BEHAVIOUR-BASED HEALTH AND SAFETY MANAGEMENT IN CONSTRUCTION:
A LEADERSHIP-FOCUSED APPROACH

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DECLARATION OF ORIGINAL AUTHORSHIP

I, VICTOR NNANNAYA OKORIE, on this day 8th of December 2014 declares that:

- The work in this thesis is my personal effort;
- Sources used or referred to have been acknowledged, and
- The thesis has not been submitted in full or partial fulfilment of the requirements for a qualification at any other university.

Signed…… V.N.Okorie………………………………………………
ABSTRACT

The construction industry remains a pillar in the South African economy, generating employment and wealth. Nonetheless, the industry is reportedly bedevilled by a high rate of accidents and serious injuries that often lead to permanent deformation and fatalities among workers and the general public. These accidents and injuries manifest due to poor construction health and safety (H&S) performance that is often related to poor H&S leadership of the key project leaders involved in the construction business.

Shortcomings pertain to client leadership in terms of involvement and commitment to H&S and project H&S related decisions of professionals (designers, project managers, quantity surveyors and engineers). They also pertain to contractor related aspects such as H&S management systems and leadership at all levels of management. In addition, contractors’ inadequacies of H&S management relative to workplace planning and materials related issues have continued to marginalise H&S performance in construction.

The H&S leadership of key project leaders is very important in creating a culture of H&S in the workplace. This study examined the H&S management practices and leadership of the key project leaders that contribute to at-risk work practices or unsafe behaviour of workers. Presently, there is limited or no research in South African construction on how the H&S leadership of the key project leaders contributes to at-risk work practices or unsafe behaviour of workers.

The methodology employed in the study included an extensive review of relevant literature, which enabled the field work to proceed unhindered. The quantitative survey and qualitative inquiry was conducted with the key construction participants in South African construction. Focus group discussions and interviews were used in a complementary manner. Accordingly, the sampling technique for the study comprised simple random and purposive sampling. The study revealed
apparent poor leadership and lack of involvement and commitment to workers’ H&S by the key project leaders. Notably, there is statistical evidence of poor H&S management practices among contractors in terms of top management commitment to and involvement in project H&S. This statistical evidence includes poor H&S education and training of workers and lack of workers' involvement and participation in H&S matters, which is the tenet of behaviour-based H&S management.

The model of leadership influence on worker H&S behaviour developed in this research constitutes an innovative contribution to construction H&S performance improvement through a leadership-focused approach. The study has established a basic level of awareness and understanding among key project leaders in that their upstream decisions during the project planning and construction phases have significant influence on workers’ safe or unsafe behaviour or at-risk work practices. The study strongly advocates transparent leadership, ethical behaviour among clients in public and private sectors, designers’ critical H&S decisions, project managers’ and quantity surveyors’ commitment towards project H&S and contractors’ adoption and implementation of behaviour-based H&S management systems. The developed leadership influence model of worker H&S behaviour in the study provides a useful guide for the key project leaders to realise the desired H&S performance improvement in the South African construction industry.

**Keyword:** Accidents, Behaviour-based safety, Construction, Health and Safety, Leadership, South Africa
LIST OF PUBLICATIONS

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DEDICATION

First, I dedicate this work to Almighty God, who is greater than all other gods and who perfects all perfections.

Second, the thesis is dedicated to late Chief H.I. Oti and late Sgt. F. Nvene, may their gentle souls continue to rest in perfect peace.

The thesis is also dedicated to my children, V.O. Okorie, J.I. Okorie and M.C. Okorie.
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ABBREVIATIONS

BBH&S: Behaviour-based health and safety
BBS: Behaviour-based safety
BoQ: Bill of Quantities
BEBOK: Built Environment Body of Knowledge
cidb: Construction Industry Development Board
CII: Construction Industry Indicators
CoA: Cost of Accidents
DoL: Department of Labour
ERIF: Employee Recordable Injury Frequency
EU: European Union
FEMA: Federated Employees Mutual Assurance
GDP: Gross Domestic Product
GCs: General Contractors
HIPL: Hazard Information and package Label
H&S: Health and Safety
HSE: Health and Safety Executive
ILO: International Labour Organisation
LTIs: Lost Time Injuries
MSDS: Material Safety Data Sheet
MSDs: Musculoskeletal Disorders
NHBRC: National Home Builders Registration Council
NIHL: Noise Induced Hearing Loss
NSW: New South Wales
OHSC: Occupational Health and Safety Certificate
**OH&SA:** Occupational Health and Safety Act

**PCs:** Principal Contractors

**PM:** Project Managers

**PMI:** Project Management Institute

**PPE:** Personal Protective Equipment

**PPPFA:** Preferential Procurement Policy Framework Act

**R&D:** Research and Development

**SACPCMP:** South Africa Council for the Project and Construction Management Professions

**SAFCEC:** South African Federation of Civil Engineering Contractors

**SCs:** Subcontractors

**S-O-R:** Stimulus-organism-response

**S-R:** Stimulus-response

**TRIF:** Total Recordable Injury Frequency

**TPB:** Theory of Planned Behaviour

**UK:** United Kingdom

**USA:** United States of America

**WHO:** World Health Organisation
DEFINITION OF TERMS

**Accident:** An unplanned event, generally with negative consequences that may or may not be associated with property damage or an injury (Hinze, 2006: 325).

**Attitude:** The psychological tendency that can cause an individual to behave in a particular way in a certain situation (Hughes and Ferrett, 2009: 2).

**At-risk work practice:** Behaviour exhibited by worker at workplace, knowing that such behaviour could put himself or another at risk (Brauer, 2006: 521).

**Behaviour:** The aggregate of all the responses made by an organism in any situation (Theron, 2003:12). The way in which a person or one acts or conducts himself/herself towards others that can directly or indirectly impact on their behaviour (Yukl, 2010: 321).

**Behaviour-based safety:** A management approach that seeks to identify critical H&S related behaviour, measure and analyse all the cases of at-risk behaviour of workers and develop action plans for performance improvement (Lees and Austin, 2011: 3).

**Culture:** Shared behaviour, norms, values and material objects that encompass what people create to express values, attitudes and norms (Howarth and Watson, 2009: 147).

**Critical H&S behaviour:** Careful evaluation of decisions and actions in response to H&S matters as way to improve performance (Hughes and Ferrett, 2009: 352).

**Employer:** Any person who employs or provides work for any person and remunerates or expressly or tacitly undertakes to remunerate that person, which excludes a labour broker as defined in section 1(i) of the Labour Relations Act, 1956 (Republic of South Africa, 2003: 4).

**Employee:** Any person who is employed by or works for an employer and who receives or is entitled to receive remuneration or who works under the direction or supervision of an employer or any other person (Republic of South Africa, 2003: 4).
Hazard: A condition with the potential of causing an accident or ill health (Hughes and Ferrett, 2009: 2), or potential situation that may cause unintentional injury or death to people or damage to, or loss of an item or belonging (Lingard and Rowlinson, 2005: 112).

Health: The protection of body and mind of people from illness resulting from materials, processes or procedures used in the work place (Forbes and Ahmed, 2011: 21).

Injury: Damage or harm to the structure or function of the body caused by acute exposure to a physical agent or force (Hughes and Ferrett, 2009: 2).

Incident: An unplanned event that has a probability of resulting in an accident or injury or in property damage (Howarth and Watson, 2009: 25).

Key participants: The construction team that comprises client, designer, project manager, quantity surveyor and contractor (Fisk and Reynolds, 2011: 3).

Leadership: The ability to establish vision and direction, to influence and align others towards a common purpose and to empower and inspire people to achieve organisational goals (Achua and Lussier (2010: 12). A process of social influence that is enacted by individuals in formal positions of power or leadership positions within an organisation, such as Minister of Works as a client, a senior architect, project manager, quantity surveyors, directors, managers and supervisors (Northouse, 2010: 3).

Performance: An evaluation of how well individuals, groups of individuals or organisations have to do in pursuit of a specific objective (Hughes and Ferrett, 2009: 2).

Workplace: Any place where an employee is or is likely to be engaged in any occupation. This includes any vehicle or mobile equipment used or likely to be used by an employee in an occupation (Hughes and Ferrett, 2008: 21).

Safety: The protection of people from physical injury (Hughes and Ferrett, 2009: 2).

Stakeholders: The clients, designers, project managers, quantity surveyors, construction managers, and contractors (Forbes and Ahmed, 2011: 12).
CHAPTER ONE: ORIENTATION OF THE STUDY

1.1 INTRODUCTION

In undertaking any research, it is necessary to establish the need for the study and clearly set out the intentions of the research. Thus, this chapter presents the intentions of the research upon which the research outcomes can be assessed. It presents the background to the study, its problem statement, scope, assumptions, importance and objectives. The chapter also briefly discusses the lack of leadership in health and safety (H&S) management, H&S as a social and moral responsibility, the cost of accidents, construction industry contribution to the gross domestic product (GDP) and the construction industry performance in South Africa. The chapter ends with the structure of the thesis.

1.2 BACKGROUND OF THE STUDY

The poor H&S performance of the construction industry worldwide continues to engender an excessive number of fatalities and injuries in the sector (cidb, 2009: ii). These injuries and fatalities persist due to poor leadership and limited involvement of clients and their consultants in H&S, poor site H&S management and poor H&S culture among key project leaders (Coble and Haupt, 1999: 904; Hinze, 2006: 21; Chinda and Mohammed, 2008: 114). It is notable that the variety of activities found on construction sites, combine to make the industry one of the most hazardous to work (Hinze, 2006: 102; Zohar and Erev, 2007: 122; Smallwood, 2008: 4). Risks show that the industry has more dangerous work places when compared to other industries. These include hazardous chemical substances, dust from wood, bricks, blocks, cement and concrete, and site noise alluded to by construction workers. The industry is noted for its hazardous nature. Workers face these risks
every day of their working lives. For example, construction workers experience noise-induced hearing loss (NIHL), dermatitis, occupational cancers and respiratory diseases (Brauer, 2006: 56; Choudhry, 2007: 54). In the United Kingdom (UK), almost 100 000 workers suffer from musculoskeletal injuries, while 750 construction workers die each year due to asbestos related diseases (Hughes and Ferret, 2009: 231; HSE, 2011: 2).

However, the hazardous nature of the industry should not be a justification for poor H&S performance. Luria (2011: 1288) and Lu and Yang (2010: 124) argue that the causes of at-risk work practices or unsafe behaviour of workers can be mitigated through effective leadership and behaviour change of project leaders. Thus, it can be argued that improvement of H&S performance in the industry is largely dependent upon leadership. Leadership has been found to be a key component of safe organisation. However, project leaders lack the leadership qualities that can bring about the desired behavioural change at all levels of management. On this note, Naoum (2011: 151) states that limited involvement and lack of commitment to workers’ H&S by key project leaders are manifestation of poor leadership, which lead to a high rate of site accidents and incidents.

Ali (2006: 21) states that the construction industry alone produces 30% of all fatal industrial accidents across the European Union (EU). It also produces 30-40% in the United States of America (USA), 50% in the Republic of Ireland and 25% in the United Kingdom (UK). Lund and Aaro (2004: 1) and Hamid, Majid and Singh (2008: 2) maintain that the number of fatalities in construction are only the tip of the iceberg when compared to the thousands of serious injuries that lead to loss of time in the industry.

In South Africa, the Construction Industry Development Board (cidb) (2009: 3) reports that the industry has a poor H&S performance record. Accidents in the industry are among the highest in all industry sectors, resulting in a third of all work fatalities. During the period 2007 to 2008, the
construction industry experienced 160 fatalities and 1400 disabilities. In addition, there were over 120000 days lost due to injuries and the total cost to the industry was in excess of R300 million (cidb, 2009: 3). This state of affairs is not peculiar to South Africa as poor construction H&S performance is often cited as a global phenomenon. Relying on global statistics, the International Labour Organisation (ILO) (2005: 2) reports that:

- Each year there are at least 60000 fatal accidents on construction sites;
- One in every six fatal accidents at work occurs on construction sites;
- In industrial countries, as many as 25 to 40% of work-related deaths occur on construction sites even though the sector employs only 6 to 10% of the workforce, and
- In some countries, it is estimated that 30% of construction workers suffer from back pain or musculoskeletal disorders (MSDs).

Apart from the human cost, the economic effects of accidents can be devastating (Brauer, 2006: 23; Cooper, 2009: 36; Coke and Sridhar, 2010: 135). Even though the direct cost of accidents such as injuries, illness or property and equipment damage can be insured against, these direct costs are trivial when compared to the indirect costs of an accident. Thus, poor H&S leadership of project leaders can cause numerous negative consequences, especially financial losses. McAleenan (2010: 56) points out that for every £1 of accident cost that an insurance company has to pay out; a contractor could incur £50 to £100 in indirect costs. According to Hinze (2006: 45), the indirect costs range from product and material damage to legal costs. These costs are often paid by clients and, overall, they have a detrimental effect on the national economy.

Documented research findings by Smallwood (2006: 2) and Choudhry (2007: 55) indicate that to achieve a sustained improvement in construction H&S performance, concerted efforts are required by key project leaders. In the same manner, Haslam, Hide, Gibb, Gyi, Pavitt, Atkinson and Duff (2005: 404), Gibb, Hide, Haslam, Hide, Gyi and Duff (2005: 5), Sherratt and Farrell (2012: 374) maintain that optimum H&S performance depends largely on effective leadership at all levels of
management. In addition, a strong H&S culture is needed in the construction industry for effective and efficient management of workers’ H&S. H&S culture entails commitment, involvement and participation of the key project leaders.

In South Africa, a gap exists between effective leadership of the key project leaders in H&S management and its positive impact on industry performance. Notably, previous research work focused on causes of site accidents and occupational safety such as:

- Occupational safety (Matthysen, 1984: 10);
- The role of project managers in construction H&S (Smallwood, 1996: 227);
- Implementation of H&S on construction sites (Coble and Haupt, 1999: 211);
- The cost of construction accidents (Pillay and Haupt, 2008: 268);
- The economic and social impact of site accidents (Mthalene, Othman and Pearl, 2008: 78);
- A model to improve the effectiveness of the occupational H&S inspectorate (Geminiani, 2008: 23), and
- The impact of H&S culture on construction site performance (Okorie and Smallwood, 2010: 380).

Set against these previous studies, this gap may be connected to clients’ poor H&S leadership and behaviour, designers H&S critical decisions and project managers poor H&S leadership in terms of project H&S plans, coordination, integration and monitoring. It may also be connected to quantity surveyors poor H&S leadership relative to inadequate financial provision for H&S in the bills of quantities (BoQs) and contractors H&S management inadequacies and poor leadership at all levels of management.

However, documented research findings (Behm, 2005: 2; Hinze, 2006: 102; Huang and Hinze, 2006: 2; Suraji, Duff and Peckitt, 2006: 1; Chinda and Mohammed, 2008: 2; Musonda and Smallwood, 2008: 2; cidb, 2009: 39) maintain that clients, designers, project managers, quantity
surveyors and contractors can contribute to an improvement in construction H&S performance. Krause (2003: 45) contends that the ultimate success of construction project H&S improvement is dependent upon the leadership of key project leaders. Similarly, Hinze (2006; 123) points out that unsafe conditions and unsafe acts on site that give rise to accidents are caused by the ineffective leadership and lukewarm attitudes of clients and their professional consultants toward workers’ H&S improvement. The required change must originate from the key project leaders as the creator of work environments.

On this note, Hopkins (2008: 584) argues that focusing on unsafe acts of workers as the only cause of poor H&S, without considering the critical H&S related behaviour of clients, designers, project managers, quantity surveyors and contractors, may not result in significant performance improvement over time. In a similar manner, Wu and Fang (2012: 3) maintain that behaviour-based H&S management systems are likely to have their greatest impact if directed upwards. This is because it is the behaviour of the key project leaders that is most critical in creating and sustaining a positive H&S culture in an organisation. Thus, effective leadership at all levels becomes critical for optimal H&S performance in the industry. The ILO (2007: 2) observes that occupational accidents can be prevented and it is everyone’s responsibility to help prevent them. They further observe that an H&S management system approach and culture at work is not only an ethical imperative, but it makes ‘dollars and sense.’ It is believed that visible leadership and active commitment to H&S by the key project leaders would lead to a healthier and safer construction industry. Given that leadership is the single most important factor that determines success or failure of an organisation (Krause, 2003: 45; Hopkins, 2006:584), this research seeks to examine the relevance of leadership for effective H&S management in the South African construction industry.
1.2.1 Poor H&S leadership in H&S management

Studies of leadership in the context of construction H&S management are not common. A few of these studies according to Cooper (2010: 15) and Lees and Austin (2011: 45) have focused on direct investigation of the roles of site managers as team leaders and the range of managerial styles they adopted in managing site operations. Leadership of site managers or the contractor’s H&S management system on their own cannot bring about the desired H&S performance improvement in the industry (Krause, 2003: 1). It is the leadership of the key project leaders according to Krause (1997: 12; 2003: 45), Haslam et al. (2005: 4), Cooper (2010: 16) and Lees and Austin (2011: 45) that can impact positively on workers’ H&S behaviour. Oloke (2010: 29) argues that there are fundamental differences between H&S leadership and H&S management. He further states that H&S leadership is a strategic function that involves the input of all the key project leaders during the project inception stages, while H&S management is an operational function of a contractor in terms of site H&S management. Thus, effective H&S management must start during project planning and at the design stages. Achieving this requires leadership skills and abilities from the key project leaders.

Leadership is not synonymous with management, although they share some common characteristics. For example, they are both concerned with influence, working with people and meeting goals (Northouse, 2010: 31). However, according to Achua and Lussier (2010: 41), management in particular is concerned with planning and budgeting (setting timetables and allocating resources), organising and staffing (establishing rules and procedures), and controlling and problem solving (developing initiatives and generating solutions). Leadership, on the other hand involves establishing direction (creating a vision by establishing strategies), aligning people with organisational goals (communicating goals and seeking commitment) and motivating and inspiring people to achieve organisational goals (empowering subordinates) (Achua and Lussier, 2010: 41;
Northouse, 2010: 32; Naoum, 2011: 152). Notably, these leadership qualities are lacking in the key project leaders and the consequences have been poor H&S performance in the industry.

However, the functions of management and leadership are interrelated. Despite the similarities, leadership is concerned with: group processes, personality, compliance, particular behaviour, persuasion, power, inspiring trust, people focus and correct performance (Luthans cited in Naoum, 2011: 152). It can be argued that the construction process requires leaders who inspire trust, exercise power where necessary and demonstrate honesty and integrity in their behaviour. A lack of these attributes among the key project leaders has engendered poor H&S performance in the industry. According to Naoum (2011: 177), poor leadership has been found to be a significant predictor of H&S outcomes in organisations and may be related to workers’ unsafe behaviour. In addition, studies conducted by Flin and Yule (2003: 45), Cooper (2010: 16) and Lees and Austin (2011: 46) have shown that there is a strong relationship between effective leadership and a positive impact on workers’ health, safety and well-being. Thus, effective H&S leadership among the key project leaders is highly desirable.

