

THE ROLE OF OPTIMUM HEALTH AND SAFETY (H&S) IN CONSTRUCTION MARKETING

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Anecdotal evidence and literature indicate that clients in developing countries are placing increasing emphasis on H&S, which manifests itself in the inclusion of H&S as a pre-qualification criterion. Optimum H&S performance also enhances overall performance and efficiency, which results in reduced cost of production. Reduced cost of production in turn, results in increased competitiveness in the market place. Given the findings of literature and anecdotal evidence a study was conducted among general contractors (GCs), which had achieved a place in the Building Industries Federation South Africa (BIFSA) National H&S Competition to determine the role of H&S in construction marketing. The salient findings include: clients primarily pre-qualify GCs relative to legislated related H&S issues, such as registration for compensation insurance, programme, and policy; clients also do so relative to accountability, H&S star grading status, and H&S statistics and require project H&S reporting, and TQM related H&S phenomena contributed to the acquisition of work, or additional work. The findings clearly indicate the role and benefits of investing in H&S and reinforce the contention that optimum H&S does provide 'better practice' H&S GCs with a competitive edge. Recommendations include that 'better practice' H&S GCs should continue to enhance their H&S related practices to maintain and enhance their competitive advantage.

Keywords: construction, marketing, health and safety, competitiveness

INTRODUCTION

Traditionally, cost, quality and time have constituted the parameters within which projects have been managed. However, increasing awareness relative to the role of H&S in overall project performance and the inclusion of H&S as a project performance measure by inter alia, petro-chemical organisations, has engendered focus on H&S by a range of stakeholders. The number of large-scale construction accidents in South Africa and the consequential media coverage has further raised the level of awareness. Furthermore, the Construction Regulations promulgated on the 18 July 2003, require inter alia, that clients and principal contractors determine whether principal contractors and contractors respectively, have made adequate allowance for H&S (Republic of South Africa, 2003). The importance of H&S has been further amplified by the negative publicity resulting from accidents, for both clients and contractors, and the realisation that the cost of accidents is included in contractors' cost structures, and that clients ultimately incur the cost thereof. Conversely, contractors that optimise cost as a result of optimum H&S are effectively more competitive in terms of price. Furthermore, they are likely to be more attractive to clients.

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Given the abovementioned a study was conducted to determine the:

- Frequency at which clients require / undertake / request various H&S related actions / interventions / submissions, and
- Extent to which various H&S related phenomena have contributed to the acquisition of work or additional work.

REVIEW OF THE LITERATURE

Statistics

During 1999, the latest year for which occupational injury statistics are available, a total of 14 418 medical aid cases, 4 587 temporary total disablements, 315 permanent disablements, and 137 fatalities were reported to the Compensation Commissioner in South Africa (2005). These equate to 1 temporary disablement for every 102 workers, 1 permanent disablement for every 1 041, and 1 fatality for every 3 925. The disabling injury incidence rate (DIIR) 0.98 means that 0.98 workers per 100 incurred disabling injuries, the all industry average being 0.78. The number of fatalities among the workers insured by the Accident Fund (AF) is the equivalent of a fatality rate of 25.5 fatalities per 100 000 full-time equivalent construction workers, which does not compare favourably with international rates.

The severity rate (SR) indicates the number of days lost due to accidents for every 1 000 hours worked. The 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 2 000 hours per year, if the SR is multiplied by 2, the average number of days lost per worker per year can be computed – the construction industry lost 2.28 working days per worker during 1999. This is equivalent to 1.0% of working time.

The key issue relative to fatalities and injuries is that should they occur on a client's existing facility or project, they could negatively affect the image of the client as perceived by the public. Furthermore, the outcome of incidents and accidents is largely fortuitous – it could be minor, moderate, major, or catastrophic i.e. the client's manufacturing or business processes may be interrupted in the case of an existing facility, or in the case of a project, be brought to a standstill. With respect to the severity rate, the number of lost working days per worker can have a substantial effect on project progress.

