

## **PREVENTING 'ACCIDENTS' IN CONSTRUCTION**

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### **Introduction**

Fatalities, injuries, and disease continue to occur in South African construction and the recent Tongaat Mall collapse resulted in a frenzy of media attention, only to dissipate similar to a spent firecracker. Needless to say various stakeholders are interested in the causes, and the Department of Labour has investigated and will continue to investigate the 'accident'. The question is: 'What will the findings be?'

Fatalities, injuries, disease, and inadequate H&S, non-compliance included, will continue to occur till such time that the following are a feature of, and / or optimised in the South African construction industry.

### **'Failure of management' versus 'Accident'**

There is no such thing as an 'accident' (Myth)! Traditional definitions include, among other: 'An unplanned event'. Are 'accidents' unplanned? Absolutely not! Any review will indicate that they are meticulously planned by default i.e. through actions and or omissions. Consequently, given that the five functions of management work are planning, organising, leading, controlling, and coordinating, then unplanned events such as 'accidents' = 'failure of management' (Reality). Effectively, the aforementioned is a philosophy and constitutes a state of mind. However, the term management must not be construed to apply solely to contractors, as there is a management echelon in all built environment stakeholder organisations, including client, project manager, designer, and quantity surveyor.

### **Construction is not inherently dangerous**

The myth that 'construction is inherently dangerous' or 'accidents are part of the job' implies that there is nothing that can be done to mitigate hazards and risk. This is not the case, as strategies, systems, procedures, and protocol can mitigate or even eliminate hazards and risk.

### **Risk management**

There are numerous risks in construction, H&S included. However, the built environment is not renowned for risk management. This lack of aversion to risk does not complement construction H&S. Project managers, principal agents, and construction managers especially should adopt a formal risk management process, and as in the case of H&S hazards and risks, quantify the risks, rank, and evolve appropriate responses where required.

### **Respect for people and 'People are our most important resource'**

Respect for people is the catalyst for the value 'people are our most important resource'. However, poor welfare facilities on site, among other, are not a manifestation of respect for people. This value is critical as it is the catalyst for H&S culture. It must be remembered that supervisors and workers that are exposed to hazards and risk are people that have a body, mind, and a soul. They invariably have a partner, a family and are derived from a community. In essence, such a value is the foundation for H&S and sustainability of an organisation.

### **Optimum H&S culture**

The catalyst for H&S culture is the value ‘people are our most important resource’. Such a value will engender a vision of a ‘fatality, injury, and disease-free work place’. Such a vision requires a complementary goal of ‘zero deviations’. To realise a goal of ‘zero deviations’, requires ‘continual improvement’ – the mission. A higher-level purpose is necessary for an optimum H&S culture – ‘sustainability of the organisation’, and for that matter, ‘sustainability of the industry’. The reason being there needs to be a rationale for H&S endeavours when fatalities, injuries, and disease are no longer occurring. In effect, H&S is a means to the end, not an end in itself.

### **Optimum status for H&S – H&S is a value not a priority**

The passé paradigm of cost, quality, and time is a critical mind set yet to be dispensed with. The continued citing of the traditional three project performance parameters as the set of criteria by which projects’ success is measured marginalises H&S and confirms ignorance with respect to the synergistic role H&S plays in overall project performance. Such citing also marginalises H&S culture, and reflects a lack of respect for people.

Furthermore, often H&S is referred to as a priority. Given that priorities may change on a daily basis, H&S should be a value i.e. H&S must always be the first consideration and all activities must be ‘structured around it’.

### **Planning**

Planning is a hallmark of the built environment and relevant to all built environment disciplines. In terms of construction, the maxim ‘construction is 80% planning and 20% execution’ is an understatement. Furthermore, ‘H&S does not happen by chance, it must be planned’.

However, there are many facets to ‘planning for construction H&S’. Completeness of design facilitates construction planning for H&S. Then, design hazard identification and risk assessments (HIRAs), a form of planning, are required to mitigate the use of hazardous materials and undertaking of hazardous processes. Such HIRAs are a prerequisite for preparing H&S Specifications, which should include residual hazards and risks i.e. those remaining after conducting HIRAs. Designers may also need to prepare ‘design and construction’ method statements which inform, among other, with respect to temporary works and related interventions to assure the integrity of temporary works and the structures. Clients’ requirements, a form of planning, should also be included in such H&S specifications. Contractors’ H&S Plans should respond to such H&S Specifications and such response should reflect in the tender documentation i.e. in the form of budgeting. However, adequate financial and other resource budgeting is not facilitated by the competitive tendering system, the obvious solution being the inclusion of comprehensive ‘H&S’ preliminaries.

Construction planning for H&S commences during the pre-tender stage, followed by the pre-contract stage, which provides the foundation for construction stage planning for construction H&S. Pre-tender and pre-contract HIRAs, programmes, site layouts, generic method statements, and temporary works designs are obvious focus areas in terms of integrating construction H&S into the future construction process. Following adjustments during the pre-contract phase the aforementioned need to translate into daily actions such as HIRAs, focused planning of construction activities, and coordination.