H&S leadership of the key project leaders, particularly in client organisations relative to the appointment of the design team and procurement processes, has come under serious scrutiny (cidb, 2011: 27). According to the cidb (2011: iii) reports on construction quality in South Africa, there are instances where contracts are awarded to contractors who are not capable of undertaking the necessary work. This indicates poor leadership and unethical behaviour in clients’ organisations. Oloke (2010: 30) states that clients’ visible leadership, commitment and active involvement are the critical factors that drive H&S management and culture. In addition, excluding H&S from project design is a manifestation of unethical behaviour and a lack of commitment to workers’ H&S by the designers. The cidb (2011: ii) reports that a successful procurement policy requires visible commitment and transparent leadership by the clients and their professional advisers. Poor leadership in both public and private sectors as noted in the cidb (2011: iii) report,
not only compromise construction quality but also increase the number of fatalities and serious injuries that have been reported on most of the sites around South Africa. Procurement barriers, design related problems, lack of integration and coordination of project H&S plans, non-facilitation of financial resources and inadequacies of H&S management in contracting organisations can be attributed to poor leadership and unethical behaviour of the key project leaders. These often result in site fatalities and injuries. Fourie (2009: 41) argues that poor leadership of the key project leaders has been associated with huge losses to the national economy, destruction of company assets and precious lives. Thus, leadership commitment towards workers H&S should permeate the key project leaders who can encourage sanity in overall project performance, H&S inclusive.

1.2.2 Health and safety as a social and moral responsibility

The bargaining power between employers and their employees is unequal (Lingard and Rowlinson, 2005: 20). Employees are usually in a disadvantaged bargaining position and the possibility exists for various forms of human exploitation. It is therefore important to recognise that employees have certain rights that should be respected. One such right is the right to H&S in the workplace. Brauer (2006: 23) holds the view that a right may be understood to be a ‘moral claim’. In this context, Brauer (2006: 23) believes that rights are claims that correlate with certain duties on the part of the person against whom these rights are held. Thus, claims are reciprocal because one person’s right is also another person’s duty. An employee’s right to a healthy and safe workplace is an employer’s duty to provide (Brauer, 2006: 452).

The Occupational H&S Act (Republic of South Africa, 2003: 9) imposes duties and responsibilities on employers to provide and maintain a working environment without risk to the health of the employees. According to the ILO (2005: 1), no price can be put on human life. It is important to view employees’ rights to a healthy and safe workplace as a moral claim, something employers are morally obliged to do, even if it is not required of them by law or corporate policy. Kant (1981 cited
in Lingard and Rowlinson, 2005: 31) argues that it is morally wrong to see workers as mere objects or things to be used in order to attain corporate objectives. Internationally and in South Africa, researchers have shown that poor site H&S performance is often attributed to a low level of ‘respect for people’ in construction in which the workforce is treated as an instrument to attain organisational goals (Smallwood, 2004: 3; Brauer, 2006: 23; Choudhry, 2007: 22; Mthalane, et al. 2008: 21). It is the right time to rethink and have a change of behaviour towards workers’ H&S.

1.2.3 Cost of accidents

The cost implications of construction site accidents for clients and the national economy cannot be over emphasised. According to Hinze (2006: 32), the costs of accidents can be categorised as either direct or indirect. Direct costs tend to be associated with the treatment of an injury and any unique compensation offered to workers as a consequence of being injured (Brauer, 2006: 24; Hinze, 2006: 32). Similarly, Hinze (2006: 32) and Brauer (2006: 24) identify indirect costs as costs that are borne by contractors through:

- Reduced productivity of both returned worker(s) and the workforce;
- Clean-up costs;
- Replacement costs;
- Delay costs;
- Costs related to additional supervision;
- Costs of rescheduling;
- Costs of transportation, and
- Wages paid while the injured is idle.

The implication of the indirect cost of accident (CoA) to contractors affects their profit margins, which in turn indirectly impacts on the national economy. Research conducted in the UK by the Health and Safety Executive (HSE) (2005: 2) determined indirect CoA to be 11 times the direct costs.
Similarly, research conducted in South Africa by Smallwood (2004: 2) determined the indirect costs to be 14.2 times the direct costs. Furthermore, research conducted in the USA by Hibbert (2008: 21) suggests that the total CoA constitutes approximately 6.5% of the value of completed construction work. In addition, recent research conducted by the HSE (2011: 2) in the UK indicates that the total CoA could be approximately 8.5% of the tender price. Behm (2005: 2) argues that clients always bear the brunt of construction site accidents as contractors tend to recover the costs of these accidents through tenders that directly and indirectly impact on the national economy. It can be argued that visible leadership and commitment to workers' H&S by the key project leaders will result in a reduction of site injuries, illnesses and fatalities common to the industry.

1.2.4 Construction industry contribution to the Gross Domestic Product (GDP)

The GDP reveals the levels of activity of each industry in the national economy. The contribution of each industry indicates its performance in terms of employment, economic activity and contribution to national development. The Monetary Policy Committee (South African Reserve Bank, 2011: ii) reports that in the last decade, the infrastructure and building sectors’ GDP has been relatively low and stable. However, the GDP of the construction sector stood at 3% when compared to agriculture at 4.2% and 20% for the manufacturing sector. The Monetary Policy Committee report further noted that the construction sector activity expanded in the first quarter of 2010 but experienced a decline in the last quarter of 2010 due to the postponement of various infrastructure and building projects in all of the nine provinces of South Africa. The decline in the construction sector activity will have a negative impact on project performance including H&S.

However, the cidb (2011: 3) report ‘Construction quality in South Africa: a client perspective’ notes that the total investment in construction is expected to slow to R168 493m in the year 2013. It will contribute an average 8.2% to the GDP as against the 2009 GDP of 10.3%. Overall growth in the construction industry fell between 1% and 3% in 2011. Thus, an expected further slowdown in non-
residential investment will dampen growth in building investment (cidb, 2011: 3). According to cidb (2011: 3), the slowdown has negatively impacted the sector. However, based on key economic variables, investment in residential building is expected to increase by an average annual rate of 4.2% during the next four years between 2011 and 2014. The consequential increase in the building investment sector will provide an enabling environment to improve overall construction performance, including H&S.

1.2.5 Construction industry performance in South Africa

In most developing countries, the public sector is the major initiator and buyer of building and infrastructural development and maintenance (Kalidindi and Thomas, 2005 cited in Emuze, 2011: 5). According to Datamonitor (2009: 8), the contribution of the South Africa construction industry to the GDP equated to $9.2 billion in 2009. The sector grew by 11.7% in 2008 to reach this figure. Civil work experienced a significant growth with 61.6% of the total revenue, while non-residential building contributed 38.4%. It is forecasted that by 2013 the construction sector will have a value of $15.3 billion, an increase of 67.3% from the 2008 figures (Datamonitor, 2009: 17). However, the annual cidb survey of contractors, clients, consultants and other stakeholders who assess the industry performance in the form of construction industry indicators (CII) suggests that the performance of the industry is sub-optimal. For instance, a survey conducted to investigate the quality of construction work in South Africa from a public sector client perspective, revealed that clients are dissatisfied with 20% of all projects and 12% of the projects surveyed had various levels of defects (cidb, 2011: iii). It was noted that clients’ dissatisfaction was highest in the residential building sector, followed by special works and non-residential building (cidb, 2011: iii).

An investigation to determine factors contributing to the poor quality of construction works, indicate a number of lapses such as corruption, political interference, cronyism, nepotism, fraud, lack of transparency in tender and procurement methods and institutional barriers. The unethical behaviour
among public officers and elected politicians point to poor leadership. Notably, the poor leadership and unethical behaviour of public officers and elected politicians relative to construction works have negative impact on overall project performance including H&S.

Another significant issue of concern that is continuously highlighted in reports (cidb, 2008: ii; 2009: 2) is that of construction H&S, which is deemed to be worrisome on construction sites. For example, the 2009 report revealed that the industry recorded 1184 accidents and 160 fatalities in 2008. A comparison of the 2008 and 2009 reports did not indicate improvement. In fact, the cidb (2009: 9) reports that overall construction H&S is not improving significantly. The construction sector continues to contribute an excessive number of fatalities, injuries and disease relative to other industrial sectors (2009: ii). The cidb (2009: ii) notes general high levels of non-compliance with H&S legislation by contractors and, specifically, construction regulations, which constitutes a major challenge to the industry. Furthermore, the cidb report indicates that many public sector clients and some private clients are losing confidence in public officers and politicians. This is due to their inability to adhere to government construction procurement guidelines in the selection and appointment of contractors and consultants without the requisite competencies relative to H&S. The cidb further suggests that these constraints, together with political interference and leadership ineptitude in making critical decisions during early project planning and procurement, leads to contract abandonment, delays, disputes and often site accidents and incidents.

The cidb (2010: 3) CII's summary results: 2009 notes that the performance related problems particularly in the area of construction H&S are not peculiar to the South African construction industry. Fourie (2009: 8) states that the poor H&S performance of the industry, particularly in developing countries, is very unsatisfactory. Similarly, Misnan et al. (2008: 192) also report that the Malaysia construction sector is bedevilled with H&S problems. The Health and Safety Executive (HSE) (2010: 2) report on improving H&S in the construction industry noted that almost £67 billion had been spent on compensation for occupational accidents since 2006. It also noted that
compensation is estimated to cost £1.36 trillion dollars worldwide in the year 2012. The report further states that almost 20-30% of the total cost is related to construction accidents and unreported cases have yet to be accounted for. Therefore, these findings suggest that the problems identified in South Africa are not significantly different from the ones in Malaysia and other developing countries.

1.2.6 International H&S comparison

Construction is, by nature a hazardous, difficult, dirty and dangerous undertaking, especially in developing countries (Coble and Haupt, 1999: 906; ILO, 2008: 3). Coble and Haupt (1999: 905) and cidb (2009: 6) argue that the rate of site accidents and fatalities in the industry is high in terms of individual costs and human suffering when compared to developed countries. The cidb (2009: 6) reports that when comparing occupational accident rates between different regions in the world, the differences between the fatality rates and accident rates are amazing. Table 1.1 below presents occupational accidents by regions, indicating the disparity between developed and developing countries.
Table 1.1 Occupational fatality and accident rates

<table>
<thead>
<tr>
<th>Region</th>
<th>Fatality rate (per 100 000 workers)</th>
<th>Accident rate (per 100 000 workers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Established Market Economies: EME</td>
<td>4.2</td>
<td>3 240</td>
</tr>
<tr>
<td>Former Socialist Economies: FSE</td>
<td>12.9</td>
<td>9 864</td>
</tr>
<tr>
<td>Asia and Islands (excluding China and India): OAI</td>
<td>21.5</td>
<td>16 434</td>
</tr>
<tr>
<td>Sub-Sahara Africa (including South Africa): SSA</td>
<td>21.5</td>
<td>16 012</td>
</tr>
<tr>
<td>Latin America and the Caribbean: LAC</td>
<td>17.2</td>
<td>13 192</td>
</tr>
<tr>
<td>Middle Eastern Crescent: MEC</td>
<td>18.6</td>
<td>14 218</td>
</tr>
</tbody>
</table>

Source: cidb (2009: 6)

Table 1.1 indicates that Asia and islands have a fatality rate of 21.5 and 16 434 per 100 000 workers respectively. Sub-Sahara African countries (21.5 and 16 012), which consist mainly of developing countries, are much higher than the Established Market Economies (4.2 and 3 240 per 100 000 workers accident rates respectively) that consist of developed countries.

The disparity in construction H&S performance between developing and developed countries can be linked to many factors such as the extent of technological advancement, H&S management practices, poor leadership, existing H&S legislation and culture (Coble and Haupt, 1999: 905; Fourie, 2009: 35; cidb, 2009: 6). For example, in developing countries, unsafe conditions exist on many sites subjecting workers to numerous hazards (HSE, 2010: 1). Critical reviews of the causes of unsafe conditions and unsafe acts that exist in developing countries point to poor leadership and unethical behaviour of key project leaders. Furthermore, Haupt (2010: 150) argues that few training programmes exist for workers’ H&S; even induction for new workers is infrequently conducted. In addition, workers themselves show no signs of risk appreciation due to their negligence and low levels of education (Okorie and Smallwood, 2012: 351). Generally, in South Africa, H&S legislation to protect workers is inadequately enforced (Geminani, 2008: 27). Smallwood and Haupt (2006: 109) also cite lack of H&S competencies among clients, consultants and contractors as factors contributing to poor H&S in developing countries.
According to the ILO (2010: 2), Sub-Saharan Africa has a high rate of tropical infectious diseases such as malaria, tuberculosis, and intestinal worms. These tropical diseases have severe H&S implications for site workers. The prevalence of HIV & AIDS in Sub-Saharan Africa is a serious challenge to the whole of the African continent and the construction industry in particular. Research conducted in South Africa indicates that construction site workers have a much higher rate of HIV & AIDS infection than other sectors (Deacon 2006: 2).

1.3 PROBLEM STATEMENT

Concern with respect to poor construction site H&S performance has tended to focus attention exclusively on unsafe behaviour and unsafe acts in the form of mistakes, omissions and rule violations (Krause, 1997: 12; DeJoy, 2005: 1; Cox and Jones, 2006: 2; Geller, 2008: 37; Lees and Austin, 2011: 45). At-risk work practices and unsafe behaviour may be connected as site workers are always in the front line of physical on-site activities. According to Haslam et al. (2005: 326), workers' activities at operational levels expose them to the proximal cause of adverse events. Behaviour related to distant causal factors precipitates the at-risk behaviour of workers on site. This includes poor client H&S leadership and behaviour (Cox, Jones and Rycraft, 2004: 825; DeJoy, 2005: 105), project related H&S behaviour of consultants such as designers, project managers and quantity surveyors (cidb, 2009: 37), and contractor H&S management and leadership at all levels (cidb, 2011: ii; Lu and Yang, 2010: 123). A great deal of exposure to hazard and risk has already occurs. Each particular incident is triggered by key project leaders’ decisions leading to at-risk behaviour (Krause, 1997: 59). Gibb et al. (2005: 45) simply state that latent conditions or leader behaviour create the H&S culture of a work environment that leads to the safe or unsafe behaviour of workers. On this note, Krause (1997: 5; 2003: 2) further states that emphasis on workers’ unsafe behaviour was at the expense of good designs and the related critical H&S leadership of key project leaders and contractor’s H&S management systems. In support of the importance of leadership for effective H&S management by the key project leaders, Hopkins (2006: 148) argues that focusing
solely on unsafe acts of workers as the only cause of poor H&S without considering the critical related H&S behaviour of clients, designers, project managers, quantity surveyors and contactors, may not result in significant H&S performance improvement in the industry. Thus, H&S performance improvement is dependent on leadership qualities exhibited by the key project leaders. In a similar manner, Wu and Fang (2012: 5) state that behaviour-based H&S management systems are likely to have their greatest impact if directed upwards. This is due to the fact that it is the leadership of management that is most important in creating and sustaining a positive H&S culture in an organisation. Leadership and leaders’ behaviour have been linked to positive H&S outcomes.

Achua and Lussier (2010: 9) point out that leadership is a key driver for a successful organisation. Flin and Yule (2003: 45) assert that there is a significant relationship between organisational success and its commitment to leadership practices. The paradigm shift from management to leadership is dictated by today’s global economy. Leadership in both public and private organisations has significant outcomes related to productivity, profit and workers’ H&S (Flin and Yule, 2003: 45; Hopkins, 2008: 485; Geller, 2008: 31). In construction organisations, most senior managers tend to be responsible and accountable for their organisational H&S performance. This resulted because of emerging legislation, regulations, and World Health Organisation (WHO) and ILO stances with respect to H&S (Lutchman, Maharaji and Ghanem, 2012: 75). Ethical principles and morality demand this. The ultimate success of H&S in any organisation is largely dependent upon the quality of leadership.

The postulated problem statement for this research suggests that the principal H&S performance challenge is more of poor leadership and a lack of commitment to worker H&S among project leaders as opposed to the lack of legislation, regulations, policies and procedures. In other words, absence of critical H&S behaviour due to the lack of visible leadership and commitment to workers’ H&S may have engendered poor construction H&S performance in South Africa. Thus, it can be
argued that the underlying theme to improving H&S performance in the South African construction industry is leadership quality and H&S commitment. This must cascade or permeate across all the key project leaders in the construction project delivery chain.

1.4 SUB-PROBLEMS AND HYPOTHESES

Sub-problems and hypotheses serve as a mind map for researchers in conducting scientific research. In other words, sub-problems and hypotheses guide researchers in reviewing literature relative to a research topic. Stressing the importance of sub-problems and hypotheses, Sutrisna (2009: 57) states that sub-problems and hypotheses are not mutually exclusive but inextricably related in the development and validation of research. Table 2.1 below presents a summary of the relationships between the sub-problems and the hypotheses developed for this study.
Table 1.2 Research sub-problems and hypotheses

<table>
<thead>
<tr>
<th>Sub-problem</th>
<th>Hypothesis</th>
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<tr>
<td><strong>Sub-problem 1:</strong></td>
<td>Hypothesis 1: Clients’ poor H&amp;S leadership and behaviour leads to awarding contracts to contractors with poor H&amp;S records</td>
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<td>Clients do not appoint contractors with adequate H&amp;S records</td>
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<td><strong>Sub-problem 2:</strong></td>
<td>Hypothesis 2: Lack of commitment to workers’ H&amp;S and unethical designer behaviour lead to H&amp;S not being designed into projects</td>
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<td>H&amp;S is not designed into construction projects</td>
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<tr>
<td><strong>Sub-problem 3:</strong></td>
<td>Hypothesis 3: Poor monitoring of projects’ H&amp;S plans by project managers lead to inadequate implementation on site</td>
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<td>H&amp;S plans are inadequately implemented on site</td>
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<tr>
<td><strong>Sub-problem 4:</strong></td>
<td>Hypothesis 4: Inadequate financial provision for H&amp;S by quantity surveyors at the tender stage results in a lack of funds for H&amp;S implementation on construction sites</td>
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<tr>
<td>Projects lack funds to implement H&amp;S on site</td>
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<tr>
<td><strong>Sub-problem 5:</strong></td>
<td>Hypothesis 5: Contracting organisations lack visible leadership and commitment to workers’ H&amp;S and thus, H&amp;S management problems exist within them</td>
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<td>H&amp;S management problems exist within contracting organisations</td>
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1.5 SCOPE OF THE STUDY

The study is focused on identifying leadership and behaviour-based H&S management as a determinant of successful H&S polices, resourcing and practices. It also focuses on developing a model of leadership influence on worker H&S behaviour. The study was conducted with public and private clients, architects, engineers, project managers, quantity surveyors, general contractors (GCs) and subcontractors (SCs) based in Cape Town, Durban, East London, Johannesburg, Port Elizabeth and Pretoria in South Africa.
1.6 ASSUMPTIONS PERTAINING TO THE STUDY

Assumptions are defined as conditions that are taken for granted without which the research work would be pointless. They are accepted as true without proof or an item that is already assumed as true (Yin 2009: 25; Leedy and Ormrod, 2010: 56). Therefore, with respect to this study, the following assumptions have been made:

- There are factors contributing to poor construction H&S performance;
- H&S performance affects the profitability of stakeholders in construction;
- Construction H&S has socio-economic implications, and
- H&S performance influences construction workers' satisfaction.