Cost of accidents

The COA can be categorised as being either direct or indirect. Direct costs tend to be those associated with the treatment of the injury and any unique compensation offered to workers as a consequence of being injured and are covered by workmen's compensation insurance premiums. Indirect costs which are borne by contractors include: reduced productivity for both the returned worker(s) and the crew or workforce; clean-up costs; replacement costs; costs resulting from delays; supervision costs; costs related to rescheduling; transportation, and wages paid while the injured is idle (Hinze, 1994). Recent research conducted in the United Kingdom (UK) determined indirect costs to be 11 times the direct costs - 11:1 (Movement for Innovation, 2003). Research conducted in South Africa determined the indirect costs to be 14.2 times the direct costs (Smallwood, 2000a).

Research conducted in the United States of America indicates the total cost of accidents to constitute, inter alia, 6.5% of the value of completed construction (The Business Roundtable, 1995) and in the UK approximately 8.5% of tender price (Anderson, 1997). Based upon the respective indirect cost multipliers determined in the UK and South Africa, namely 11 and 14.2, and the estimated compensation insurance for 2002, the total cost of accidents could have been between:

- $R\ 200.1m + (R\ 200.1m \times 11) = R\ 2\ 401.2m$, and
- $R\ 200.1m + (R\ 200.1m \times 14.2) = R\ 3\ 041.5m$

Further, based upon the value of construction work completed in the year 2002, namely R 56 343m (South African Reserve Bank, 2003) the total COA could have been between 4.3% ($R\ 2\ 401.2m / R\ 56\ 343m$), and 5.4% ($R\ 3\ 041.5m / R\ 56\ 343m$) of the value of completed construction (Smallwood, 2004). The key issue relative to the COA is that ultimately, clients incur the COA, as the COA is included in contractors' cost structures. Furthermore, given the contribution of the estimated COA, should clients negotiate a contract with a contractor, or elect to use the selected tender process, then ideally contractors that optimise H&S performance are more attractive to clients.

Client responsibilities in terms of the Construction Regulations

Clients are required to (Republic of South Africa, 2003):

- Prepare and provide the Principal Contractor (PC) with H&S specifications;
- Provide the PC with any information that may affect H&S;
- Appoint each PC in writing;
- Ensure that the PC implements and maintains H&S plan – conduct audits at least monthly;
- Stop work not in accordance with the H&S plan;
- Provide sufficient H&S information when changes are made to design and construction;
- Ensure that every PC has workers' compensation insurance cover;
- Ensure that PCs have made provision for the cost of H&S in their tenders;
- Discuss the contents and approve the H&S plan;
- Ensure that a copy of the H&S plan is available, and
- Appoint a PC that is competent and has the resources.

However, clients may appoint an agent in terms of the responsibilities, but the agent must be competent and have the resources. The requirements of clients are such that contractors committed to H&S are likely to be more attractive to clients as contractor commitment and compliance will facilitate execution of client duties in terms of the Construction Regulations. Conversely, uncommitted contractors and / or contractors that lack competencies are likely to require increased effort on the part of clients, and should clients have appointed agents in such cases, then the increased effort is likely to translate into increased cost.

Procurement related issues

Procurement systems are important as they affect contractual relationships, the development of mutual goals, the allocation of risk, and ultimately provide the framework within which projects are executed (Dreger, 1996). The traditional construction procurement system, which entails, inter alia, the evolution of a design by designers, the preparation of bills of quantities and related documentation by quantity surveyors and the engagement of a contractor through competitive bidding, invariably on the basis of price, does not complement H&S. This may be due to the separation of the design and construction processes, the incompleteness of design upon both preparation of documentation and the commencement of construction, and the engagement of contractors on the basis of price (Rwelamila and Smallwood, 1999).

Competitive tendering marginalizes H&S. Market conditions in South Africa are such that contractors frequently find themselves in the iniquitous position that should they make the requisite allowances for H&S, they run the risk of losing a tender or negotiations to a less committed competitor (Smallwood, 1996). Consequently, competitive tendering may discourage commitment to H&S. During research conducted in South Africa approximately 50% of project managers advocated the inclusion of a provisional sum for H&S (Smallwood, 1996). This would ensure that all tenderers allocate an equitable amount of resources to H&S.

South African contract documentation generally does not engender H&S. Although references are made to H&S in standard contract documentation, such references are primarily in the form of specific reference to the Occupational Health and Safety Act. In many cases they can be described as indirect, hardly coercive and, depending upon the level of commitment, contractors continue to address H&S to varying degrees (Smallwood and Rwelamila, 1996). Conversely, reference to H&S in contract documentation in tandem with other H&S related interventions such as the inclusion of a provisional sum for H&S, or an H&S section in the Preliminaries, is likely to engender commitment to H&S by contractors.