### **The six stages of projects and H&S**

Historically, construction H&S has been viewed as the contractor’s problem. However, a brief review indicates the influence of all project stakeholders on construction H&S during the six stages of projects: project initiation and briefing; concept and feasibility; design development;

tender documentation and procurement; construction documentation and management, and project close out. A brief upon initiation that includes a planned 100 storey office block presents challenges and opportunities in terms of H&S. Given that it is likely to entail a structural steel frame, the challenge of extensive work at elevated heights presents itself. However, the opportunity exists to drop AC ducting and cable tray suspension rods (hangars) through holes drilled in the corrugated decking which is to receive a concrete overlay i.e. permanent formwork to the slabs. This mitigates having to drill holes in the soffit of reinforced concrete slabs in the case of a reinforced concrete framed structure to insert anchors to receive such rods. The concept of natural stone cladding panels has implications for construction H&S during their attachment to the frame. The specification of materials that contain hazardous chemical substances during design development and for that matter tender documentation and procurement has implications for construction H&S. The extent to which construction H&S is included as a criterion for selection of contractors and budgeting for H&S is facilitated, has obvious implications for construction H&S. The linkage between the management of the physical construction process and its related activities and construction H&S is obvious. Project close out includes activities such as the handing over of the H&S File including as built and as laid drawings, the latter including the 'as laid' position of electrical cables and gas lines.

### **Construction is a Science, Art, and a Profession / Sound Construction Management**

Management skills and the application thereof are a pre-requisite for optimum H&S. The five functions of management work, namely planning, organising, leading, controlling, and coordinating are necessary to realise among other the development of objectives, strategies, systems, procedures, and protocol.

Management and integration of project resources (Smallwood, 2006) are also a pre-requisite for H&S – these include: management; supervision; labour; surface and core competencies; information; technology; innovation; subcontractors; plant and equipment, and materials.

One of the many challenges in terms of construction H&S is the limited 'barriers to entry'. The establishment of Construction Management programmes at traditional universities in the 60's and 70's was the result of an identified need therefore. Such programmes focus on three streams, namely economics, management, and science and technology, all of which are required to manage the business of construction and projects, construction H&S included. An example includes the subject 'Structures', which empowers graduates to design temporary works such as support work and formwork, and scaffolding.

### **Tertiary Built Environment education that addresses construction H&S**

Given the impact of the six stages on, and the role of all built environment stakeholders in construction H&S, a pre-requisite for optimum H&S, including appropriate status, is the inclusion of H&S in the tertiary education of all built environment disciplines. The reason being that education is a pre-requisite for awareness, sensitisation, commitment, and the development of an optimum H&S culture, and the required competencies to contribute to, as opposed to marginalise, construction H&S.

However, the reality is that with the exception of construction management programmes, which address construction H&S to varying degrees, tertiary built environment education addresses construction H&S to a limited extent, if at all - architecture, engineering, interior design, landscape architecture, and quantity surveying.

### **Sound core and surface competencies**

Competency and more specifically, 'competent' person is frequently referred to, and certainly within legislation, regulations, and standards. The draft 2013 South African Construction Regulations make reference to knowledge, training and experience, and where applicable qualifications specific to the work or task. However, Sanghi (2004) suggests that competencies are divided into two categories: the surface, which are required to be at least effective, and core, which distinguishes superior performance from average performance. The surface competencies are:

- Knowledge: information regarding content, and
- Skills: ability to perform a task.

The core competencies are:

- Self-concept: values, aptitude, attitude, and self-image;
- Traits: self-confidence, team player, and handles ambiguity, and
- Motives: focus on client success, and preserves organisation / personal integrity.

Although the surface competences are important, it is core competencies that are invariably critical in a dynamic environment such as construction. Examples include values, aptitude, ability to handle ambiguity, and preservation of integrity.

### **Integration of design and construction**

There are two issues in terms of the integration of design and construction, namely the influence of design on construction H&S, and the type of procurement system.

Design influences construction directly and indirectly. Directly, through design, choice of structural frame, details, method of fixing, constructability, and specification of materials and finishes. Indirectly, through choice of procurement system and conditions of contract, procurement, decision regarding project duration, and reference to H&S on various occasions.

Certain procurement systems such as design-build promote the integration of design and construction. Optimum integration engenders and enhances H&S as it facilitates contractor contributions to the design process. Furthermore, designing for H&S is one of sixteen design for constructability principles – contractors can contribute substantially to designing for constructability.