1.7 IMPORTANCE OF THE STUDY

The significance of the study is to add to the existing Built Environment Body of Knowledge (BEBOK) in the area of construction H&S. The research explored the leadership behaviour of clients, designers, project managers, quantity surveyors and contractors H&S management relative to poor construction H&S performance. Attempts were also made to examine the leadership and behaviour of contracting organisations in terms of H&S workplace planning and material-related issues in the industry. It is anticipated that the evaluation of H&S practices and behaviour of the key project leaders could lead to an incremental improvement in construction H&S performance in South Africa in terms of:

- A reduction in the loss of human lives;
- A reduction in worker absenteeism;
- A reduction in the direct and indirect cost of accidents (CoA);
- An increase in construction productivity;
- An improved quality of construction work, and
- A reduction in the number of H&S related claims, disputes and litigation.
1.8 OBJECTIVES OF THE STUDY

Hinze (2006: 121) argues that accidents are not impersonal events as they have a cause. Given that the H&S leadership and behaviour of key project leaders is most critical in creating a culture of H&S in favour of H&S in an organisation, behaviour-based H&S management within a leadership context should impact directly on the project stakeholders (Hopkins, 2006: 583; Wu and Fang, 2012: 2). Thus, the aim of the study was to examine how the leadership and behaviour of the key project leaders contribute to poor H&S performance in the South African construction industry. Key project leaders include: clients, designers, project managers, quantity surveyors and contractors. The study also offers solutions through a model for leadership influence of worker H&S behaviour. The objectives of the study were to:

- Identify and assess the causes of poor construction H&S performance in South Africa;
- Evaluate the causes that are rooted in the behaviour of the key project leaders;
- Evolve a model for leadership influence of worker H&S behaviour in terms of performance improvement, and
- Recommend strategies that can mitigate the causes of poor construction H&S in South Africa.

1.9 STRUCTURE OF THE THESIS

Chapter one establishes the need for the research upon which the research outcomes can be assessed. It provides an introduction, background to the study, statement of the research problem, sub-problems and hypotheses, importance of the study and its objectives. Chapter two presents a review of literature related to accident theories, causes of poor construction H&S performance, H&S behaviour of clients, designers, project managers and quantity surveyors, and contractors’ H&S management and leadership. Furthermore, it discusses contractors’ inadequacies in relation to H&S workplace planning, site conditions, welfare facilities, drug and substance abuse programme
and materials-related issues. Chapter three presents a general overview of behaviour-based H&S management and its applications. Attention is also given to a leadership-focused approach and types of leadership. The chapter ends with an overview of transformational leadership. Chapter four presents the theoretical and conceptual framework of the study. Chapter five addresses the research methodological issues, while Chapters six and seven present the results of the study and the proposed models arising from it respectively. Chapter eight provides the conclusions and recommendations that emanate from the study, possible contributions to academic knowledge and its implication for the South African construction industry. It also provides limitations of the study and recommendations for future research. Figure 1.1 illustrates the thesis structure.
Figure 1.1 Structure of the thesis
CHAPTER TWO: AN EXPOSITION OF CONSTRUCTION H&S PERFORMANCE

2.1 INTRODUCTION

This chapter presents the causes of accidents, explanations related to accident theories and H&S leadership and behaviour of the key project leaders with respect to poor H&S performance. The chapter also addresses clients’ poor H&S leadership and behaviour, which lead to awarding contracts to contractors with poor H&S records. It then discusses designers’ H&S decisions, project managers’ H&S leadership and behaviour in terms of coordination, integration and monitoring of project H&S plans implementation. The chapter continues to discuss quantity surveyors leadership and behaviour in terms of financial provision for project H&S at the tender stage and lack of commitment relative to preparation of interim monthly valuation certificates.

The chapter also discusses:

- Contractors’ H&S management policies;
- Top management H&S leadership and behaviour;
- H&S management at site level;
- H&S culture as a component of management;
- H&S education and training;
- Importance of H&S education and training;
- Inadequacies of H&S management in contracting organisations relative to H&S workplace planning;
- Materials-related issues;
- Provision of welfare facilities on construction sites, and
- Lack of implementation of programmes to combat drug and substance abuse.

The chapter concludes by discussing the implication of South African Construction Regulations.
2.2 CAUSES OF POOR CONSTRUCTION H&S PERFORMANCE

Accidents do not occur without a reason as they are caused by unsafe acts and unsafe conditions or both (Heinrich, Petersen and Ross, 1980: 12; Hinze, 2006: 201). Unsafe acts are violations of accepted safe procedures of work, while unsafe conditions are the existence of hazardous physical conditions in the working environment (Brauer, 2006: 16; Hinze, 2006: 211). Cameron and Duff (2007: 495); Conchie, Taylor and Charlton (2011: 1209) argue that most accidents result from a combination of contributing causes. Notably, accidents occur due to failure of control by management. Flin and Yule (2003: 45) and Haslam et al. (2005: 427) contend that accidents occur due to poor leadership and lack of commitment of the key project leaders. For example, clients failure to appoint or select contractors with good H&S records and consequently contractors’ lack of H&S competencies at all levels of management have been noted as the critical factors leading to at-risk practices on sites (Flin and Yule, 2003: 45; Brauer, 2006: 45; Hopkins, 2008: 36; Wu and Fang, 2012: 89). However, it could be argued that complex interplay between the key project leaders during project planning is a major factor contributing to poor construction H&S performance. In other words, both unsafe acts and unsafe conditions common on construction sites can be traced back to poor H&S leadership and unethical behaviour of the key project leaders.

In South Africa, the dominating causes of fatalities are: struck by (17%), fall to different levels (17%) and others (47%) (cidb, 2009: 3). In addition, other causes contributing to poor H&S performance in the industry have been identified (Zohar and Luria, 2003: 567). These include:

- Lack of management commitment (Lu and Yang, 2010: 123);
- Poor H&S culture (Ali, 2006: 109; cidb, 2009: i);
- Inadequate supervision (Copper, 2010: 18; Sherratt and Farrell, 2012: 373);
- Inadequate H&S training (Cameron and Duff, 2007: 495);
- Lack of worker involvement (Krause, 2003: 2), and
• Work pressure (Hughes and Ferrett, 2009: 41).
These causes point to poor H&S leadership and unethical behaviour of the key project leaders.

Tam, Zeng and Deng (2004: 1) conducted a study in the Chinese construction industry. They identified the following as causes of accidents:
• Poor H&S awareness of top leaders;
• Lack of H&S training;
• Poor H&S awareness of project managers’ inadequate provision of resources for H&S;
• Lack of certified skilled labour;
• Poor equipment;
• Inadequate enforcement of H&S rules;
• Lack of organisational commitment;
• Inadequate education of workers;
• Inadequate provision of personal protective equipment (PPE), and
• Inadequate teamwork.
Although the study was extensive, the researchers failed to consider the impact of construction materials, designers and workplace planning on H&S performance. A critical review of all the causes of accident points to management failure, which is a manifestation of poor leadership.

The HSE (2007: 2) used case study procedures to examine fatal accidents in the UK and identified causes such as failure to ensure safe systems of work, poor maintenance, use of defective materials, and poor supervision and training. These causes also point to poor leadership. However, the study was mainly concerned with fatal accidents on construction sites, which cannot be used to generalise causes of poor construction H&S performance. Thus, it has been found that identification of the root causes of poor construction H&S performance can realise a permanent improvement in construction H&S performance. This can be achieved by examining critical H&S behaviour of the key project leaders.
Haslam et al. (2005: 416) conducted research to determine factors contributing to construction accidents in the UK. They used the following major categories to determine the degree of influence the factors have on workers’ H&S:

- The worker and the work team, which are affected by worker actions or behaviour, worker capabilities including knowledge and skills, communication, immediate supervision, and workers’ health or fatigue;
- The workplace, which is influenced by site conditions, site layout and space, working environment, work schedule, and housekeeping;
- Materials that are affected by factors such as their suitability, usability, and packaging;
- Plants and equipment that are affected by their suitability, usability, condition, and
- Originating influences that fundamentally impact on the other factors. These are clients’ requirements, economic climate, construction education, permanent works design, project management, construction processes, H&S culture, and risk management.

The findings lead to the conclusion that sustainable performance improvement in construction H&S is achievable through commitment, involvement and participation of the key project leaders and participants. Thus, this study seeks to expand on the conclusions reached by Haslam et al. (2005: 416) to examine how leadership and behaviour of the key project leaders and participants’ clients, designers, project managers, quantity surveyors and contractors contribute to poor H&S performance in the South African construction industry.
2.3 ACCIDENT THEORIES

Accidents are not impersonal events as they have a cause. The causes of accidents can better be understood by examining some of the accident theories that amplify the various views of known scholars on what causes accidents and incidents on construction sites.

2.3.1 Domino Theory

Heinrich et al. (1980: 12) was one of the early scholars with a passion to identify the causes of accidents in factories. This passion led to the development of his accident domino theory, which has stood the test of time. The domino model for accident causation consists of five dominoes, namely ancestry and social environment, fault of a person, unsafe acts and conditions, accident and injury. The five dominoes line up in sequence and when one is knocked over it hits another domino that, in turn, knocks over another. The Heinrich accident domino model points out two possibilities. Firstly, an accident can be caused by ancestral or social environmental factors, unsafe acts of persons, or unsafe conditions resulting in injury or accident in the form of body harm or damage to property. Secondly, it could be caused by inability to provide workers with PPE and a lack of proper supervision. This Heinrich domino theory illustrates the chain of events that lead to accidents. This chain of events is the complex interplay of H&S leadership and behaviour among the key construction participants that finally gives rise to site accidents and incidents.

2.3.2 Multiple Causation Theory

Petersen (1996: 11) developed a multiple causation theory that differs from the Heinrich domino theory. Petersen’s model is based on the belief that many contributing factors come into play to cause an accident. Abdelhamid and Everett (2000: 1) argue that by using a multiple causation model, the factors surrounding an accident will be revealed. A hypothetical case can be used to illustrate a multiple causation model. For example, with respect to a step ladder accident, the
questions would be: Why was the defective ladder not found during the normal inspection? Why did the supervisor allow its use? Did the injured person know that the ladder should not be used? These questions point not only to the injured person, but also to the management, supervision and other persons or departments that relate to the site accident. The answers to these questions could be used to identify the causes of the step ladder accident. Therefore, understanding the principles behind the multiple causation theory will guide site managers and supervisors towards effective H&S management and provide improved definition of responsibilities and pre-job planning.

2.3.3 Accident Proneness Theory

Hinze (2006: 12) explains the causes of construction site accidents through the accident proneness theory, which links accident causes to individual personality traits. He contends that the ‘accident proneness’ theory is a personal idiosyncrasy predisposing the individual who possesses it towards a relatively higher degree of accident rates. The theory has the underlying assumption that even when exposed to the same conditions, some people are more likely to be involved in accidents because of their innate propensity for accident. Documented research findings have shown that there is a relationship between personality traits and poor H&S performance. Lingard and Rowlinson (2005: 12) report that there are some aspects of personality traits that could be linked to job performance, including delinquent behaviour such as site H&S violations, unnecessary absenteeism and alcohol abuse. However, the ‘accident proneness’ theory of Hinze could be useful for H&S management as a guide in determining individual propensity for accident occurrence and taking preventative measures or actions.

2.3.4 Human Error Theory

Reason (2007: 13) uses his human error theory to identify the causes of accidents in more complex industries such as the oil industry and mining. Although his work concentrates on major incidents like Chernobyl, Challenger and the Kings Cross underground fire, he argues that most safety
systems have a number of layers or plates. Each of these plates aims to prevent a potential incident passing through it. Reason (2007: 13) further argues that due to human error, none of the plates are impervious - they all have holes. These holes allow the potential incident to pass through the plate, or that layer of the safety system. In most cases, the next layer or plate in the system will intercept the potential incident and prevent its occurrence. However, the next plate or layer also has a hole. Reason’s (2007: 14) human error theory explains that when holes in all the plates line up, the potential incident become a reality - the accident actually occurs. This theory simply illustrates the role of chance in an accident, as a number of holes could line up to allow the accident to happen. It takes human factors into consideration as well as other environmental factors that contribute to poor construction H&S performance.

Indeed, there are other research teams and scholars who have demonstrated their passion for explaining the causes of poor construction H&S that are relevant to this study. These are, *inter alia*, Abdelhamid and Everett (2000: 2) with their theory of the human tendency to commit errors and Suraji, Duff and Peckitt (2001: 344) with the constraint-response theory. In addition, Gibb et al. (2005: 1) in terms of what causes accidents and Haslam et al. (2005: 402) in terms of the factors contributing to construction accidents. This research focuses on a leadership-approach, which *inter alia* includes: client H&S leadership, designer H&S critical decisions, project manager H&S leadership, quantity surveyor H&S leadership in terms of financial provision, contractor H&S management systems and leadership at all levels as illustrated in Figure 2.1.
The key project leaders, identified in Figure 2.1, act as impervious plates at different stages, as stated by Reason (2007: 12) in his human error theory. The theory explains that when the holes in all the plates line up, a potential incident becomes a reality—the accident actually occurs. The holes in the lined up plates are failures arising from the interaction between the clients, designers, project managers, quantity surveyors and contractors that give rise to the immediate circumstances, unsafe conditions and unsafe acts. Thus, site accidents and incidents depend on the proximal influences of the leaders’ H&S behaviour. Notably, the at-risk practices or unsafe behaviour of workers on site are directly and indirectly caused by the critical H&S
leadership and behaviour of the key project leaders who are the collective creator of the work environment. In other words, their poor H&S leadership and unethical behaviour are the holes in the plates that allow the potential incident to become a reality. These include:

- Clients’ poor H&S leadership in terms of appointing contractors without good H&S records,
- Designers not designing H&S into construction;
- Project managers’ poor H&S leadership in terms of project H&S plans not being integrated into work programmes and poor monitoring;
- Quantity surveyors’ poor H&S leadership in terms of non-inclusion of H&S sections in the bills of quantities (BoQs) and inadequate financial provision for project H&S;
- Inadequacies in contractors’ H&S management systems, and
- Poor leadership at all levels of management.

The poor leadership of the key project leaders and the effects of their poor H&S behaviour result in a chain of events leading to poor construction H&S performance. The discussions in the following sections focus on the above mentioned leaders’ H&S leadership and behaviour relative to construction H&S management.

### 2.4 IMPLICATIONS OF CLIENTS’ POOR H&S LEADERSHIP ROLES AND BEHAVIOUR

In all types of construction contracts, the clients first seek bids from prospective contractors to carry out their intended projects. They often do so with their built environment professional advisors who are experts in design, cost and construction project management. As noted by the European Agency for H&S at Work (2004: 2), major H&S related problems encountered during all construction operations could be avoided by ensuring that due consideration is given to the project design and procurement process. Client H&S leadership in the early project planning and procurement stage can negatively or positively impact on project H&S performance. McAleenan (2010: 111) is of the opinion that clients have vital roles to play in terms of the selection of professional advisors and
procurement methods to suit the intended construction project. It has also been noted that successful delivery of any project starts first from the procurement process (cidb, 2011: 27). The Construction Regulations (Republic of South Africa, 2003: 12) require that clients appoint competent professionals designers, project managers and quantity surveyors. Conversely, clients’ lack of visible leadership in the appointment of competent professionals often leads to awarding contracts to contractors without adequate H&S records (Musonda, Pretorius and Haupt (2012: 71). For example, unethical behaviour and non-adherence to procurement process in the clients’ organisations have been noted as major factors contributing to poor H&S performance (cidb, 2011: ii). Poor H&S leadership among construction client particularly at the project planning and procurement stages marginalise H&S performance. Thus, lack of commitment to workers’ H&S by client organisations is a serious challenge to construction H&S management.

2.5 THE CONSTRUCTION CLIENT

Clients are defined in Construction Regulations (Republic of South Africa, 2003: 8) as the people who, in the course of furtherance of business or operation, seek or accept the services of others which may be used in carrying out projects for themselves. Oloke (2010: 31) asserts that a client can be a person or an organisation responsible for commissioning and paying for the design and construction of a facility and is usually, but not always, the owner of the facility being commissioned. The client can also be the users of the proposed facility or may be separate bodies. The clients may also represent other interest groups that include the owner, user or other identified persons, groups and organisations that influence and are affected by acquisition, use, operation and demolition of the facilities (Oloke, 2010: 30). However, the ‘client’ is a ‘body’ or ‘entity’ that initiates and finances construction projects.
2.5.1 Types of construction clients

In the context of construction projects, clients can be broadly classified into public and private. The public clients are the government ministries and departments and other government agencies, while the private clients are the public liability companies, limited companies, sole proprietors and individuals. The clients as owners of projects have a substantial influence on the way a project is run (CIDB, 2009: 18). McAleenan (2010: 101) asserts that the governance of any project begins and ends with the client. Behm (2005: 24) and Huang and Hinze (2006: 174) stress the importance of clients’ H&S leadership, particularly decisions made at the early project planning phase through the appointment of the design team and contractors. In addition, public sector clients are governed by legislation that requires them to treat all contractors equally, without discrimination and also to act in a transparent and appropriate manner (McAleenan, 2010: 101). At project conception and initiation, clients directly affect resource control, project team composition and coordination, which directly impact on H&S both on and off project sites. Clients’ H&S leadership indicates that their leadership attributes can impact on workers’ unsafe or safe practices on sites. Thus, clients should exercise due care and diligence in the appointment of key professionals with prerequisite competencies that will in turn lead to the appointment of contractors with the required H&S records.

2.5.2 Clients’ H&S leadership in the appointment of the design team

Clients’ H&S leadership roles are best demonstrated through the appointment of the design team. The composition of the design team varies according to the size and level of risks anticipated in the project. Clients are required in terms of the Construction Regulations (Republic of South Africa, 2003: 8) to check the competencies of designers such as architects, engineers, quantity surveyors and project managers before appointing them. It is very important at the project planning stage that clients’ H&S commitment and leadership should reflect on the appointment of the project team as their competencies have a direct and indirect influence on the overall construction H&S performance. The composition of the design team is very important with respect to their advice in
the appointment of a competent contractor. According to Hinze (2006: 316), the need for clients’ commitment to project H&S stems from the rising costs of workers’ compensation claims and high costs of litigation associated with poor construction H&S performance. Thus, clients should demonstrate commitment and diligence when exercising this important duty. Emphasising the importance of client leadership roles for effective H&S management, Hinze (2006: 87), McAleenan (2010: 42) and Oloke (2010: 30) argue that accidents are caused by inappropriate response to certain constraints and the environment. All of these factors impact on H&S and are directly influenced by clients.