Pre-qualification

Various authors, inter alia, Levitt and Samelson (1993) advocate pre-qualification of general contractors and subcontractors on H&S by clients and general contractors respectively. The purpose of pre-qualification in the H&S sense is to provide a standardized method for the selection of contractors on the basis of demonstrated H&S work records, H&S commitment and knowledge, and the ability to work in a healthy and safe manner. The Business Roundtable (1995) maintains that the selection of health and safety conscious contractors can pay dividends. Levitt and Samelson (1993) contend that screening contractors in terms of their expected H&S performance is an effective way of enhancing H&S performance on projects. Furthermore, such pre-qualification is likely to engender commitment to H&S by contractors, as should they not be, then they are unlikely to meet H&S pre-qualification criteria.

Levitt and Samelson (1993) advocate evaluation using two types of data:

- Data about a contractor's past H&S record, which will provide an objective prediction of its future performance: insurance measures; statistics, and references from past clients or contractors, and

- Data about a contractor's current H&S practices, which provides a more current, but subjective prediction of its future performance: programme; accountability; induction; training; toolbox talks; meetings; inspections; and computation of statistics and the cost of accidents.

Elements of marketing and H&S

According to Lavender (1996) "marketing management is primarily concerned with ways of generating revenue, so that the overall organisational objective of profitability can be achieved." Organisations can either adopt a market or production-oriented approach. A market-oriented organisation structures all other activities around marketing, and a production-oriented organisation decides what it will produce or construct, and then decides how to market itself. Lavender (1996) argues that there are a number of basic issues that need to be considered. These are the: extent of market orientation of the organisation; the distinction between client needs and wants; the distinction between features and benefits, and the effect of external factors.

The market-oriented organisation places satisfaction at the centre of its philosophy and activities. The organisation will identify how to generate revenue by providing the market with what it requires, and then decides how to produce it at minimum cost. The production-oriented organisation bases its activities around its products and / or production process, relying on the product or service to sell itself. Construction organisations exhibit different types of orientation. Contracting organisations are generally production oriented. However, contractors in the housing and property development sectors tend to be more market-oriented. Materials manufacturers tend to be market-oriented, but many are monopolies, and thus have the ability to manipulate the market. Relative to orientation within the context of H&S the issue is that there are clients that view H&S as a value. Furthermore, such clients invariably include H&S as a project parameter and pre-qualify contractors in terms of H&S. Therefore, contractors need to project competence in terms of historical H&S performance, and H&S systems, procedures and practices. Furthermore, a healthy and safe conscious contractor is likely to have realized cost savings through minimisation of the cost of accidents and the synergy between H&S and the other project parameters.

The second basic issue is that of needs vis-à-vis wants – needs address the essentials, whereas wants differentiate (Lavender, 1996). Relative to needs and wants within the context of H&S the issue is that clients need contractors to undertake construction, but certain clients may want incident / accident-free projects. Therefore, contractors can commit themselves to zero incidents and assure clients of a superior service in the form of incident / accident-free projects. According to Hinze (1997) studies conducted in the USA in the early 1990s indicated that the percentage of clients pre-qualifying contractors in terms of H&S was increasing each year. 46% of clients stated that they would be more concerned about H&S, and 47% that they had increased concern regarding pending Federal H&S related legislation in the future. Within the South African context the promulgation of the Construction Regulations (Republic of South Africa, 2003) has engendered increased focus on H&S. Research conducted by Smallwood and Haupt (2005) investigated the extent of the impact of the Construction Regulations. Based upon responses to a five-point scale and a 'No' option, and a resultant mean score, which represents the degree of central tendency of responses, the following can be deemed to be manifestations of the impact: review of provision for H&S other than financial e.g. H&S plan, & H&S programme; review of financial provision for H&S, and pre-qualification on H&S.

The third basic issue is that of features and benefits. The features define what the product or service is, whereas the benefits encourage the potential client to appoint a specific contractor. Relative to features and benefits within the context of H&S, the issue is that the benefit of an incident / accident-free project may encourage a client to appoint a specific contractor.