### **Quality and Quality Management Systems**

Phil Crosby (1979) presents the four absolutes of quality as: definition – conformance to requirements; performance standard – zero defects; system – prevention, and measurement – price of non-conformance. These absolutes apply unequivocally to H&S. Firstly there are numerous H&S requirements contained in, among other, legislation, standards, and H&S Specifications, that need to be conformed with. Secondly, the obvious performance standard relative to H&S is zero accidents. However, it is the deviations that create the opportunity for incidents, the outcome of which is fortuitous, either minor, moderate, major, or catastrophic. Thirdly, the system is certainly prevention as opposed to appraisal or inspection. Although inspections play a role in H&S and quality, unlike in the case of brickwork which can be demolished and re-built, once an arm is severed it is severed! Fourthly, in terms of measurement, the cost of accidents (COA) is ideal as all stakeholders can relate thereto and it can be expressed as a percentage of the cost or value of a project or the value of completed construction on a macro scale. In South Africa this was estimated to be between 4.3% and 5.4% of the value of completed construction, whereas the cost of implementing H&S is estimated to be between 0.5% and 3% of project costs (Smallwood, 2004).

Furthermore, a documented Quality Management System (QMS) complements H&S as it, among other, documents the systems, procedures, and protocol required relative to the design, procurement, and construction processes. Furthermore, adopting a formal standard approach to activities assures an optimum outcome and prevents issues being overlooked.

### **Health and Safety Management Systems (H&SMSs)**

The elements of an H&SMS provide the framework for the management of H&S, namely policy, planning, implementation and operation, checking and corrective action, and management review. However, given the relationship between quality and H&S, the use of a documented QMS or an integrated management system, will complement H&S as it will require the following of procedures relative to, for example erecting and striking of support work and formwork.

### **‘H&S is a profit centre’**

Given that the COA is estimated to be between 4.3% and 5.4% of the value of completed construction, whereas the cost of implementing H&S is estimated to be between 0.5% and 3% of project costs, clearly H&S is a profit centre’ (Smallwood, 2004).

However, the synergy between construction H&S and the other eleven project parameters (Smallwood, 2006) results in further financial benefits: environment; cost; developmental criteria; environment; productivity; public H&S; quality; time; client satisfaction; design team satisfaction, and worker satisfaction.

### **Elimination / Mitigation of ‘excusitis’**

Schwartz (1995) maintains unsuccessful people suffer from a mind deadening thought disease called ‘excusitis’. Every failure has the disease in its advanced form. However, the more successful the individual, the less inclined he / she is to make excuses. Schwartz also cites a traffic engineer’s contention that there is no such a thing as a true accident. An accident is a result of human or mechanical failure, or a combination of both – nothing happens without a cause. Consciousness and mindfulness will avert the development of ‘excusitis’ due to the lack of necessity.

### **Consciousness and mindfulness**

Consciousness can be defined as “the perception and awareness of sensations, which will be related to particular intentions.” and “the awareness of sensations, namely seeing, hearing, smelling, tasting, touching and cognising; the basic climate of the mind from moment to moment.” (Payutto, 1999). It is important to note that consciousness is fashioned into specific qualities by intention.

Through self-observation a person can see, be aware, and in control of his / her own body or mind-mindfulness. This includes awareness of mind movement - thoughts, and awareness of the constant changes of all mental phenomena resulting in intuitive wisdom, which in turn averts clinging to conditioned phenomena that would lead to suffering (Tanphaichitr, 2001).

Support work can be used to explain the role of optimum consciousness and mindfulness. The intention to realise optimum H&S will engender optimum observation and cognising relative to inadequate support work - consciousness. Mindfulness will result in, among other, intuitive wisdom, which will prevent clinging to the conditioned phenomenon of cost i.e. reducing the centres of standards or omitting bracing to reduce cost, which could result in a collapse and suffering of workers.

## **Conclusions**

There is an unhealthy ‘culture’ in the form of: a lack of respect for people; the focus on cost, quality, and time; ‘excusitis’; ‘construction is inherently dangerous’; ‘accidents happen’, and ‘H&S costs money’.

A pre-requisite for the realisation of optimum status for, and focus on H&S are respect for people, values, H&S culture, and competence, which in turn requires comprehensive tertiary built environment education, which includes construction H&S. The aforementioned, in tandem with a focus on risk management, planning, and integrated multi-stakeholder contributions throughout the six stages of projects, appropriate procurement underpinned by quality and H&S management systems, and sound management, will realise optimum H&S, provided there is a level of complementary consciousness and mindfulness.

## **Recommendations**

A paradigm shift is necessary in terms of how construction H&S is viewed and promoted. Legislation constitutes a template; however, ‘people are our most important resource’ and ‘H&S is a profit centre’ represent rallying points. The Council for the Built Environment and its constituent Councils and related Voluntary Associations must act.

Built environment tertiary education must address construction H&S in the form of the strategies, systems, and interventions related to the respective disciplines, which must be reviewed during accreditation visits by the respective Councils. Despite the promulgation of the Construction Regulations on 18 July 2003, this is still an issue! Furthermore, current inadequacies in terms of built environment practitioners’ H&S competencies must be addressed through continuing professional development (CPD).

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