Clients’ proactive leadership in H&S as argued by Geller (2008: 30) and Lutchman et al. (2012: 101) require that an H&S approach be adopted that is not dependent on the monitoring of injuries after they have occurred. Clients as the owners and financiers of construction projects are required by law to demonstrate visible leadership, commitment and active involvement in the appointment and selection of the design team. This ultimately leads to the appointment of a competent contractor, which is of utmost importance for effective H&S management (cidb, 2011: 26).

### 2.5.3 Clients’ H&S leadership in the provision of H&S information

Studies have shown that inadequate project H&S information during the design stage contributes to poor H&S outcomes. Oloke (2010: 30) argues that good H&S standards on any construction project largely depend upon information available to the design team. The Construction Regulations (Republic of South Africa, 2003: 8) require clients to provide information and instructions that might affect the H&S of a worker doing work. Notably, construction process and operations are characterised with uncertainties, sometimes affected by changing weather or cyclical economic downturns (Brauer, 2006: 167). Apart from the impossibility of predicting natural occurrences such as weather, information regarding what lies beneath the ground may be uncertain. Nonetheless, Gambatese, Toole, Behm (2008: 12) assert that 60% of all fatal construction accidents can be
attributed to lack of information about the site or premises in advance before work commences. Haslam et al. (2005: 22) concluded that decisions made early in a project’s life, particularly during the design stages that are dependent upon adequate information, impact on construction workers’ H&S. The clients have a legal duty to provide adequate information concerning the sites to the designers who are responsible for designing H&S into the project (cidb, 2009: 19). Gibb et al. (2005: 3) and Gambatese et al. (2008: 18) also contend that poor provision of H&S information by clients to the designers manifest in schedules and specifications. The level of non-compliance to this important role by some clients suggests poor leadership and a lack of commitment to project H&S.

However, there is a limit to how much information clients and designers can adequately provide through drawings (Brauer, 2006: 167). The uncertainty of predicting the future seems to explain a lot, for example excessive rainfall can cause a delay in meeting a project schedule. The consequences can lead to pressure in meeting project targets and often result in accidents on site. Regardless of the argument of uncertainty in predicting the future, provision of adequate H&S information to the design team by the clients has a significant impact on project H&S performance (Gambatese et al. 2008: 12; cidb, 2009: 19).

2.5.4 Clients’ H&S leadership in provision of adequate financial resources

Steven (2010: 63) contends that sound cost advice relative to construction H&S during the project planning stage is of utmost importance as it helps to allocate adequate funds for H&S in the project. Steven (2010: 64) states that public and private clients are required to engage the service of a quantity surveyor who is a cost expert in all developmental projects. The quantity surveyor must quantify the project cost risks so that a reasonable assessment can be made for budgeting purposes. Steven (2010: 63) further maintains that with a client proactive cost risk control measure, such as adequate budgeting for H&S, problems arising during construction relative to H&S could be mitigated. The Construction Regulations (Republic of South Africa, 2003: 4) require that clients
make adequate financial provision for their projects. Lack of adequate financial provision for H&S during the project planning stage by clients has been noted as a vital challenge for H&S management (Gambatese et al., 2008: 13; cidb, 2009: 18). The level of non-compliance with this regulation by some clients suggests poor leadership and a lack of commitment to project H&S.

2.5.5 Clients’ H&S leadership in pre-qualification of contractors

Contractor pre-qualification is an effective means of identifying which contractors meet the client’s requirements to perform the work in the most effective and efficient manner (Lutchman et al. 2012: 174). Thus, overall project performance improves when clients successfully exclude poor performing contractors from their list. Lutchman et al. (2012: 174) further state that pre-qualification enables clients to assess relevant information with respect to the contractors’ H&S management systems such as H&S historical and performance records, insurance records, workers’ H&S training and employees’ competencies. Furthermore, clients evaluate the information against pre-established criteria to determine whether the contractor is qualified to bid for the work (Lutchman et al. 2012: 174).

In addition, pre-qualification helps client organisations to exclude unsafe contractors from client lists, thereby reducing effort in managing the H&S performance of contractors. It has been noted that a lack of pre-qualification by client organisations encourages contractors without adequate H&S records, competencies and experienced staff to bid, resulting in unnecessary paper work. Pre-qualification is very important to both the client and contractor organisations as it helps them to both meet regulatory compliance and achieve H&S improvement performance (cidb, 2009: 17). Thus, a lack of H&S pre-qualification by client organisations allows contractors without the prerequisite competencies to carry out their construction projects and this often results in fatalities and injuries on site.
2.5.6 Clients’ H&S leadership in the contracts procurement process

Procurement is the process of clients selecting or appointing the most economically viable or competent contractor to carry out construction projects (McAleenan, 2010: 111). However, construction process and contractual relationships between clients and contractors is different from other normal contracts in many respects. Construction project contracts are governed by legislation and regulations at both provincial and national levels. For example, the Construction Regulations (Republic South Africa, 2003: 12) require that clients who wish to procure a construction project should take every reasonable step to ensure that the person (contractor) appointed or engaged is competent to carry out the work in the most safe and efficient manner. Notably, the public sector is the largest client of the South African construction industry with the responsibility of providing quality products. In meeting this obligation, the public sector clients are governed by legislation that requires them to treat all contractors equally, without any discrimination and also to act in a transparent manner (McAleenan, 2010: 111).

Transparency underscores or accentuates one of the research sub-problems, which states that contractors without adequate H&S records are awarded contracts. The cidb (2011: ii) reports indicate that procurement related barriers such as fraud and corruption in the appointment of contractors who are not capable of undertaking the necessary work, is a serious challenge to the government. Lack of transparency and commitment by clients in the project procurement process are the major factors contributing to poor project performance, including H&S, according to McAleenan (2010: 112).

Procurement policy that is governed by ethical behaviour enables best values to be achieved and encourages the early involvement of the supply chain (McAleenan, 2010: 112). The underlying theme to improve the procurement process and bring sanity into contracts awarded to competent contractors is client commitment and visible leadership.
2.5.7 Clients’ H&S leadership in the awarding of contracts to contractors

Awarding a contract to a successful bidder (contractor) by the clients’ organisation (public and private) follows a due process. However, in the public sector (clients) there is a construction procurement guideline that sets common minimum standards for procuring and awarding contracts to contractors. For example, the National Home Builders Registration Council (NHBRC) outlines the following conditions under which registered contractors’ tenders will be evaluated for awarding contracts:

- Financial capability;
- Technical competency;
- Construction experience, and
- Management.

However, instances have shown that these guidelines are not strictly adhered to by the Council. As noted by the cidb (2011: 21) reports, the poor quality of work completed by some contractors who are registered under the NHBRC raises a big question as to how contracts were awarded to them. Investigations as to why contracts were awarded to these contractors showed that the tender process was poorly managed and, specifically, was open to abuses such as bribery, fraud, corruption and nepotism (cidb, 2011: 21. These are unethical behaviour and indicate poor leadership. The consequences of awarding contracts to contractors without adequate competencies are poor project performance including H&S. Furthermore, the Preferential Procurement Policy Framework Act (PPPFA) (Republic of South Africa, 2001: 2) provides for the evaluation of tender and awarding of contracts in the public sector on the basis of:

- Price and preference;
- Response to the proposed scope of work or project design;
- Quality control practices and procedures;
• Qualifications and demonstrable experience of the key staff, and
• Demonstrated experience of the tendering entity with respect to specific aspects of the project and comparable projects.

Conversely, these policies and procedures are hardly adhered to by the appointed construction safety officers in the construction world, as noted by Fourie (2009: 45). The non-adherence to these procedures is a manifestation of poor leadership and a lack of commitment (Fourie, 2009: 41). The cidb (2011: 22) report also notes that there have been instances where contracts are not awarded in accordance with the client’s procurement policy, for example, overturning the recommendations of a tender evaluation committee due to political interference. A survey conducted by the cidb construction industry in 2009 indicated the extent of contracts that were not awarded in accordance with client procurement policies was 22% for provincial, 16% for national corporations, 7% for national departments and 7% for local authorities. It has also been noted that political interference and lack of transparency frequently result in the appointment or awarding of contracts to contractors that do not have the necessary abilities to carry out the work in a safe and efficient manner (cidb, 2011: 23).

Comparing the criteria for tender evaluation in both the NHBRC and the PPPF Act 2001, there was no reference to H&S. At the international level, H&S management is included as one of the pre-qualification criterion for tender evaluation and as a requirement for awarding contracts. An example of pre-qualification requirements of New South Wales (NSW) Australia Government for capital projects over $2.5 million or R17 million is illustrated below:

• Compliance with the NSW government code of practice for procurement;
• In-house corporate project management systems;
• Experience and performance requirements;
• Submission of contractor performance reports;
Compliance with NSW government quality management system guidelines, and
Compliance with requirement for NSW government H&S management system guidelines.

The lack of inclusion of a H&S management system as pre-qualification criterion in the South African procurement policy and guideline could be a factor for clients’ inadequate budgeting for H&S during project planning stage (cidb, 2011: 27). Furthermore, the cidb (2011: 28) notes in their report that lack of commitment to H&S and lack of transparency in tender evaluation resulted in the awarding of contracts to contractors without adequate H&S records.

2.5.8 Clients’ H&S leadership in the appointment of contractors

Oloke (2010: 39) and Musonda et al. (2012: 71) contend that clients have a pivotal leadership role in setting and achieving high standards in construction H&S performance. The consensus of various H&S researchers on the influence of clients in improving construction H&S converges on the central idea that clients’ H&S leadership is desirable for effective H&S management (Brauer, 2006: 12; Huang and Hinze, 2006: 175; Gambatese et al. 2008: 2; Spangenberg, 2009: 56; Conchie, Taylor and Charlton, 2011: 1209). They set the tone for projects, have overall control of contracts and the way projects are undertaken, make key decisions such as those related to budget and time and appoint the design team and contractors. Huang and Hinze (2006: 178) and Musonda et al. (2012: 23) argue that high standards of H&S are achieved on projects where clients are committed and demonstrate transparent leadership. The importance of clients’ H&S leadership in both the public and private sectors, leading to the award of a contract to a competent contractor, is highly desirable for effective H&S management.
2.5.9 H&S project monitoring by clients

The clients as the owners and financiers of the construction projects have a legal obligation to monitor and ensure that the principal contractors have put in place all arrangements with respect to a construction phase H&S plan on site. Lingard and Rowlinson (2005: 163) maintain that effective H&S management entails adequate monitoring and reporting of performance and process to review performance and make improvements. Monitoring provides clients with the information needed to review activities and decide how to improve workers’ H&S on site. It has been noted that most site fatalities and injuries have been linked to clients’ poor H&S leadership in terms of inadequate monitoring of contractors’ activities on site. Hinze (2006: 121) argues that successful H&S management requires that clients regularly attend site H&S meetings to discuss H&S matters.

Musonda et al. (2012: 111) identifies two types of monitoring, active monitoring and reactive monitoring. Active monitoring involves regular inspection and checks to ensure that standards are being implemented and management controls are working. It is a requirement that clients be proactive in monitoring to ensure that best practice standards are observed and implemented on their project sites. Reactive monitoring takes place when accidents and incidents have occurred (Musonda et al. 2012: 111). Reactive monitoring could be termed learning from mistakes. However, information from active and reactive monitoring is useful for identification of situations that create the risks and to help client organisations review the situations as a feedback mechanism (Hinze, 2006: 121). Thus, effective H&S management can be clients’ visible H&S leadership, commitment to workers’ H&S and active involvement through monitoring their project H&S.
2.6 THE IMPORTANCE OF CLIENTS’ LEADERSHIP IN H&S

Research studies reveal that effective H&S leadership promotes safe sites and increases productivity and profitability of organisations (Flin and Yule, 2003: 47; Tam et al. 2005: 569; Gambatese et al. 2008: 23). The benefits of effective leadership and H&S culture in a client’s organisation are enormous. A client’s visible leadership and commitment to workers’ H&S has the following benefits (ILO, 2008: 2):

- Reduced number of site accidents and incidents;
- Reduced amount of lost time;
- Improved overall project performance;
- Improved awareness of regulatory requirements;
- Encouraged workers participation in H&S;
- Improved worker relations and morale;
- Reduced insurance costs;
- Lowered absenteeism, and
- Developed a positive H&S culture.

Krause (2003: 3; Hopkins (2008: 31) point out that the ultimate success of project H&S management is largely dependent upon clients’ H&S leadership and commitment. It could be argued that no amount of detailed H&S regulations and contractors’ management H&S systems can make up for deficiencies in clients' poor H&S leadership.
2.7 IMPLICATIONS OF DESIGNERS’ H&S CRITICAL DECISIONS

The objective of managing H&S in design is to maximise the opportunity of eliminating hazards and risks in design during the early planning stage. This is to ensure that the project is constructed in a safe manner and used, maintained and demolished without causing harm to the workers (Steven, 2010: 61; Oloke 2010: 30). Designers’ critical H&S decisions should be based on the rationale of eliminating hazard and risk through design. Prevention through design is a fundamental concept within the field of construction H&S (Gambatese et al. 2008: 19). Designing for safety is the formal process that incorporates H&S through hazards analysis at the beginning of a design (Rwamamara, 2007: 37). This process starts with the identification and evaluation of the hazards and risks with the aim of eliminating or reducing them at source.

Haslam et al. (2005: 6) reviewed 100 construction accidents in the UK and found that 50% of the cases could have been mitigated through design change. Similarly, Behm (2005: 589) found that design was linked to 42% of 224 fatality incidents in construction in the USA from 1990 to 2003. In a study conducted in South Africa among contractors by Smallwood (1996: 1), design was identified as the aspect that negatively impacted on H&S. It behoves on designers to demonstrate skills, abilities and commitment in designing H&S into projects and reducing the wanton destruction of precious lives and property.

Ergonomics in design is another important area that requires designers’ critical H&S intervention. Haupt (2010: 147) argues that ergonomics should be considered as fundamental knowledge in designing items and systems. Designers influence ergonomics given that they evolve the concept, execute the detailed design, provide details and specify materials. For example, bricklayers often experience one-handed repetitive lifting of bricks, which weigh between 1kg and 6kg, and working with mortar in awkward positions results in lower back region, forearm and shoulder injuries. This could be mitigated through design. Further manual materials handling have resulted in various musculoskeletal problems. For example, cement weighing 25kg in the UK to 50kg in other countries.
that is lifted to appropriate height for the contents to be tipped into a concrete mixer or wheelbarrow. This can be eliminated by specifying mechanical lifting devices for bricks and cements.

Documented research findings of Rwamamara (2007: 59) and Gambatese et al. (2008: 438) indicate that construction site H&S performance is directly linked to designers' H&S decisions and leadership roles. The direct effects include: concept design, selection of structural frame, detailed design, selection of cladding and specification of materials (Huang and Hinze, 2006: 2). The indirect effects include: procurement methods and pre-qualification of contractors in term of H&S (Rwamamara, 2007: 57). In addition, constructability reviews should be carried out by designers in the early stages of project planning and design (Oloke, 2010: 32). An H&S analysis conducted during project design stages is an effective means of identifying unnecessary hazards that could have been ‘designed out’ through the use of alternative components systems or construction methods (Rwamamara, 2007: 58). These important designer roles relative to project H&S can only be achieved through visible leadership and commitment to workers’ H&S.

2.7.1 Poor H&S leadership of designers

The hierarchy of designers’ leadership starts with eliminating the hazards through engineering design or approach (Gambatese et al. 2008: 438). If hazards cannot be eliminated through engineering design, then safety devices are incorporated (Rwamamara, 2007: 37). Gambatese et al. (2008: 441) argue that where risk of injury cannot be eliminated through engineering design or reduced by incorporating H&S device, H&S warning and instructions, training should be the last resort. Designers should demonstrate their leadership quality and competency through their design decisions as it was determined that 70% of accidents could have been eliminated or avoided during the project design stage (European Foundation, 1991 cited by Gambatese et al. 2008: 19).

Furthermore, designers are required to coordinate their design with that of others in order to improve the ways in which risks are managed (Hinze, 2006: 103; Oloke, 2010: 31). The importance of good
design translates to construction sites where workers who carry out the construction work go home without losing their arms, legs and eyes. It behoves designers, therefore to exercise due diligence to mitigate the H&S risks associated with construction processes resulting from their design decisions. Steven (2010: 61) maintains that the fundamental principle of designing H&S into projects is the reduction of risk of injury, health and fatalities inherent in construction process. Set against the critical H&S leadership role of designers, they have the obligation to design H&S into projects. A lack thereof constitutes unethical behaviour and poor leadership.

2.7.2 Designers lack commitment to workers’ H&S

Designers have a leadership role to ensure that the H&S of workers is maintained at an acceptable standard. For example, in the case of Miller v. DeWitt (37 111. 2d 273, 226 N.E. 2d 630) in the USA, city of Illinois, where a steel roof had to be shored up while construction took place beneath it, the roof fell and injured a worker. It was stated, as a general rule of duty of care, that to supervise (leadership attribute) the work merely created a duty of care to designers by seeing that the building when constructed met the contracted plans and specifications. The previous position of the courts was that the designers, such as architects and engineers, owed no duty to the workers to supervise the contractor’s methods and assure workers’ H&S. Thus, with the emergence of new regulations in many parts of the world and the ILO position on workers H&S, the courts found liability, despite the argument of the designers that the shoring was a method or technique of construction over which they had no control. Furthermore, in the case of Olsen v. Chase Manhattan Bank, 175 N.E. 2d 350, Widman v. Rossmoor Sanitation, Inc., (1965-70, 97 Cal. Rptr. 52); the courts stated that under the terms of contracts the designers had the right to interfere and even stop the work if the contractor had begun work in an unsafe and hazardous manner. However, the position of the courts was seriously challenged in Arkansas in the USA in 1960 when the court found that the ‘supervising’ engineer who saw that an excavation wall was badly shored had a duty to workers’ H&S. For his
failure to supervise the site he was deemed liable for the deaths of the three workers in a cave-in  
(*Erhart v. Hummonds, 334 S.W. 2d 869*) (Howarth and Watson, 2009: 37). The above cases clearly illustrate that designers have a leadership role in the management of workers' H&S apart from designing H&S into projects. Designers need behavioural change and commitment towards workers' health, safety and well-being.

### 2.8 INADEQUATE IMPLEMENTATION OF PROJECT H&S PLANS

Project H&S plans are written documents prepared by the principal contractor and set out how the construction phase H&S plan of a particular project will be managed. Howarth and Watson (2009: 130) assert that H&S plans are vital for project H&S management as they identify environmental restrictions and existing on-site risks peculiar to a particular project and site. Thus, each construction project and site is unique and calls for preparation of a detailed H&S plan. Thorough knowledge of a site in terms of physical and health hazards is a prerequisite for successful completion of a project (Brauer, 2006: 112; Naoum, 2011: 71). The project site spot assessment conducted by the principal contractor should be integrated into the project specifications and project H&S plans for effective site H&S management (Hughes and Ferrett, 2009: 287). Fisk and Reynolds (2012: 4) contend that the project leader (project manager) has a leadership role to integrate, coordinate and monitor the project H&S plans preparation and implementation.