External factors constitute the fourth basic issue. When marketing a product or service, the benefits being emphasised can be undermined by external factors that are outside, or partially outside the control of an organisation. An external factor results when part of the responsibility for delivering a benefit is given to another stakeholder. A typical example is that of subcontracting – the main contractor's ability to deliver the benefit of an incident / accident-free project may be marginalised by the inability of subcontractors to perform satisfactorily.

Marketing mix and H&S

Marketing mix refers to the group of variables that constitute the organisation's activities: product or service; price; promotion, and distribution (Lavender, 1996).

Organisations need to decide what products or services they are going to provide. However, relative to product or service, there are a number of related matters, namely branding, after-sales service, and product life cycle. Within the context of H&S branding constitutes a major opportunity in that a contractor can evolve a 'brand' that is synonymous with 'incident / accident-free' contracting.

Although H&S cannot be directly linked to after-sales service, there is an indirect link in that within the context of design-build the issue of fitness for purpose arises i.e. use of a structure should not expose users to any hazards and risk. Furthermore, structures should be designed with consideration for H&S during maintenance in mind. However, the Construction Regulations (Republic of South Africa, 2003) require that designers consider ergonomics throughout all phases of projects – design-build contractors are included in the definition of designer.

As in the case of after-sales service, product life cycle cannot be directly linked to H&S. However, there is an indirect link in that if the stages of a product or service's life cycle are reviewed then the indirect link of H&S is highlighted – the stages are introduction, growth, maturity, and saturation. Generally, profits are low during the introduction stage. However, profitability can be enhanced through minimisation of incidents / accidents, and the synergy between H&S and the other project parameters. During the growth phase, profits are likely to increase. However, such an increase can be engendered through optimum H&S. Furthermore, an accident could have a major negative impact on growth. During the maturity phase when profits generally level off due to increased competition, optimum H&S performance has the potential to differentiate between average and above average performance. Furthermore, optimum H&S performance has the potential to offset the effects of a fall in business volume during the saturation and decline stages, when business volume falls and products are invariably withdrawn from the market respectively.

Price is a critical element in marketing since revenue is based upon the quantity of units sold multiplied by the unit price, in terms of manufactured products. However, in the case of contracting, price is a major determinant in terms of the decision to award a project. Given the cost of accidents, and the synergy between H&S and the other project parameters, it can be argued that within the context of H&S and marketing, it is relative to price that H&S has the most potential to contribute.

However, the converse applies, as inadequate or the lack of H&S can substantially marginalise an organisation's competitiveness as a result of an increase in the cost of production.

The purpose of promotion is to turn potential clients into actual clients (Lavender, 1996). There are six traditional stages: unawareness of the product or service; awareness of the product or service; interest in and understanding of the product or service; desire for the product or service; conviction about the value of the product or service, and purchase of the product or service. Within the context of manufacturing and contracting, an organisation's H&S performance has the potential to complement the awareness of, interest in and understanding of, desire for, conviction in, and ultimately purchase or use of an organisation's product or service respectively. There are several methods of promotion: advertising; personal selling; sales promotion, and publicity (Lavender, 1996). The commitment of an organisation to H&S can be promoted in advertising in the various media. During personal selling of a product or service, the H&S features of a product or commitment to H&S can be highlighted. Sales promotion is directed at increasing sales, and interventions include demonstrations and sales material. Sales material may for example include H&S features of products, such as the integral guardrails of a support work system. Contractors may also feature their focus on H&S in sales material. However, both manufacturers and contractors should ensure that sales material does not feature unsafe conditions and / or unsafe acts.

Distribution is essentially related to transport and delivery. There are direct links between distribution and H&S, in particular ergonomics. The palletisation of bricks and mechanical off-loading thereof simultaneously improve delivery and enhance ergonomics through the minimisation of manual handling.

RESEARCH

Sample stratum

The sample frame consisted of 25 general contractors (GCs), which achieved a place in the Building Industries Federation South Africa (BIFSA) National H&S Competition and, or a BIFSA 4 or 5-Star H&S grading on one or more of their projects during the period 1995 - 2001. 13 GCs responded, which represents a response rate of 52%.

Analysis

Given that respondents were required to respond in terms of frequency and impact on a scale of 1 to 5, it was necessary to compute an importance index (II) with a minimum value of 0, and a maximum value of 4, to enable a comparison of, and to rank various actions / interventions / submissions, and phenomena.

