative to the occupations of Site Manager, Site H&S Officer, and CAH&SA, and the mean of the three occupations.

It is notable that all the mean scores are above the midpoint score of 3.00, which indicates that in general the composite skills can be deemed to be important.

In terms of the mean, leadership, general management, planning, interpersonal / developmental predominate, followed by technical, negotiating, and financial. In terms of Site Manager, leadership, planning, general management, interpersonal / developmental, and negotiating predominate, followed by financial and technical. In terms of Site H&S Officer, leadership, general management, negotiating, interpersonal / development, and planning predominate, followed by technical and financial. There is an absolute difference of 0.67 between sixth ranked technical and seventh ranked financial.

In terms of CAH&SA, interpersonal / developmental, general management, leadership, technical, and planning predominate followed by financial and negotiating. There is an absolute difference of 0.79 between fifth ranked planning and seventh ranked negotiating.

To summarise, in general the composite skills of leadership, general management, planning, and interpersonal / developmental are more important than the other skills.

Table 4 Importance of composite skills relative to the management of H&S.

Composite skill	Occupation			
	Site	Site H&S	Client	Mean

	Manager (PC)		Officer (PC)		Appointed H&S Agent			
	MS	Rank	MS	Rank	MS	Rank	MS	Rank
Interpersonal / Developmental	4.40	4	4.23	4	3.96	1	4.20	4
General management	4.50	3	4.31	2	3.95	2	4.25	2
Financial	4.19	6	3.19	7	3.28	6	3.55	7
Leadership	4.71	1	4.38	1	3.94	3	4.35	1
Negotiating	4.39	5	4.27	3	3.02	7	3.89	6
Planning	4.62	2	4.19	5	3.81	5	4.21	3
Technical	4.09	7	3.86	6	3.84	4	3.93	5
Mean	4.41	1	4.06	2	3.69	3	4.06	

Table 5 indicates the degree of concurrence with a range of statements relative to the management of H&S in terms of percentage responses to a scale strongly disagree to strongly agree, and a mean score ranging between 1.00 and 5.00. In summary, respondents concur that H&S is an integral part of construction management, construction, and all activities, and that H&S is a line function and that site management take ownership of H&S. Furthermore, although ‘H&S can be consulted into the construction process’ it merely sound construction management. There is also concurrence that in order to manage H&S, knowledge of design, the design process, procurement, construction, and the construction process is required.

Table 5 Extent of concurrence with statements.

Statement	Response (%)					MS
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
H&S should be an integral part of all activities	0.0	0.0	0.0	0.0	100.0	5.00
H&S should be an integral part of construction	0.0	0.0	0.0	0.0	100.0	5.00
H&S should be an integral part of construction management	0.0	0.0	0.0	0.0	100.0	5.00
Site management should take ownership of H&S	0.0	0.0	0.0	0.0	100.0	5.00
H&S should be a line function	0.0	0.0	14.3	0.0	85.7	4.71
H&S can be ‘consulted into the construction process’	0.0	0.0	0.0	28.6	57.1	4.67
In order to manage H&S requires knowledge of construction	0.0	0.0	0.0	57.1	42.9	4.43
In order to manage H&S requires knowledge of the construction process	0.0	0.0	0.0	0.0	28.6	4.29
H&S is merely sound construction management	0.0	16.7	0.0	33.3	50.0	4.17
In order to manage H&S requires knowledge of design	0.0	0.0	14.3	71.4	14.3	4.00
In order to manage H&S requires knowledge of the design process	0.0	0.0	28.6	57.1	14.3	3.86
In order to manage H&S requires knowledge of procurement	0.0	0.0	28.6	57.1	14.3	3.86

III. Conclusions

In general the composite knowledge areas of OH&S, project administration, design, are more important than the other areas. However, knowledge relative to the other areas, namely financial management, law, construction technology / technology, planning, and management / management of parameters, is also important.

In general the composite skills of leadership, general management, planning, and interpersonal / developmental are more important than the other skills. However, the other skills, namely financial, negotiating, and technical are also important.

The importance of the composite knowledge areas, the incumbent knowledge areas, the composite skills, and incumbent skills, has implications in terms of the acquisition of underpinning knowledge in built environment technology, design, construction management, and OH&S. The acquisition of the underpinning knowledge in turn has implications in terms of suitable tertiary education programmes. Construction Management programmes, which address the streams of economics, management, and science and technology, appear to be the most suitable programmes, particularly those which include a comprehensive subject or component in the form of OH&S, and the subjects project management and theory of structures. The subject project management being important due to the knowledge required relative to the management of design and / or design delivery, and the subject theory of structures being important due to the knowledge required relative to the design of temporary works.

IV. References

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