Smallwood (2006: 3) points out that absence of a construction phase H&S plan on any project often creates problems for supervising engineers, project managers and clients when assessing contractors’ performance during construction relative to H&S. Similarly, Howarth and Watson (2009: 129) contend that a project H&S plan is a road map that directs contractors, clients and project managers in implementing and monitoring project H&S on site. The leadership roles of project managers in construction H&S management are vital relative to coordination, integration and implementation of project H&S plans on site.
2.8.1 Inadequate coordination of project H&S plans

The South Africa Council for Project and Construction Management Professions (SACPCMP, 2006: 3) identification of work and scope of services for construction project managers acknowledges six stages of standard services for project managers. In terms of the project management contractual relationship with the client, these stages are, *inter alia*: project initiation and briefing, concept and feasibility, design development, tender documentation and management and project close out. These standard services are concerned with planning, controlling and executing all works required for successful completion of any construction project. Considering the six standard services to be performed by the project manager in the construction project process, Smallwood (2008: 3) concludes that the appointed project manager has leadership roles in coordinating and integrating H&S plans into the project during the design phase and monitoring its full implementation on site. Stage one of the standard services, Section 1.5 requires the project manager to manage the coordination of the preliminary design to form the basis for the initial viability of the project and Section 2.2 specifically requires the project manager to advise the client on the appointment of H&S consultants. Project H&S plans are intrinsic parts of the project manager’s leadership role. This role demands certain abilities and a project manager’s good interpersonal relationship skills to facilitate any information required by H&S consultants for the designers, so that the information can be adequately integrated into project design (Lu and Yang, 2010: 32).

In this regard, the facilitation of the preparation and integration of H&S plans into the project during the design phases by a project manager is a bold step to improve construction H&S performance. The other roles required by the identification of work for the construction project manager on standard services Sections 5.11, 5.12 and 5.13 are:

- Monitoring the preparation of a contractor’s H&S plan;
- Auditing the contractor’s H&S plan, and
- Ensuring compliance with the H&S plan by the contractors on site.
Arguably, project managers have a leadership role to ensure that the project H&S plan is adequately prepared and integrated into the construction work programmes. Documented research findings of Burke (2003: 43) and Smallwood (2008: 4) conclude that most fatalities, injuries and diseases occur on site due to lack of or absence of H&S plans. Sub-standard H&S plans can adversely affect the overall project performance. Burke (2003: 45) contends that the project manager has a responsibility to determine the resource levels required to complete a project without compromising H&S. Lack of performance of these important roles by project managers translates to poor leadership.

2.8.2 Poor integration of H&S plans by project managers

Effective H&S management largely depends on integration of project H&S plans into the overall construction process (Hughes and Ferrett, 2009: 312). Each project and its site are unique. Project managers as project leaders have a responsibility to provide the principal contractor with all the necessary site information that will guide him to prepare a detailed project H&S plan. They also have a responsibility to communicate to all parties involved in the contract the ways in which the project H&S will be managed with respect to workers’ H&S (Howarth and Watson, 2009: 129; Hughes and Ferrett, 2009: 287). Thus, the prepared H&S plan by the principal contractor should be integrated into the project specifications and work programme by the project manager in the most efficient manner (Hughes and Ferrett, 2009: 287). Lack of integration of project H&S plans into construction work programmes by the project manager has an adverse impact on project H&S performance.
2.8.3 Poor leadership in monitoring project H&S plans

Project managers’ H&S leadership roles entail active monitoring of project H&S plan, clear communication with respect to project H&S goals, and liaison with principal contractors and their subcontractors on H&S (Smallwood, 2008: 3). Poor leadership skills among the project managers as noted by Lu and Yang (2010: 123) have impacted seriously on project H&S management. Leadership skills have become important in project management including H&S management. Inadequate monitoring of project H&S plan implementation by project managers on site has negative consequences on project H&S performance. Construction H&S positive outcomes largely depend on project managers’ H&S leadership and interpersonal skills (Wu and Fang, 2012: 1). However, there are instances where project managers are lacking in these obligations imposed on them by the contract terms and conditions. An example of this case illustrates inadequate project H&S monitoring and the poor leadership role of a site project manager as cited by Howarth and Watson (2009: 37).

For example, in the UK a case involved a plaintiff (bricklayer) versus a defendant (an employer a limited company). The offence occurred in January 2003, when the bricklayer, an employee of the defendant fell through an uncovered first floor access hole. The holes were previously covered with loose or unfixed covers, which were later removed. When the case came up for hearing in the Magistrate Court in April 2005, it was held that the site project manager’s involvement was due to his/her presence on the project. It is evident that a project manager has a leadership role to prevent site hazards that pose a threat to workers’ H&S. Geller (2008: 36) and Hopkins (2008: 148) argue that leaders who show empathy and genuine care for workers’ H&S motivate them to higher levels of performance. The above case illustrates how poor leadership of project managers can impact negatively on construction site H&S performance.
2.8.4 Constraints in preparation and monitoring of projects H&S plans

The project manager as the project leader is required by law to effectively coordinate and integrate H&S plans into the project specification and work programme for effective H&S management. The SACPCMP (2006: 3) also demands this. Undoubtedly, if a client and their appointed agent, for example, a project manager, provide inadequate information regarding a site or premise to the principal contractor, this is a serious constraint on effective H&S management. The required information includes the actual positioning of high voltage cable, access roads, existing railway, schools and existing buildings as these will enable the design team to assess the contractors’ suitability for the project. Lack of adequate information from clients to the design team marginalises the preparation of H&S plans and their implementation. Smallwood (2006: 3) points out that non-conformance to methods and sequencing of construction in terms of implementation of the H&S plan by the principal contractor is due to inadequate information provided to the design team during the project planning stage. Adequate information regarding an intended project enables a design team to appoint a competent contractor with the necessary resources to complete the work in a safe manner.

Sunindijo and Zou (2012: 2) note that lack of relevant capabilities such as intelligence, interpersonal skills and leadership qualities among project personnel are some of the constraints in discharging their construction H&S responsibilities. Project managers’ positions as project leaders are very important in construction H&S management. They are responsible for performing H&S management tasks such as eliminating hazards and risks through design coordination, realistic project cost estimating, and integrating and monitoring project H&S plans (Sunindijo and Zou, 2012: 3). Project managers need to have leadership qualities and interpersonal skills to meet their responsibilities. It has been argued that intelligence, interpersonal skills and leadership each have an influence on project personnel in interaction with contractors and workers. These, in turn, impact on project construction H&S performance.
2.9 IMPLICATIONS OF INADEQUATE FINANCIAL PROVISION FOR PROJECT H&S

Paucity of funds is one of the major factors contributing to contractors’ poor H&S interventions on site. Inadequate allocation of financial resources to H&S during early project planning or at the tender stage is one of the major factors hindering contractors’ H&S interventions on site (Brauer, 2006: 532). Adequate financial provision to project H&S can be realised through the provision of a provisional sum for H&S in the BoQs by quantity surveyors. This can alleviate most of the H&S problems encountered on site due to lack of funds (Olatunji, Sher and Gu, 2011: 67).

Contractors bidding for construction projects are expected to comply with the preliminary and general section of the BoQs. This has a provision for matters related to project H&S and the standard form of contract, which contains clauses that provide for insurance and indemnity to cover injury, loss of life and damage to property and works (Olatunji et al. 2011: 68). In instances where quantity surveyors did not provide for these in the BoQs or during the project tendering stages, the consequences were inadequate financial resources for contractors’ site H&S interventions. Olatunji et al. (2011: 68) argue that quantity surveyors as construction cost experts have a duty and responsibility to ensure that contractors make adequate provision for H&S in their tenders. However, contractors and site supervisors hold onto the myth that construction H&S is less important and an unnecessary cost (Hinze, 2006: 112). Nonetheless, Smallwood (2006: 2) maintains that H&S should be afforded status equal to that of cost, quality and time, and be included among the criteria used for pre-qualifying and final selection of contractors. Hinze (2006: 132) also asserts that H&S management entails an amalgamation of H&S with cost control, scheduling and quality. Notably, quantity surveyors’ lack of commitment in providing adequate H&S information in the BoQs has significant impact on contractors’ H&S management. The non-inclusion of information relative to H&S in the BoQs during preparation by quantity surveyors is poor leadership and unethical behaviour.
Government fiscal and monetary policies that regulate the aggregate demand in economy through taxation and the quantity of money in circulation at a point in time through credit squeeze and an increase in interest rates, can adversely affect the construction industry via construction companies. Mbachu and Nkado (2006: 2) assert that an increase in income tax reduces net income, which invariably affects purchasing power and consequently results in a fall in demand of goods and services. They further maintain that construction activities will be drastically reduced and force contractors to tender in keen competition. Consequently, the unfavourably low tender prices adversely affect all the participants in the industry with little or no money for contractors to invest in construction site H&S (Mbachu and Nkado, 2006: 2). However, equitable allocation of resources to H&S at the tender or negotiating stage can mitigate contractors’ lack of funds to invest in H&S. Olatunji et al. (2011: 68) point out that beside the unfavourable economic climate resulting in low tenders by contractors, the inability of quantity surveyors to facilitate financial provision for H&S in the BoQs has a significant influence on contractors’ H&S management on site. Inadequate financial provision for project H&S at the tender stage or during negotiation by quantity surveyors points to poor leadership and lack of commitment to workers’ H&S.

### 2.9.1 Poor H&S leadership of quantity surveyors towards project H&S

Quantity surveyors are the financial experts in the construction industry (Olatunji et al. 2011: 581). They primarily undertake financial evaluation of construction projects, advising clients on the optimal use of funds as well as strategies to maximise human and physical resources (Olatunji et al. 2011: 581). In all developmental projects, expert financial advice is very important for clients as a guide to taking correct decisions relative to financial matters. Notably, incorrect financial decisions during the project planning stage will have a negative impact on overall project performance including H&S. However, it has been noted that quantity surveyors are lacking in discharging these important leadership roles. One of the consequences is insufficient funds for project H&S. Smallwood (2006: 2) argues that failure by quantity surveyors to advise clients correctly about the
financial implications of their projects during the early planning stages is tantamount to poor leadership and professional incompetence.

2.9.2 Lack of commitment in preparation of interim valuations certificates
Almost all construction projects are normally paid for as the work proceeds, so interim valuations are required at monthly intervals during the progress of the work. Quantity surveyors as the construction financial experts are required to prepare interim valuations of the work carried out by the contractors (Olatunji et al. 2011: 581). The purpose of these monthly valuations is to determine the extent of work carried out by contractors so that payment will be made. This monthly payment to contractors, which is based on the extent of work executed on site, alleviates their cash flow problems. It has been noted that contractors’ lack of funds has a negative impact on their site H&S interventions. Mbachu and Nkado (2006: 2) argue that on a project where quantity surveyors are committed to preparation of interim valuations contractors’ cash flows are improved. However, Olatunji et al. (2011: 3) argue that lack of commitment by quantity surveyors relative to preparation of interim valuations has both a direct and indirect impact on construction H&S performance. Gibb et al. (2005: 562) state that adequate financial provision for H&S is of utmost importance to any construction project H&S management. Thus, it is an undisputed fact that with visible leadership and commitment to project H&S by quantity surveyors project H&S can be significantly improved.

2.10 INADEQUACIES OF H&S MANAGEMENT IN CONTRACTING ORGANISATIONS
Management of construction H&S is complex. This can be traced to the unique nature of the construction industry and its complex set of operations that involve several participants (Oloke, 2010: 29). These are affected by environmental factors that generate different kinds of hazards (McAleenan, 2010: 39). For this reason, a proven H&S management system and culture become imperative. Forbes and Ahmed (2011: 12) argue that contracting organisations should adopt H&S
leadership that influences and motivates workers. Brauer (2006: 12) also contends that H&S management entails hazard identification and risk assessment associated with the construction process. Lingard and Rowlinson (2005: 23) and Spangenberg (2009: 112) maintain that construction H&S management should consider systematic planning, organising and controlling to ensure that all construction activities are performed in a safe manner so as not to place workers at risk. However, researchers, inter alia: Boin and Schulman (2008: 1050) and Krause, Groover and Martin (2010: 46) have linked poor construction H&S performance to inadequate H&S management by the contracting organisations. These inadequacies exist in the form of poor implementation of:

- Company H&S policies due to poor leadership at all levels of management (Lutchman et al. 2012: 56);
- Lack of commitment to workers’ H&S by the top leaders (Krause, 2003: 2; Krause et al. 2010: 45);
- Poor supervision due to lack of empowerment of frontline managers (McAleenan; 2010: 32);
- Poor H&S project planning (Spangenberg, 2009: 56, Forbes and Ahmed, 2011: 12);
- Lack of H&S education and training of workers (Hughes and Ferrett, 2009: 40);
- Poor H&S culture (Chinda and Mohammed, 2008: 114);
- Poor H&S workplace planning (Fisk and Reynolds, 2012: 45), and

These inadequacies result from poor leadership and lack of commitment to workers’ H&S at all levels of management that directly and indirectly impact on workers’ H&S behaviour.

Cooper (2010: 16) and Lees and Austin (2011: 2) argue that effective H&S management by a contracting organisation is largely dependent on visible leadership and commitment to workers’
H&S. According to Hinze (2006: 60), effective H&S management by any contracting organisation should manifest through:

- Establishment of clear policy for H&S;
- Organisation of all employees for the management of H&S;
- Provision of adequate financial resources;
- Systematic H&S training;
- Project H&S planning that entails identifying hazards;
- Assessment of risks, and
- Auditing and reviewing H&S practices for performance improvement.

It could be argued that a contracting organisation that addresses all these H&S management inadequacies can meet current H&S challenges leading to H&S performance improvement and high productivity. Notably, a contracting organisation’s H&S performance improvement is linked to its H&S policy. The policy must be clearly defined and set out the organisation’s H&S intentions and values relative to workers’ H&S.

Lingard and Rowlinson (2005: 27), HSE (2008: 2) and Howarth and Watson (2009: 124) state that corporate policy defines an organisation’s H&S intentions and aspirations. The policy underlines the organisation’s commitment to H&S that must receive approval from top management. Howarth and Watson (2009: 124) argue that policy is not an H&S document that specifies detailed arrangements for H&S management, but a formal demonstration of organisational commitment to involvement and participation in H&S. Hinze (2006: 100) states that policy is an organisation’s H&S philosophy, that is, the driving force behind an H&S programme. Organisational H&S policy seeks to express a company’s commitment to workers H&S. In other words, H&S management of any organisation derives its power from a written H&S policy. As a guiding principle, it should be comprehensive and understood by all employees (Hinze, 2006: 56). The importance of
organisational H&S policy is recognised by the Construction Regulations (Republic of South Africa, 2003: 4) Section 4(2), which stipulates that any construction enterprise with five or more employees must have a written H&S policy statement. According to Howarth and Watson (2009: 124), organisational H&S policy should set a high level of H&S standards, which reflect H&S legislation and regulations. It should also define H&S responsibilities at all levels of management, provide policy with regard to adequate provision of H&S resources and H&S should be an integral part of business performance.

Even though contracting organisations may have well written H&S policies, questions may be asked regarding implementation. Poor implementation of organisational H&S policy by top company management and frontline managers has been linked to major causes of site accidents and incidents. Conversely, well planned and implemented H&S policy by a contracting organisation is a demonstration of visible leadership and commitment to workers’ health, safety and well-being. This not only results in reduction of site accidents but also leads to high productivity.

2.10.1 Inadequate implementation of H&S policy

A well written company H&S policy without proper implementation is not effective. An excellent H&S policy largely depends on its implementation (Hinze, 2006: 45). Successful H&S management by any organisation, according to Hughes and Ferrett (2009: 56), is measuring and monitoring H&S policy to ensure that the organisation is achieving its H&S objectives and targets. Inadequate implementation of an organisations’ H&S policy has been linked to poor site H&S performance. Management at all levels should be acquainted with the company’s H&S policy as a guide for its full implementation. Hughes and Ferrett (2009: 20) and HSE (2010: 2) illustrate key ‘elements of successful H&S management’ as shown in Figure 2.2. Hughes and Ferrett (2009: 20) maintain that the key elements of successful H&S management have been extensively used in commercial and manufacturing sectors. The key elements of successful H&S management comprise: policy,
organising, planning and implementation, measuring performance, reviewing performance and an auditing and feedback mechanism. Thus, effective H&S management by contracting organisations is largely dependent upon its full implementation of these identified components.

Figure 2.2 Key elements of successful H&S management (Adapted from Hughes and Ferrett, 2009: 20)

However, Hughes and Ferrett (2009: 21) argue that although the key elements of successful H&S management have been effectively applied in both commercial and manufacturing sectors, there is a lack of worker participation and involvement in H&S management. This negates the principles of modern H&S management and behaviour-based H&S management systems, where workers involvement and participation in workplace H&S matters is regarded as a component for effective H&S management. Notwithstanding the above argument, the majority of construction companies particularly in developing countries implement their H&S policies based on the key elements of
successful H&S management adopted by the UK HSE. This factor could one of the reasons for poor H&S performance in developing countries including South Africa.

The key elements of successful H&S management can achieve positive H&S outcomes if properly organised and implemented. Rwamamara (2007: 26) argues that to effectively implement company H&S policy, personnel and resources should be organised to support the systematic planning and control of site H&S.

Organising for H&S entails creating roles, responsibilities and relationships that support the systematic management of H&S in an organisation. The various departments in the organisation must be involved and committed with the on-going process to make it work (Rwamamara, 2007: 26). This is often described as a ‘positive H&S culture’ that is lacking in most of the contracting organisations in developing countries including South Africa (cidb, 2011: 6). Organisational H&S policy should emphasise: commitment in achieving excellence in H&S, recruiting a competent workforce and H&S training to enable them to fulfil their H&S responsibilities. It should also emphasise allocating roles and responsibilities that entail monitoring employees’ knowledge and awareness of H&S, involving employees in reviewing H&S problems and procedures and an up-down H&S communication flow within the organisation and externally. However, it has been noted that in most contracting organisations these cultures are lacking and H&S communication flows from top-down (Griffith and Watson, 2004: 23; Hamid et al. 2008: 242 and McAleenan, 2010: 39). The consequences of this point to poor H&S leadership that exists in most contracting organisations and engender poor H&S performance in the industry, particularly in developing countries.

Planning and implementation is the key to ensure that H&S management efforts work. He, who fails to plan, plans to fail (Hinze, 2006: 112). Planning for H&S involves setting objectives, identifying hazards, assessing risks, implementing standards of performance and developing a positive H&S culture. Hazards identification and risk assessment during project planning phases help to eliminate
hazards from the source (Behm, 2005: 589 and Brauer, 2006: 172). Researchers have shown that construction organisations, particularly small sized enterprises infrequently conduct hazard identification and risk assessment on their projects. The consequences of such poor leadership have resulted in high levels of incidents and accidents on site. Hinze (2006: 163) and Spangenberg (2009: 112) contend that 65-70% of site accidents and incidents occur due to inadequate project planning by the contractor. Zohar and Erev (2007: 122) agree that many accidents occur as a direct result of inadequate planning. Thus, if project activities are carefully planned, uncertainty and risk are minimised.