Findings

Table 1 indicates the frequency at which clients require / undertake / request various H&S related actions / interventions / submissions. Given that the II values of five of the nine actions / interventions / submissions are above the midpoint value of 2.0, they can be deemed to be prevalent. However, only two are $> 2.4 \leq 3.2$, which indicates that they can be deemed to occur between sometimes to often / often. Those that have II values $> 1.6 \leq 2.4$ can be deemed to occur between rarely and sometimes / sometimes, and those with values $> 0.8 \leq 1.6$ between never to rarely / rarely.

Table 1: Frequency at which clients require / undertake / request various H&S related actions / interventions / submissions.

Action / Intervention / Submission	Response (%)						II	Rank
	Don't know	Never	Rarely	Sometimes	Often	Always		
H&S pre-qualification (Compensation insurance registration)	0.0	0.0	23.1	0.0	30.8	46.2	3.00	1
H&S pre-qualification (Programme)	0.0	7.7	15.4	23.1	15.4	38.5	2.62	2
H&S pre-qualification (Other H&S criteria such as accountability)	0.0	0.0	23.1	46.2	7.7	23.1	2.31	3
H&S pre-qualification (Policy)	0.0	7.7	15.4	46.2	15.4	15.4	2.15	4
Project H&S reporting	0.0	15.4	23.1	15.4	38.5	7.7	2.00	5
H&S project plans	0.0	7.7	46.2	30.8	7.7	7.7	1.62	6
H&S pre-qualification (Specific level of star grading status) (Average)	0.0	7.7	61.5	23.1	0.0	7.7	1.38	7=
H&S pre-qualification (Statistics)	0.0	30.8	30.8	15.4	15.4	7.7	1.38	7=
Incentives for H&S	0.0	46.2	46.2	0.0	0.0	7.7	0.77	9

Table 2: Extent to which various H&S related phenomena have contributed to the acquisition of work or additional work.

Phenomena	Response (%)						II	Rank
	No	Minor..... Major						
		1	2	3	4	5		
Improved productivity as a result of H&S	0.0	7.7	15.4	30.8	38.5	7.7	2.23	1
Programme performance as a result of H&S	0.0	7.7	15.4	38.5	30.8	7.7	2.15	2=
Quality performance as a result of H&S	0.0	7.7	23.1	23.1	38.5	7.7	2.15	2=
Compliance with client H&S requirements	0.0	0.0	38.5	23.1	30.8	7.7	2.08	4
Management commitment to H&S	0.0	0.0	30.8	46.2	15.4	7.7	2.00	5=
Integration of H&S into activities	0.0	0.0	38.5	30.8	23.1	7.7	2.00	5=
Consideration and / or preservation of the environment as a result of H&S	0.0	7.7	38.5	15.4	30.8	7.7	1.92	7=
Past overall H&S performance	0.0	0.0	38.5	46.2	0.0	15.4	1.92	7=
Reduced cost as a result of H&S	0.0	7.7	30.8	38.5	15.4	7.7	1.85	9
Overall H&S performance on work in progress	0.0	7.7	30.8	46.2	7.7	7.7	1.77	10=
H&S culture	0.0	7.7	46.2	23.1	7.7	15.4	1.77	10=
Management of subcontractor H&S	0.0	0.0	41.7	41.7	16.7	0.0	1.75	12

Given that H&S pre-qualification (Compensation insurance registration) is a legal and contractual requirement, it is understandably ranked first. However, it is notable that

H&S pre-qualification (Programme) and (Other H&S criteria such as accountability), and the requirement of project H&S reporting, can be deemed prevalent.

CONCLUSIONS

The paucity of literature relative to the role of H&S in marketing indicates that researchers have not addressed the relationship. Furthermore, it is also an indication of the lack of appreciation for the existence of the relationship. However, the status quo could also be attributable to the general limited focus on, and attention to construction marketing by contractors.

Clients are using H&S criteria to pre-qualify GCs. However, they are currently using 'lower level' criteria, such as registration for compensation insurance, programme, and policy. These findings reinforce the direct role of optimum H&S in construction marketing.