Good management depends on good measurement. It is very important to measure H&S performance. Hughes and Ferrett (2009: 56) contend that measuring and monitoring H&S in an organisation is a leadership function that entails ability to track performance over time and evaluate the effectiveness of H&S improvement strategies. H&S managers at all levels should be proactive through close evaluation before things go wrong and this involves regular inspection and checking. Rwamamara (2007: 27) states that measurement of H&S performance helps an organisation to identify problem areas in which improvement is needed and provides data that can be used in benchmarking or comparative assessment. Set against these arguments many contracting organisations hardly measure their performance.

Achieving optimal H&S performance by contracting organisations largely depends upon effective monitoring and measurement. Monitoring ensures that a company’s H&S policy is being carried out as planned. Documented research findings of Zohar and Luria (2003: 567), Lund and Aaro (2004: 271) and Gibb et al. (2005: 4) assert that over 70% of contractors rely on lagging indicators to measure their organisational H&S performance. Lagging indicators focus on measuring site accidents and incidents when they have occurred. This is in contrast to leading indicators that require continuous improvement by gathering information and monitoring H&S performance on
individual, work group, department and corporate levels (Lutchman et al. 2012: 58). H&S measurements that were based on leading indicators according to Fisk and Reynolds (2012: 321) and Lutchman et al. (2012: 59) help to avoid incidents and also enhance organisational H&S performance and culture. This is in line with behaviour-based H&S management principles.

Active monitoring of H&S performance helps management to ensure that standards are adequately implemented and controlled (Brauer, 2006: 451). Rwamamara (2007: 28) argues that reactive monitoring after an accident or incident involves learning from mistakes. The consequences of these have been reoccurrence of site accidents and incidents. Monitoring provides the necessary information to review activities and decide how to improve performance. Reviewing H&S performance is assessing the effectiveness and reliability of organisational H&S policy. Monitoring and auditing indicate whether H&S policies have been reliable and effective (Howarth and Watson, 2009: 128). According to Rwamamara (2007: 56) reviewing the effectiveness of organisational H&S policy is very important in relation to implementation of organisational H&S policy. Geminiani and Smallwood (2006: 4007) conducted research on contractors’ perceptions of the effectiveness of the Department of Labour Inspectorate relative to South Africa construction H&S. They conclude that there were lapses in the implementation of H&S rules and regulations by contracting organisations in South Africa. The lack of H&S policy implementation by contractors points to poor leadership and lack of commitment to workers’ H&S. Similarly, Howarth and Watson (2009: 128) argue that lack of H&S policy implementation by contracting organisations, particularly among small sized companies, is a serious challenge in terms of H&S performance improvement. Thus, effective implementation of H&S policy by contracting organisations helps management to control and monitor their H&S performance and thereby direct attention and resources to areas where improvements are needed.
2.10.2 Lack of commitment to project H&S by top management

Senior management commitment is crucial to positive H&S management in any organisation (Krause, 2003: 1). Lingard and Rowlinson (2005: 30) maintain that top management is ‘the engine’ that drives construction H&S management towards the goal of sustaining and maintaining an H&S working environment. H&S management in organisations begins at the corporate level, where directives and objectives regarding company H&S policies are set (Krause, 2003: 2; Lu and Yang, 2010: 123). It is senior management that recommends H&S management systems, site-level management, accident and incident investigation, H&S committees, behaviour observation and feedback (Krause et al. 2010: 46). An organisation’s H&S management and H&S culture is ultimately a reflection of the values senior management place on H&S and is communicated to site managers, supervisors and site operatives in the workplace (Hinze, 2006: 123). These arguments indicate the importance of top leaders’ commitment to H&S management. However, it has been reported that projects lacking top management commitment and involvement are characterised with injuries, damage to plants and associated adverse impact on the corporate image of the organisation (Hinze, 2006: 34). Figure 2.3 illustrates the sequence through which top management communicates H&S issues to the workforce.

![The hierarchy of organisational H&S management](image)

**Figure 2.3 The hierarchy of organisational H&S management (Adapted from Hinze, 2006: 321).**

The illustration in Figure 2.3 clearly shows how H&S leadership and behaviour of top management can influence site workers’ H&S. For instance, decisions made at senior levels affect the priorities, attitudes and behaviour of middle managers, site managers, supervisors and the employees lower down the organisational hierarchy (Flin and Yule, 2003: 47; Krause et al. 2010: 47). These are
critical indicators with respect to how top management value workers’ H&S. Geller (2008: 32) contends that top management leadership, commitment, involvement and participation in H&S are important factors for cultivating positive beliefs, attitudes and behaviour of workers toward H&S. Hopkins (2008: 32) and Krause et al. (2010: 49) maintain that top leaders should demonstrate their H&S commitment by:

- Establishing organisational H&S goals and objectives;
- Communicating organisational H&S values;
- Allocating adequate resources for H&S implementation;
- Approving H&S management systems;
- Carrying out hazard investigation and risk analysis;
- Carrying out behaviour observation and feedback;
- Showing concern for workers, and
- Encouraging worker participation.

The aforementioned leadership qualities can bring about better H&S management in the industry.

Luria (2011: 1288) argues that in instances where top leaders do not carry out these components of effective H&S, the sites will be characterised with high accidents and incidents. Research pertaining to management commitment to H&S, conducted by Flin (2004: 261) in the UK, concluded that projects have poor H&S records when senior management commitment to H&S is not visible. Lack of top management commitment to workers’ H&S as noted by Geller (2008: 30) manifests through:

- Irregular visits to site to discuss H&S with workers;
- Poor attendance of site H&S meetings;
- Non-recognition of H&S efforts of workers in the form of awards;
Inadequate financial provision for H&S matters;
Lack of accountability at all levels of management; inadequate H&S training of workers;
Lack of worker participation in all H&S matters, and
Up-down flow of H&S communication.

This behaviour negates the principle of behaviour-based H&S management in construction.

Leadership styles and behaviour of top management have significant impact on workers’ H&S behaviour directly and indirectly. Direct impact includes regular site visits to discuss H&S matters with workers (Naoum, 2011: 157), regular attendance of site H&S meetings and recognition of workers’ H&S efforts (Brauer, 2006: 187). In addition, it includes adequate H&S training of workers (Hinze, 2006: 45) and worker participation and involvement in H&S matters (Hopkins, 2008: 2 and Yukl, 2010: 45). The indirect impact includes adequate financial provision for H&S (Geller, 2008: 31), down–up communication (Lu and Yang, 2010: 123) and accountability and transparent leadership (Luria, 2010: 271).

A demonstration of all these leadership qualities by top leaders can positively influence the H&S behaviour of workers on site.

2.10.3 Poor H&S leadership of managers at site levels

Howarth and Watson (2009: 115) argue that managers play a crucial role in promoting project H&S management, which results in less site accidents and incidents. Studies comparing low and high accident plants have shown that on the safest sites managers who demonstrated leadership and acted as planner, organiser and a good role model for others realise excellent H&S performance (Hinze, 2006: 231). In terms of direct effects, managers can demonstrate their commitment to workers’ H&S by prioritising H&S over productivity when production conflicts with H&S (Flin and Yule, 2003: 46). Conversely, Sunidjo and Zou (2012: 3) point out that lack of intelligence and interpersonal skills have been found to negatively impact on managers in promoting a positive H&S
Hinze (2006: 241) concurs and states that a site with a poor H&S performance is one with an autocratic leader who is mostly dogmatic and lacks good human relations. He further argues that when these attributes are lacking among project personnel, there is less than optimal H&S performance. However, Lingard et al. (2005: 2) assert that managers are the conduit between top management and site managers with their crews and play an important role in shaping workers' understanding by communicating the company's H&S policies to them. They further identify the following leadership roles among managers:

- Formulating H&S policies for top management;
- Overseeing the activities of site managers, supervisors, H&S officers, and
- Coordinating affairs within the H&S department.

Although management and leadership are used interchangeably, managers who have the ability and personality to direct, control, supervise and show concern towards others in order to achieve organisationally set goals are leaders. Documented research findings have shown that managers who show empathy and genuine concern for workers' health, safety and welfare can retain them longer and motivate them to achieve higher performance (Lutchman et al. 2012: 34). Flin, O'Connor and Crichton (2008: 49) also argue that on sites where managers show transformational leadership qualities, employees are motivated, which translates into commitment leading to better H&S behaviour of workers.

Site managers have roles and responsibilities to achieve tasks and also to maintain the H&S of the workforce (Lingard et al. 2005: 2; Fisk and Reynolds, 2012: 343). They know the workers' problems as they are always with them. Furthermore, they interpret organisational policies and procedures and provide management with feedback on construction site H&S performance. According to Flin and Yule (2003: 48) and Brauer (2006: 342), site managers or supervisors have contributed to changing the unsafe behaviour and unsafe acts of workers such as enforcing the use of personal
protective equipment on site. In the same vein, lack of leadership and commitment to workers’ H&S by site managers has a negative impact on H&S performance.

Several studies have examined the effectiveness of site managers in promoting site H&S performance such as site H&S induction of new workers, disciplining workers, co-ordinating work activities, motivating workers and conducting site H&S training. Lingard et al. (2005: 1) conducted research with supervisory roles in H&S performance and concluded that lack of commitment and leadership qualities among site managers or supervisors are contributing factors to unsafe conditions and unsafe acts found on sites. Vredenburg (2002: 259), Cox (2003: 2) and Okorie and Smallwood (2012: 322) point out that poor leadership qualities, such as poor communication in the use of English language among site managers or supervisors, area serious challenge in construction site H&S management. In addition, lack of empowerment in terms of skills development and interpersonal skills among the site managers or supervisors, according to Zohar and Luria (2004: 322) and Wu and Fang (2012: 99), impacts negatively on site H&S management. Lutchman et al. (2012: 203) identify the following leadership qualities among site managers and supervisors, which are attributed factors of poor H&S management:

- Poor H&S behaviour by setting low standards;
- Lack of proactivity in managing risks and H&S of workers;
- Lack of transparency and trust in their relationship with the workforce;
- Lack of competence and capability of workers’ H&S;
- Not motivating workers to do the right thing, and
- Lack of care regarding workers’ well-being.

Drawing from the importance of managers’ leadership attributes, relative to effective project H&S management, affirmed that managers need to be proactive, transparent, trustworthy and role
models in their relationship with workers. Additionally, managers should exhibit leadership qualities and behaviour that can motivate workers to do the right thing that, in turn, will result in promoting a positive H&S culture.

2.10.4 Inadequate H&S management systems in contracting organisations

There are some tested management systems that have been used for effective H&S management in contracting organisations. Brauer (2006: 48) asserts that the adoption of non-bureaucratic H&S management systems in the construction industry has proved effective at all levels of H&S management. Systems or approaches that have been adapted to involve workers in developing H&S solutions for the workplace are:

- H&S committee (Tam et al., 2004: 572);
- H&S representative (Hughes and Ferrett, 2009: 31);
- H&S site meetings and toolbox talks (Hinze, 2006: 231);
- H&S audit (Krause, 2003: 56);
- H&S promotion (Lingard and Rowlinson, 2005: 213), and
- Worker participation and engagement (Howarth and Watson, 2009: 45; Lutchman et al. 2012: 147).

Krause (2003: 44), Fisk and Reynolds 2012: 56) assert that the involvement of workers in workplace decisions is critical in continuous performance improvement. According to Lutchman et al. (2012: 101) involving workers in organisational H&S matters can result in improved H&S performance. Krause (2003: 341) and Geller (2008: 32) contend that organisational H&S culture is grown and sustained through employee involvement in decision-making. However, research conducted by Hamid et al. (2008: 242) on what causes construction site accidents in Malaysia concludes that these tested H&S management systems are lacking or inadequately implemented by contracting organisations, resulting in poor construction H&S performance. Employees tend to be more aware
of hazards in the workplace than employers are and should therefore be involved in the workplace H&S programme (Flin et al. 2008: 47). Their involvement has helped in terms of hazard identification. It has been noted that lack of involvement and lack of participation of workers in H&S matters is a major factor contributing to poor H&S (DeJoy, 2005: 2; Lutchman et al. 2012: 23).

Irregular H&S site meetings have also been found to impact negatively on H&S performance (Lund and Aaro, 2004: 2; Hinze, 2006: 231). Contracting organisations should encourage regular site meetings that foster team work and team building among workers.

Construction site H&S committees often consist of representatives of the employer, workers and subcontractors. This encourages interaction between the parties and helps to improve trust and communication (DeJoy, 2005: 2; Howarth and Watson, 2009: 46) and the expertise of each can be put to use (Brauer, 2006: 57). In addition, H&S committees have proved to be effective in discovering unsafe practices and problems on site (Howarth and Watson, 2009: 45). Lund and Aaro (2004: 2) argue that H&S committees promote positive H&S site performance. Conversely, where this is lacking, workers loyalty and commitment will be low, consequently leading to unsafe behaviour that often results in accidents and incidents (Howarth and Watson, 2009: 45).

It is interesting to note that many people contribute only a small fraction of their full capability as they do not feel a sense of personal belonging and because they are bound by a bureaucratic management system that does not encourage good participatory H&S management (Hughes and Ferrett, 2009: 156). Hinze (2006: 112) maintains that sites have higher injury rates when H&S meetings are irregularly held to discuss site H&S rules, hazards, corrective actions, accident prevention, review of accidents and near misses. Howarth and Watson (2009: 56) also contend that on a construction site where toolbox talks were absent, there were a disproportionate number of accidents and incidents. DeJoy (2005: 23) also found that when management failed to involve workers in decision-making, these organisations were more likely to experience lower productivity,
increased site accidents and incidents and low morale among workers and managers. H&S management systems are very important tools for effective H&S management, particularly workers involvement and participation, which gives them ownership of H&S matters that concern their health, safety and well-being in the work environment.

2.10.5 Inadequate project H&S planning and control

Oloke (2010: 31); Fisk and Reynolds (2012: 23) argue that planning construction project H&S should be a holistic approach to the management of construction processes. Howarth and Watson (2009: 129) state that project H&S planning and control are very important for project success particularly during the inception stages and to completion and beyond. Similarly, Fewings (2010: 165) and McAleenan (2010: 101) argue that consideration of workers’ H&S at the initial stages of project planning is important to ensure that H&S practices are built in rather than bolted out. However, this concept does not seem to be a panacea, as it only represents an important step towards effective H&S management. Hinze (2006: 112) states that a contractor who fails to plan must plan to fail. According to Fisk and Reynolds (2012: 207), the root causes of accidents can be broadly split into three classes namely those due to design decision, those due to lack of planning and those due to construction methods and procedures. Inadequate construction project planning has been reported to be a major factor contributing negatively to high levels of worksite injuries (Spangenberg, 2009: 112). Poor H&S leadership and lack of commitment to workers’ H&S relative to project planning and control by contracting organisations has negative impact on workers’ H&S behaviour.

Planning and control are important elements for successful completion of construction projects. Materials supply must be properly scheduled, sub-contractors’ work should be planned, as should the sequencing of site work. In view of this, adequate project planning and control becomes vital for its successful completion. This can be achieved through visible leadership and commitment by management at all levels. Howarth and Watson (2009: 123) contend that approximately 63% of site
fatalities were due to a lack of construction activity planning. Hinze (2006: 231) concurs that many accidents occur as a direct result of inadequate planning. Forbes and Ahmed (2011: 35) and Fisk and Reynolds (2012: 215) state that work pressure on workers to meet clients’ schedules on most construction sites is attributable to poor project planning. Hinze and Parker (1978) cited in Hinze (2006: 112) argue that unsafe superintendents were those who were considered by their superiors to not meet their job costs and time schedules. Their findings also amplify the relationship between poor project planning and poor H&S practices. Inadequate project planning of activities including H&S by contractors always create uncertainties before the work commences on site and consequences will be site accidents. Thus, with visible leadership and commitment by management of contracting organisations, including project activities that are carefully planned, uncertainty and risk are minimised.

2.10.6 Inadequacies relative to H&S management in contracting organisations

Construction site accidents, injuries and disease remain a serious problem due to poor site H&S management (cidb, 2009: 3; Fisk and Reynolds, 2012: 45). So do ineffective identification of unsafe conditions emanating from site conditions (Hughes and Ferrett, 2009: 56), poor worksite environment, poor site layout, poor housekeeping (Howarth and Watson, 2009: 30) and a lack of or inadequate site supervision (Mthalene et al. 2008: 6). The major causes of workplace accidents identified by the cidb (2009: 91; cidb, 2006: 12) are: falls, struck-by, caught between, electric shock and others. All these identified causes of construction site accidents point to poor leadership and a lack of commitment towards worker H&S by management.

Pillay and Haupt (2009: 269) investigated the causes of construction site accidents in the Eastern Cape. They identified the following causes:

- Lifting of heavy materials;
- Struck by objects;
• Working in awkward postures and positions,
• Losing balance, lipping and tripping;
• Falls from heights;
• Contact with hot substances or objects;
• Exposure to electricity;
• Exposure to or contact with harmful substances, and
• Being caught in or between objects.

An analysis of the causes of workplace accidents reveals that the majority of accidents emanate due to poor leadership and lack of commitment by management. These include poor site conditions (Fewings, 2010: 165), poor site layout (John, 2009: 2; Fisk and Reynolds, 2012: 34), untidy work environment (HSE, 2009: 2), poor illumination (Brause, 2006: 91), lack of mechanisation and inadequate provision of site welfare facilities (Guldenmund, 2007: 231). In addition, inadequate enforcement of H&S rules and regulations on site (Brauer, 2006: 34; Germiniani, 2008: 34), poor site supervision and a lack of H&S training (Hughes and Ferrett, 2009: 113) are noted. However, causes of site accidents and incidents could be prevented if adequate consideration is given to workplace planning during the early stages by management (Fewings, 2010: 167; McAleenan, 2010: 189). This highlights the lack of leadership and commitment by management of contracting organisations.

2.10.6.1 Poor work environment

The working environment can affect the mental acuity of the workers (Hinze, 2006: 112). He further states that if the workers are well focused on the work and the surroundings are relatively safe, the chance of an injury is greatly reduced. A well planned workplace is likely to be a safe site with high morale, less site accidents and incidents. For instance, a site with good spaces will allow manoeuvrability for vehicles and cranes. Haslam et al. (2005: 410) assert that adequate site planning and effective placement of facilities within a construction site improves the movement and
manoeuvrability of vehicles and materials. This decreases site hazards and accidents and improves the H&S of workers on site. Lack of space for movement of vehicles and cranes on site are sources of major site accidents and incidents. The importance of management commitment relative to a well-planned site and provision of welfare facilities was equally recognised by Hughes and Ferrett (2009: 278) and Fewings (2010: 168). They stated that well planned worksites result in: time saving, lower cost, higher quality of work and reduction of site accidents and incidents. Conversely, management’s failure to adequately plan worksites, impacts on overall construction performance including H&S.

2.10.6.2 Poor site conditions

Many accidents and incidents have occurred on construction sites due to poor site conditions such as muddy soil and debris resulting in overturning cranes and mobile plant accidents (cidb, 2009: 2). Fewings (2010: 167) ascertains that lack of workplace planning not only impacts negatively on project performance, but also has an undesirable effect on workers’ H&S behaviour. Proper planned worksites have been found to significantly improve workers’ H&S and increase morale of plant operators (Fewings, 2010: 167). A well-planned worksite layout is required for construction materials stacking and the manoeuvrability of vehicles and heavy equipment on site. Figure 2.4 shows an accident involving a mobile plant and workers on site due to a cramped site. This accident could have been prevented had management taken adequate steps to properly plan the worksite. This supports the argument that the reckless destruction of precious lives and properties on site are not caused by workers’ unsafe behaviour, but rather by poor leadership and lack of commitment to workers’ H&S by management.
2.10.6.3 Construction materials-related issues

More people die from work-related diseases than from workplace accidents (Coke and Sridhar, 2010: 135). The ILO (2008: 2) reports that hazardous substances kill about 438 000 workers annually, and 10% of all skin diseases are estimated to be attributable to workplace exposure to hazardous substances. During 2006 to 2008, it is estimated that 137 000 people whose current or most recent job in the last eight years was in the construction industry, suffered from an illness that they believed was caused by the job (Coke and Sridhar, 2010: 135). In 2007, it was also, estimated that over 2.3 million working days were lost as a result of work-related ill health (HSE, 2008: 2). Work-related diseases have been found to have significant impact on workers’ health and well-being. Most often, hazardous chemicals used on sites were supplied without the requisite hazard information and packaging label (HIPL) and materials safety data sheets (MSDS), thereby exposing workers to risks (Hughes and Ferrett, 2009: 320). Thus, these could have been prevented through management commitment and visible leadership during design.
Muscular sprains, strains and back pain are common as a result of manual material handling on site. Hughes and Ferrett (2009; 143) report that accidents due to poor manual material handling techniques accounted for 25% of all reported accidents in 2007 in the UK construction sector. Construction site workers, according to Haupt (2010: 150), experience cuts, bruising and abrasions from sharp edges of materials due to poor materials manual handling. Rwamamara (2007) contends that mechanical handling methods should always be used wherever possible to reduce the high number of work-related accidents.

Table 2.1 illustrates some of the causes of construction site ill health and the effect on workers. It indicates that the most common primary materials used for construction site work pose serious health problems for workers. McAleenan (2010: 121) affirms that chemical and other hazardous substances are present throughout all construction stages and demolition. These hazards are created by the work process and mainly through their usage. For example, the size and weight of materials directly impact on construction site workers' health to the extent that careful consideration with respect to the choice of material and dimension during design can reduce site accidents and incidents (Rwamamara, 2007: 57). Design that considers the size and weight of construction materials to be used on site will invariably reduce work-related accidents by completely eliminating the likelihood of heavy manual material handling.
Table 2.1 Causes of construction ill health

<table>
<thead>
<tr>
<th>Causes</th>
<th>Organ or system most affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water, aggregate</td>
<td>Skin diseases,</td>
</tr>
<tr>
<td>Drilling operations</td>
<td>Ear drum (Hearing)</td>
</tr>
<tr>
<td>Asbestos, cement, timber, silica, quarry, mortar</td>
<td>Lung, dermatitis, skin cancer, pneumoconiosis, carcinoma of the lung</td>
</tr>
<tr>
<td>Lead and other metals</td>
<td>Kidneys, nervous reproductive systems</td>
</tr>
<tr>
<td>Solvents</td>
<td>Kidneys, liver, nervous systems</td>
</tr>
<tr>
<td>Gas, vapours and fume</td>
<td>Dizziness, brain damage, lung cancer</td>
</tr>
<tr>
<td>Hazardous waste</td>
<td>Kidneys, liver, nervous systems and productive systems</td>
</tr>
<tr>
<td>Heat and extreme cold</td>
<td>Circulatory system</td>
</tr>
<tr>
<td>Musculoskeletal disorders</td>
<td>Areas most affected</td>
</tr>
<tr>
<td>Lifting</td>
<td>Lower back, shoulders</td>
</tr>
<tr>
<td>Awkward postures</td>
<td>Knee, hip, shoulders, lower back</td>
</tr>
<tr>
<td>Repetitive motion (work)</td>
<td>Shoulder, neck, wrists</td>
</tr>
<tr>
<td>Hand-tool vibration</td>
<td>Fingers, wrists</td>
</tr>
</tbody>
</table>

(Hughes and Ferrett, 2009: 123)

Similarly, poor material packaging is another problem. The UK HSE (2008: 12) reports on construction intelligence contend that lack of coherent packaging standard documents that guide the materials specification and standard code have a direct impact on construction workers’ health. Notably, these are usually given as American or British standards. The HSE (2008: 12) further maintain that lack of standardisation of construction materials, in fact in the whole of Africa, is a major factor contributing to the prevalence of substandard construction materials in the continent. This argument further construes poor leadership at top management and lack of commitment to workers’ health and well-being. However, it is mandatory that packages containing any chemical substances should indicate their flammability and toxicity. The information about this educates people, who are supplied with chemical substances on the procedures to protect themselves, the general public and the environment (Hughes and Ferrett, 2009: 320).
Additionally, some projects entail contact with existing hazardous substances such as asbestos in old buildings, bio-hazardous substances such as fungi, rat urine and exposure to waste drains (Coke and Sridhar, 2010: 137). Further, some hazards exist in the form of discrete substances in the work environment such as gases, vapours, fumes, liquids, dust and solids. According to Hughes and Ferrett (2009: 223), dust created during the construction process impacts on site workers health when it enters into the bloodstream, causing damage to human organs. Notably, it is not only site workers who are affected but also others in the vicinity, including members of the public. The ILO (2009: 2) reports that over 30% of all cancers could probably be linked to workplace hazards. However, management has the responsibility to prevent these through the design and provision of appropriate PPE.

Gases and vapours are generated through the processing of some construction materials on site. When inhaled into the bloodstream, they can cause dizziness and brain damage (Hughes and Ferrett, 2009: 224). Most of the primary materials used in the construction process, pose various health hazards to workers. These materials are used for a variety of purposes, for instance cement, a basic construction material is used for concreting, bricklaying, surfacing and plasterwork. When cement reacts with water, sand and aggregate, the hazardous chemical substances contents give rise to health issues such as dermatitis and severe alkali burns (Brauer, 2006: 321).

Paints are other important materials commonly used for both new-work and during maintenance that impact on workers’ health. McAleenan (2010: 129) states that this primary material has a wide range of toxicological properties capable of causing dermatitis by removing natural protective oil from the skin. In addition, paint solvents are known for causing narcosis and damage to the peripheral nerves, liver and kidneys (McAleenan, 2010: 129). Brauer (2006: 322) contends that almost all primary construction materials pose severe health hazards during site application. However, primary control of site hazardous substances, according to Hughes and Ferrett (2009: 225), include the use of appropriate PPE such as hand gloves, eye protection and personal hygiene.
It is the duty of management to ensure that appropriate PPE is provided to workers at the right time. Frontline managers are responsible for enforcing its use by workers.

2.10.6.4 Lack of provision of site welfare facilities

Maximum site welfare facilities should be provided on construction sites to comply with the best international standard code of practice. Contractors’ H&S management inadequacies such as poor provision of site welfare facilities have been noted as a serious challenge for workers’ health. Research findings of Williams (2006: 2) have shown that there are significant relationships between adequate provision of sites welfare facilities and positive improvement on workers’ ill health and work-related disease. Site facilities may include first aid, toilets, hand wash basin, changing-room, personal storage room and rest areas. Such facilities should be easily accessible and have adequate heating, lighting and ventilation, as they impact on workers’ well-being and site H&S culture. It is a well-known fact that only a sound mind and sound body are efficient at work. Brauer (2006: 572) and Hughes and Ferrett (2009: 258) assert that a lack of site welfare facilities on construction sites can negatively affect production and increase worker absenteeism numbers.

The types of activities encountered in construction site operations could cause accidents at any time, so first aid provision needs to be available at all times when people are at work (Hughes and Ferrett, 2008: 256). People at work can suffer injuries or fall ill. First aid at work sites is one of the welfare facilities employers are expected to provide. Its provision saves lives, as minor injuries are prevented from becoming major ones.

Toilets and wash hand basins are essential for workers well-being and to promote environmental hygiene. The code of practice stipulates that water closets, wash hand basins and urinals should be provided on site. In addition, special provision should be made for disabled workers, and there should be separate facilities for men and women (Brauer, 2006: 570). Toilet doors should be capable of being locked from the inside. Hughes and Ferrett (2009: 232) report that construction
sites with good and functional sanitary facilities contribute to workers morale and improved production, and also promote the development of site H&S culture.

Drinking, potable water must be readily accessible to the entire workforce (Howarth and Watson 2009: 89). The supply of drinking water must be adequate and wholesome. If water on site is not fit for drinking, alternative clean drinking water should be provided as water is an agent for many viruses.

Accommodation for changing clothing must be provided and must be clean, warm, dry, well ventilated and secure. Such accommodation is necessary when the work activity requires employees to change into specialist clothing. Where workers are required to wear special or protective clothing, an arrangement should be made for workers’ personal clothing not to be contaminated by any hazardous substances (Hughes and Ferrett, 2009: 257).

Most importantly, decent eating and recreation facilities on site are of immense importance to workers' health and well-being. In addition, arrangements must be in place to ensure that food is not contaminated (Coke and Srindhar, 2010: 361). Hughes and Ferrett (2009: 258) argue that site hygiene is important for all contractors, especially those engaged in maintenance operations where workers are required to work with asbestos or other hazardous substances. It has been noted that a lack of visible leadership and commitment to workers’ health and well-being in the contracting organisations is the major factor contributing to inadequate provision of site welfare facilities on construction site. This not only impacts on workers’ health and well-being but also increases worker absenteeism that results in lower production.

2.10.6.5 Lack of drug and other substance abuse programmes

A key challenge in the area of site workers’ health within the context of the South African construction industry is drug and other substance abuse. Deacon (2006: 3) observes that drug and
other substance abuse are high among South African construction site workers. According to Hinze (2006: 231), drug and substance abuse refer to illegal drugs such as heroin, cocaine, marijuana, crack and LSD. It has been found that drug and substance abusers contribute to 40% of industrial fatalities and 47% of industrial injuries (Deacon, 2006: 3; Hinze, 2006: 231). Furthermore, absenteeism, accidents and incidents have been linked to alcohol usage on site (Deacon, 2006: 3).

Another contending case is smoking among site workers. Smoking is associated with lung cancer, cardiovascular disease, diabetes mellitus and most other respiratory diseases of chronic nature (Deacon, 2006: 4). These diseases have been found to have a significant impact on the general health of construction site workers. They not only affect their personal health but also impact negatively on their productive capacity, absenteeism and non-compliance of site rules and regulations (Deacon, 2006: 3). It is arguable that an absence or lack of drug and substance abuse programmes among South African contractors could be a serious challenge to H&S management.

2.11 CULTURE AS A COMPONENT OF H&S MANAGEMENT

The concept of culture was first developed by the British anthropologist Edward Burnt Taylor, who defined it as “that complex whole which includes knowledge, beliefs, art, law, morals, custom and any other capabilities and habits acquired by man as a member of a society” (Flin et al. 2008 36). Similarly, Ali (2006: 14) and Reason (2007: 17) define culture as learned and shared behaviour, norms, values and material objects that also encompass what people create to express values, attitudes and norms. This implies that H&S culture is a subset of an organisational culture. According to Zahor (2002: 156), H&S culture was introduced to the nuclear debate by the International Advisory Group of the International Atomic Agency (IAEA) in the analysis of the Chernobyl disaster. The IAEA (1986 cited in Boin and Schulman, 2008: 1051) defines H&S culture as “the product of individual and group values, attitudes, competencies and patterns of behaviour that determine the commitment, and the style and proficiency of an organisation’s H&S
performance”. Overall H&S culture can be described as a set of beliefs, norms, attitudes, social and technical practices that are concerned with minimising the exposure of individuals within and beyond an organisation to conditions considered dangerous or injurious (Misnan et al. 2008: 193).

H&S culture is a subset of organisational culture that affects members’ attitude and behaviour in relation to continual organisational H&S performance. The outcome of these attitudes and behaviour could be measured and assessed to see the degree to which the organisation may or may not possess an effective H&S culture. It is important to note that this outcome has been lacking in the industry. With respect to definitions of H&S culture, the definition that is generally accepted by many H&S researchers states that “H&S culture is the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to H&S and the life style and proficiency of an organisation’s H&S (CSNI, 1993 cited by Boin and Schulman, 2008: 1051). Therefore, H&S culture is important because it forms the context within which individual and leader H&S attitudes develop and persist and H&S behaviour is promoted. In addition, a healthy and safe work environment is necessary to erase the high risk image that is closely associated with construction (Misnan et al. 2008: 193). The growth and development of construction operations demand that proactive management of H&S should be in place to ensure compliance with H&S relative to construction workers and properties. Construction related accidents can be avoided or eliminated through the implementation of an H&S culture that demonstrates optimum commitment to H&S that permeates all levels of an organisation (Hinze 2006: 201; Misnan et al. 2008: 192).

2.11.1 Influence of H&S culture on organisational practice

There is a link between organisational culture and the external environment. According to Reason (2007: 17) that societal cultural values, norms and practices affect organisational cultural practices. Ali (2006: 13) maintains that culture is the interactive aggregate of common characteristics
influencing a human group’s response to its environment. Studies conducted by Dorfman (2004: 12) support the view that national culture and industry are integral parts of the environment in which organisations function. By implication organisational culture should influence both the broader societal culture and the industry in which they operate. Ali (2006: 141) points out that society are differentiated by values, while organisations are differentiated by practice. The work of Reason (2007: 19) on organisational culture and leadership affirms that organisational culture and practices also affect leaders' behaviour. Specifically, it is a shared basic assumption that is learned by a group of people within an organisation through solving problems of external adaption and internal integration. Having worked well enough, it is considered valid and taught to new members as the correct way to perceive, think, and feel in relation to particular problems (Reason, 2007: 231).

However, over time, the response of founders and subsequent leaders relative to organisational culture alters their behaviour, which influences the management in terms of H&S policies and procedures.

Organisational culture reflects the societies in which they are embedded, that is, organisations with high performance orientations are found in societies with high focus. Chinda and Mohammed (2008: 114) argue that leader beliefs, values, perceptions and behaviour are manifestations of the collective behaviour of the wider society from which the leader originates. Leaders within a given organisation consciously and unconsciously exhibit behaviour attributed to the larger society. According to Chinda and Mohammed (2008: 114), cultural variations play vital roles in shaping leaders who are employed by the construction organisation. Most importantly, studies have shown that 80-90% of site accidents are attributed to human behaviour (Cox and Jones, 2006: 564; Hopkins, 2006: 875). The integration of H&S culture within the construction industry will contribute to the reduction of construction accidents that result in:

- Countless loss of lives;
- Damage to property and equipment;
• Poor quality of work;
• Absenteeism;
• High compensation insurance premiums;
• Poor productivity;
• Loss of time;
• Disputes and litigation, and
• Negative perceptions.

Krause (1993) cited by Smallwood (2004: 3) maintains that there is a relationship between culture and leadership. According to him, H&S culture is at the upstream end of an organisation and influences management systems, which influence exposure that may or may not result in incidents at the end point of the sequence. Smallwood (2004: 4) further argues that H&S performance must be accepted as an achievable goal to realise an optimum H&S culture. H&S goals must be set at a high level with vision and mission. Norms are unwritten, accepted rules, which tell people in an organisation how they are expected to behave. Norms may be concerned with such things as how managers deal with their staff, how people work together, how people should work or the extent to which relationships should be formal or informal. Values are beliefs on how people should behave with regard to such matters as care and consideration for colleagues, customer service, the achievement of optimum performance relative to quality and innovation. Naoum (2011: 231) identifies characteristics of the people employed by the organisation relative to cultural issues, which influence H&S in organisations:
• Level of qualifications required;
• Level of past experience required;
• Recruitment process;
• Rewards and promotion of employees;
- Training of employees;
- Decision-making level;
- Type of power exercised within the organisation;
- Amount of risk the organisation takes;
- Line managers’ involvement in strategic decisions;
- Subordinates’ awareness of organisation objectives, and
- System of communication and co-ordination used.

The combination of these factors leads to a conceptual model for the three major dimensions of organisational culture as shown in Figure 2.6.

![Venn diagram showing Technical culture, Management culture, and Social culture intersecting]

**Figure2.5 The three dimensions of organisational culture (Adapted from Naoum, 2011: 144).**
2.11.2 Impact of H&S culture on construction sites

Many construction workers are killed or injured every year as a result of construction operations, and some suffer ill-health (Naoum, 2011: 145). Construction related hazards are not restricted to those working on site alone; children and members of the public are also killed or injured due to inadequate control of construction activities on site (Luria, 2010: 1289). H&S culture has been recognised as one of the ingredients that realise improvement of H&S on construction sites. The (ILO, 2005: 1) reports that in spite of the effort of governments, unions, employers and clients, incidents or accidents will continue to occur on construction sites unless the contracting organisations have an optimum H&S culture (Hinze, 2006: 201). The site workers should share common beliefs, values, attitudes, opinions and motivation relative to H&S. Yukl (2010: 47) reports that H&S culture is aimed at changing the culture of the construction industry from one in which risks are regarded as an inherent part of the job to one in which employers’ and employees’ attitudes actually care about their own H&S, as well as the H&S of others. DeJoy (2005: 3) points out that those organisations with a good H&S culture have employees with positive patterns of attitudes and behaviour toward H&S practices. Furthermore, these organisations have mechanisms in place to gather H&S related information, measure H&S performance and bring people together to learn how to work in a healthy and safe manner.

It follows that creating an H&S culture means that leaders are constantly aware of hazards in the workplace. It becomes second nature to leaders to take steps to improve H&S. H&S culture within an organisation is closely linked to the leaders’ attitudes in respect for H&S. They share the organisational risks, accidents and incidents. Visible leadership, commitment and active involvement are the key components of creating an organisational H&S culture that cultivates the positive beliefs, values, practices, norms and attitudes that translate into safe behaviour. Howarth and Watson (2009: 161) identified the following critical indicators for promoting construction site H&S culture:
• Defining H&S responsibilities for all workers;
• Developing upstream measures, for example, number of reports of hazards and suggestions and number of committees;
• Align management and supervisors through establishing a shared vision of H&S goals and objectives;
• Implementing processes that hold managers and supervisors accountable for their roles;
• Evaluating and rebuilding any incentives and disciplinary systems for H&S;
• Ensuring that the H&S committee is functioning appropriately;
• Providing multiple paths for employees to bring suggestions or problems pertaining to site incidents and near misses;
• Developing a system that tracks and ensures timeliness in hazard corrections;
• Ensuring that injuries and near misses are reported, and
• Evaluating and rebuilding the incident investigation system as necessary to ensure that it is timely, complete and effective.