The TQM related H&S phenomena, which have contributed to the acquisition of work, or additional work, clearly indicate the indirect role and benefits of optimum H&S in construction marketing. In essence, optimum H&S does provide 'better practice' H&S GCs with a competitive edge, and increases their attractiveness to clients.

RECOMMENDATIONS

'Better practice' H&S GCs should continue to enhance their H&S related practices to maintain and enhance their competitive advantage through the optimisation of cost. Furthermore, construction contractors and manufacturers should include or increase their focus on H&S in their marketing mix, in particular relative to product or service, promotion, and distribution.

However, contractor associations should promote the relationship between and importance of H&S relative to marketing. Furthermore, client associations should promote interventions that engender commitment to H&S by contractors.

REFERENCES

- Anderson, J (1997) The problems with construction. *The Safety and Health Practitioner*, May, 29 - 30.
- Compensation Commissioner (2003) *Report on the 1998 Statistics*, Pretoria.
- Hinze, JW (1994) Quantification of the indirect costs of injuries. In: R. Issa, RJ Coble and BR Elliott (eds.) *Proceedings of the 5th Annual Rinker International Conference on Safety and Loss Control*, Gainesville, Florida, 357 – 370.
- Lavender, S (1996) *Management for the construction industry*. Harlow, Essex: Addison Wesley Longman Limited.
- Levitt, RE and Samelson, NM (1993) *Construction Safety Management*. New York: John Wiley & Sons, Inc.
- Movement for Innovation (M4I) (2003) *A Commitment to People "Our Biggest Asset"*. http://www.rethinkingconstruction.org/rc/publications/reports/rfp_report.pdf
- Republic of South Africa (2003) *Government Gazette No. 25207 Construction Regulations 2003*. Pretoria.
- Rowlinson, S (1997) *Hong Kong Construction – Site Safety Management*. Hong Kong: Sweet & Maxwell Asia.

- Smallwood, JJ (1996) The role of project managers in occupational health and safety. *In*: LM Alves Dias and RJ Coble (eds.) *Proceedings of the First International Conference of CIB Working Commission W99 Implementation of Safety and Health on Construction Sites*, Lisbon, Portugal, 227-236.
- Smallwood, JJ (2000) *A study of the relationship between occupational health and safety, labour productivity and quality in the South African construction industry*. Unpublished PhD Thesis. University of Port Elizabeth, Port Elizabeth.
- Smallwood, JJ (2004) The influence of clients on contractor health and safety (H&S) *In*: (eds.) *Proceedings of the ARCOM Conference*, Edinburgh, – September, .
- Smallwood, JJ and Haupt, TC (2005) *Research Release 05/02/01 Impact of the Construction Regulations*. Cape Peninsula University of Technology and Nelson Mandela Metropolitan University.
- South African Reserve Bank (2003) *Quarterly Bulletin*. Pretoria: South African Reserve Bank.
- Tang, SL, Lee, HK, and Wong, K (1997) Safety cost optimization of building projects in Hong Kong. *Construction Management & Economics*, 15 (2), 177 – 186.
- The Associated General Contractors of America (AGC) (1992) *An Introduction to Total Quality Management*. AGC: Washington, D.C.
- The Business Roundtable (1995) *Improving Construction Safety Performance Report A - 3*. New York: The Business Roundtable.
- Smallwood, JJ (2004) Optimum cost: The role of health and safety (H&S). *In* (eds.) *Proceedings of the International Cost Engineering Council 4th World Congress*, Cape Town, 17 – 21 April, CD-Rom Smallwood-J - Optimum Cost-Health & Safety.pdf
- Rwelamila, PD and Smallwood, JJ (1999) Appropriate project procurement systems for hybrid TQM. *Proceedings*, Second International Conference of CIB Working Commission W99. Implementation of Safety and Health on Construction Sites, Honolulu, Hawaii (edited by Singh, A, Hinze, JW and Coble, RJ), 87-94.
- Dreger, GT (1996) Sustainable development in construction: Management strategy for success. *Proceedings*, 1996 CIB W89 Beijing International Conference: Construction Modernization and Education, Beijing. CD Rom file: //D1/papers/160-169/1633/.163.htm.
- Fryer, B (1997) *The Practice of Construction Management*. 3rd Edition. Oxford: Blackwell Science.
- Hinze, JW (1997) *Construction Safety*. New Jersey: Prentice Hall Inc.