Construction site H&S improvement, as argued by Howarth and Watson (2009: 161), is a continuous process involving monitoring and evaluating H&S culture indicators provided by the organisation. They further maintain it is not a journey where an organisation can ever arrive and stop. Lutchman et al. (2012: 322) compare the application of Deming’s management planning model to the context of the continuous H&S improvement model Plan-Do-Check-Act. Therefore, site H&S culture entails common beliefs shared by all leaders with continued commitment to improve their workplace H&S.

2.12 BENEFITS OF H&S CULTURE
The study of culture is very important in all facets of human endeavour. As noted by Ali (2006: 12), Kheni (2008: 56), Tijhusi and Fellows (2012: 24) and Howarth and Watson (2009: 149),
understanding culture provides management with insightful knowledge of human behaviour. This is vital in formulating policies and procedures that have contributed immensely to improving production, profitability and H&S management and result in reduction of both direct and indirect costs of accidents. According to Lutchman et al. (2004), a strong culture is crucial for successful H&S management. It was noted in Chinda and Mohammed (2008: 121) that a strong culture sets out a system of informal rules that determine how people predominantly behave. Hinze (2006: 202) asserts that contractors, who have developed excellent construction H&S management approaches, including H&S culture management systems, gain a substantial reduction in costs of workers’ compensation and liability insurance premiums, as well as a reduction in the indirect or hidden costs of accidents.

In addition, they also gain very important positive benefits from an excellent H&S record. The most important gain is the upswing in the morale of construction supervisors and workers. Another obvious benefit is that H&S compliant organisations are more attractive to owners of construction, mainly due to lower organisational fixed costs and improved quality of construction output. In fact the Business Roundtable (1991 cited by Lutchman et al., 2012: 323) suggests that a contractor’s H&S performance is an indicator of his or her dedication to the principles of quality.

Luria (2011: 1288) maintains that culture impacts on the organisational management system, which subsequently affects the overall organisational performance through the mechanism of day to day practices such as decision-making, problem solving and strategy formulation. Krause et al. (2010: 46) maintain that culture contributes to the management of workers’ H&S through behaviour modification. As Hinze (2006: 202) rightly states “working on a project without establishing a strong H&S culture is tantamount to holding a dead man’s hand.” The importance of culture in human life, and in particular organisational H&S culture, emphasises the commitment (beliefs, norms and attitudes) held by all leaders to achieve their set goal: an accident and injury free workplace.


2.13 H&S EDUCATION AND TRAINING OF WORKERS

Poor H&S performance in the construction industry is a major concern that can be attributed to many factors. One of these factors is a lack of H&S education and training among construction organisations. Education and training plays a key role in the development of awareness and understanding of the specific hazards and risks associated with construction operations and its environment (Howarth and Watson, 2009: 116; Hughes and Ferrett, 2009: 60; Oloke, 2010: 29; Lutchman et al. 2012: 102). Despite the importance of H&S education and training, contractors do not have a good record of investing in training its employees compared with organisations in other industries (Hughes and Ferrett, 2009:23). For instance, in the Australian construction industry, training of employees increased from 12% to 17% according to the Australian Bureau of Statistics (ABS, 2003 cited in Lingard and Rowlinson, 2005: 125). The South African construction industry is even worse. According to Haupt (2010: 147), employee training is below 10%. Additionally, a study conducted in the United Kingdom by Bust, Gibb and Pink(2008: 587) reports that the construction industry provides less training to its employees compared to other industrial sectors, including those industries in which casual employment is common, such as retail or catering.

Luria (2011: 1291) maintains that H&S education and training is a prerequisite for an appropriate level of awareness relative to H&S, which in turn is a prerequisite for the development of an optimum H&S culture. However, the importance of H&S education and training relative to construction H&S performance cannot be over emphasised, particularly in construction where the levels of illiteracy and numeracy are deemed to be very low (Zahor, 2002: 156; Vazquez and Stalnaker, 2004: 121; Naoum, 2011: 51).

2.13.1 Inadequate H&S induction training

Induction training is given to new employees, trainees and contractors to familiarise them with the organisation’s H&S policy, conditions and quality of service (Naoum, 2011: 185). It has been noted
that lack of site H&S induction particularly of new workers is a major factor contributing to site injuries. Hinze (2006: 45) succinctly states that new workers are accidents waiting to happen. H&S induction training is very important as it familiarises new workers and contractors with the organisation’s H&S policy and hazards and risks inherent to the project site. Hughes and Ferrett (2008: 56) identify the following factors to include in H&S induction training for new workers:

- The H&S policy of the organisation;
- A brief summary of the H&S management system including employees’ immediate supervisor and source of H&S information;
- The employee responsibility for H&S including any general H&S rules (smoking prohibition);
- Accident reporting procedures of the organisation, location of accident book and nearest first aider;
- Fire and other emergency procedures including location and assembly points;
- Hazards that are specific to the work;
- A summary of any relevant risk assessment and safe systems of work;
- Location of welfare, canteen facilities and rest rooms;
- Procedures for reporting defects or possible hazards and name of responsible person to report to, and
- Details of the possible disciplinary measures for non-compliance with H&S rules and procedures on site.

According to Hinze (2006: 145), items specific to the organisation may be included. These are:

- Internal transport route and pedestrian walkways;
- The correct use of PPE and maintenance procedures;
- Manual handling techniques and procedures, and
- Details of any hazardous substances in use and any procedures relating to them.
The importance of H&S induction training for new workers cannot be over emphasised as it familiarises them with organisational H&S policies, hazards and risks inherent to the project site.

2.13.2 Lack of job-specific H&S training

Spangenberg (2009: 56) contends that educating and training workers with respect to all aspects of their work provide them with the skills to look after themselves and do things right. This, in turn, creates a culture of safe work. Job-specific H&S training ensures that employees undertake their job in a safe manner. Similarly, it is a form of skill training and is often best done ‘on the job’. This form of H&S training is sometimes called ‘toolbox talks’. Hughes and Ferrett (2009: 41) identify some items such as: H&S system of work, identification of hazardous works and procedures of analysis, a permit to work system, emergency procedures and correct use of PPE. A lack of this job-specific H&S training has been reported to impact negatively on the workforce. Arguably, poor job-specific H&S training can lead to incorrect use of equipment and tools that often results in site accidents and incidents.

2.13.3 Inadequate supervisory and management H&S training

It is understood that most site accidents occur because supervisors and management are unaware of the dangers that exist in a particular work process and on certain areas of the site (McAleenan, 2010: 112). It is necessary to develop an attitude change in supervisors and managers through H&S training. Notably, training supervisors and managers in H&S will make them better H&S leaders, and this will reflect in their site H&S management leadership and behaviour. Hughes and Ferrett (2008) state that supervisory and management H&S training course content should include, inter alia, loss control, communication and human relations, employee involvement in H&S investigations, H&S training of operatives, H&S inspection, training with respect to the use of PPE, machine safeguarding and H&S law.
Krause et al. (2010: 47) argue that H&S training keeps management informed of H&S legal requirements, accident prevention techniques and changes in law. It also encourages management to monitor H&S standards during visits or tours of the site. It is important that all levels of management, including the board directors, receive H&S training that will, in turn, enhance their H&S leadership capabilities.

2.13.4 Inadequate specialist H&S training

Fewings (2010: 165) reports that most site equipment-related accidents and incidents occur due to incompetent operators, lack of supervision and inadequate H&S training. However, Hughes and Ferrett (2009: 342) opine that specialist H&S training is normally needed for activities that are not directly related to a specific job, but more to an activity, such as:

- Driver and operator training;
- Scaffolding training;
- Excavator, shaft, tunnel training;
- Handling explosive training;
- Pile-driving training;
- Cofferdam and caissons training;
- Steel structural erection training, and
- Signaller training.

Brauer (2006: 77) contends that with specialist H&S training of workers, their attitudes and competencies in handling mechanical plants will be improved. Major site accidents have occurred due to a lack of specialist H&S training among workers. This highlights poor leadership and poor H&S culture within the management of contracting organisations.
2.14 IMPORTANCE OF H&S EDUCATION AND TRAINING

Hinze (2006: 34) states that ‘injuries cost, safety pays.’ This statement of Hinze epitomises the importance of H&S education and training. H&S education and training create awareness among construction professionals, managers and sites workers alike. Safe work practices not only pay in terms of financial gain, but also in terms of company corporate image, which is equally very important (ILO, 2007: 2). Similarly, apart from satisfying legal and moral obligations of H&S training, the economic implications are boundless for employers in that they contribute to:

- A reduction in accident severity and frequency;
- A reduction in injury and ill health related to absenteeism;
- A reduction in compensation claims and, possibly insurance premiums;
- An improvement in H&S culture of the organization, and
- An improvement in staff morale.

H&S education and training of workers is crucial in all facets of H&S management as it creates awareness of existing hazards and risks in the workplace. In addition, it empowers workers to do things right. Haupt (2010: 149) stresses the importance of education and training as a vehicle that drives H&S culture. According to Hughes and Ferrett (2009: 60) and Lingard and Rowlinson (2005: 231), inadequate H&S education and training by contractors impact on workers’ competencies, skills, knowledge, and H&S awareness. Stressing the importance of education and training of workers, Yule, Flin and Murdy (2007: 138) argue that changing attitudinal behaviour of workers and managers will be difficult without investing in H&S education and training. Naoum (2011: 145) contends that construction workers are the ‘human capital’ of the construction organisation and need care and development. Agreeably, H&S education and training empowers workers and also helps in the development of organisational H&S culture. Poor H&S education and training by contracting organisations has been linked to workers’ unsafe behaviour, and the consequences of these have been an increase in site incidents, accidents and fatalities. In addition, it indicates poor leadership and lack of commitment to workers’ H&S and well-being.
2.15 IMPACT OF SOUTH AFRICAN CONSTRUCTION REGULATIONS ON H&S MANAGEMENT

The enforcement of South African H&S legislation and regulations falls within the ambit of the occupational health and safety (OH&S) Inspectorate in the Department of Labour (DoL). However, the cidb (2009: 14) report notes that currently the South Africa Construction Regulations (2003: 2) are perceived to have a positive impact on workers H&S within South African construction. Smallwood and Haupt (2006: 91) contend that the impact of Construction Regulations has manifested itself widely among clients, designers, project managers and general contractors, and, in particular, has increased their H&S awareness and H&S consideration. The cidb (2009: 12) report on construction H&S in South Africa: status and recommendations, notes that the Construction Regulations (2003) have had the desired ‘upstream’, ‘midstream’ and ‘downstream’ impact. Conversely, Geminiani (2008: 45) argues that good H&S legislation largely depends on the competencies of the inspectors and enforcement mechanisms. For example, the DoL inspectorate influence is currently downstream (on construction sites) and their role is reactive as opposed to proactive (cidb, 2009: 14).

However, there is strong criticism that the inspectorate’s role is reactive as opposed to proactive. A recent study by Geminiani (2008: 45) to investigate the effectiveness of the DoL inspectorate revealed that the inspectorate is more ineffective than effective. He identifies the following reasons that make the inspectorate ineffective:

- Inadequate H&S competencies;
- Infrequent visits to sites;
- Use of marginally appropriate checklists;
- Limited coverage of site visits;
- Poor morale, motivation and job satisfaction;
• Ineffective legislation enforcement;
• Ineffective H&S assurance;
• Not contributing to an improvement in H&S;
• Insignificant in terms of accident prevention, and
• Ineffective in conducting its duties.

The above arguments point to poor leadership and a lack of commitment to workers’ H&S by the authority that has the responsibility to recruit skilled personnel, train and motivate inspectors to discharge their duties more effectively.

**2.17 SUMMARY**

Construction H&S is of tremendous importance to many industry stakeholders and role players in South Africa. Improved H&S performance provides organisations with opportunities for enhancing value creation in the workplace through direct and indirect cost reduction, reduced number of accidents and incidents, and the unquantifiable benefits of a motivated and safe workforce. Providing a healthier and safer workplace is not only a legal requirement but also a moral obligation of all the key project leaders. Deliberate failure to do so is poor leadership, lack of commitment to workers’ H&S, unethical and a breach of professional code of conduct.

The key project leaders and participants (clients, designers, project managers, quantity surveyors and contractors) have a duty and responsibility to ensure that workers perform their tasks without harm. The OH&S Act 1993 and Construction Regulations 2003 mandate clients, consultants and contractors to discharge their duties with due care and diligence so as not to bring harm to workers. The consequences of failing to do so often result in poor construction H&S performance. The critical H&S decisions of the key project leaders have both a direct and indirect effect on workers H&S behaviour or at-risk work practices. Improving H&S performance in the industry therefore is the ultimate responsibility of the key project leaders and participants. Client H&S leadership should
manifest through the appointment of competent and resourceful design teams and provide adequate financial resources for H&S. In addition, it should demonstrate commitment and transparent leadership in the procurement process by awarding contracts to contractors with good H&S records. Designers should show commitment in their design decisions to eliminate any possible hazards and risks. Project managers’ H&S leadership and involvement is vital for effective H&S management as poor coordination, integration and monitoring of project H&S plans impact on its proper implementation by contractors on site. This, in turn, has an adverse effect on workers H&S. Inadequate financial provision for H&S in the BoQs or contractors not making adequate financial provision for H&S in their tenders amount to poor leadership and lack of commitment by quantity surveyors. The consequence of this is insufficient or lack of funds for contractors H&S interventions on sites.

At the operational level, the appointed contractors have duties and responsibilities to plan, organise and manage all construction work to protect workers from harm. Poor construction H&S performance is attributable to poor leadership by top leaders, lack of commitment to workers’ H&S at all levels of management and poor leadership. This manifests through: poor H&S education and training of personnel, lack of H&S culture, lack of workers involvement and participation and inadequate enforcement of H&S rules and regulations. Effective H&S management in any organisation is largely dependent upon leadership commitment and H&S management systems in place. The key project leaders’ commitment to worker H&S and ethical behaviour is the most critical factor that determines or influences workers’ safe or unsafe behaviour on construction sites.
CHAPTER THREE: LITERATURE ON A LEADERSHIP-FOCUSED APPROACH TO
BEHAVIOUR-BASED HEALTH AND SAFETY

3.1 INTRODUCTION
This chapter presents discussions related to the concept of behaviour-based H&S, behavioural approaches to H&S management and trends synonymous with behaviour-based H&S. It will further examine leadership, leadership theories, leadership versus management and the influence of leadership on behaviour-based H&S by examining certain leadership styles and their corresponding attributes. The chapter also discusses challenges of traditional behaviour-based H&S implementation in construction and strategies for implementing a behaviour-based H&S management system. It concludes with a discussion on the behaviour-based H&S leadership-focused approach and a summary of the chapter.

3.2 CONCEPT OF BEHAVIOUR-BASED HEALTH AND SAFETY
Accident and fatality statistics in the construction sector all over the world have remained roughly the same since the early 1990s (Brauer, 2006: 13; Zohar and Erev, 2007: 34; Kheni, 2008: 23; Howarth and Watson, 2009: 17; Sherratt and Farrel, 2012: 373). It has also been observed that H&S related legislation, regulations and management systems are not enough to further improve construction H&S performance (Krause, 2003: 345; DeJoy, 2005: 105; Hopkins, 2006: 567). Krause (2003: 342), Cox and Jones (2006: 162), Hopkins (2006: 567) and Lees and Austin (2011: 2) contend that the typical top-down control approaches to H&S management systems no longer achieve the desired results. However, H&S legislation and regulations for accident and injury prevention in the workplace have achieved success (cidb, 2009: 37). Lees and Austin (2011: 45) argue that such successes are limited as workplace accidents are on-going.

Thus, inadequacies in the enforcement of rules and management oversights have led to a search for better ways of managing construction H&S. Notably, by 1980 Krause and his associates
originated the concept of a behaviour-based H&S process. According to Krause (1997: 3) this concept was developed on the premise that workplace H&S is a complex field, involving the constant interface of organised human groups with industrial activities of all descriptions. It can be argued that understanding human dynamics or behaviour in relation to industrial H&S is better than focusing on legislation, regulations and H&S management systems.

However, by 1940 Skinner started his work on applied behaviour analysis (Krause, 1997: 20; Cox and Jones, 2006: 164; Hopkins, 2006: 584). Although literature indicates that before Skinner’s work on behaviour, other psychologists had paid attention to behavioural patterns, not as a subject itself but as an indicator of internal mental states. This is undoubtedly related to their psychological school of thought that holds to the belief that only internal mental states of people such as attitudes, states of mind, perceptions, beliefs and values were the important areas of interest in the field of psychology. As cited in Krause (1997: 20), Geller (2008: 36), and Lees and Austin (2011: 46), the work of Skinner (1940) was the first rigorous application of the scientific method to the study of behaviour. Skinner used strict measurement to identify and vary the elements of animal behaviour under controlled conditions. In this manner, he produced the first systematic, verifiable findings about overt and observable behaviour applicable to humans as well. Krause (1997: 3) states that the work of Skinner (1940) gave the world scientifically valid laws that define the relationships between behaviour and other factors. Primary among these factors was the role of antecedents and consequences, events which precede and follow behaviour. Skinner’s discovery demonstrated that external actors or factors could reliably predict behaviour. This statement was supported by Geller (2008: 37) who stated that we do what we do because of the factors in both our external and internal world. This confirms that all behaviour has one or more antecedents, which initiate the behaviour that either encourages or discourages its repetition. This fact holds true for the H&S leadership and behaviour of the key project leaders who have both direct and indirect relationships with worker H&S behaviour on site. In other words, it is the behaviour of the key project leaders that determines
or influences worker H&S behaviour. Their negative or positive behaviour will have negative or positive consequences on workers’ H&S behaviour on site. As argued by Krause (1997: 21), behaviour gives rise to consequences with the probability that similar behaviour will occur again in the future, if the antecedents are not identified or eliminated. This is the origin of the principle of the “antecedent-behaviour-consequence” (ABC) behaviour model.

This ABC behaviour change model can be applied to change any behaviour in any area that involves human behaviour not just H&S related issues (Krause, 1997: 21). The model has been successfully applied in all areas of behavioural management. The logic behind the ABC model is that the antecedent conditions (activators) signal when behaviour can achieve a pleasant consequence (a reward) or avoid an unpleasant consequence (a penalty). Therefore, activators direct behaviour and consequences that determine whether the behaviour will recur (Geller, 2008: 38). It is notable that a positive change of the project leaders’ critical H&S leadership and behaviour will directly and indirectly impact positively on the at-risk practices or unsafe behaviour of workers.

The behavioural science approach to H&S management postulates that behaviour change will lead to an expected change in attitude. Geller (2003: 1; 2008: 37) opines that humans do what they do because of the factors in both their external and internal world. He further argues that given the difficulty in objectively defining internal states or traits, it is far more cost effective to identify environmental conditions that influence behaviour and change them when behavioural change is needed. Thus, the complexities in human nature make it difficult to precisely define internal states of mind. In support of the above fact, Lees and Austin (2011: 45) state that the concepts of values, attitudes and beliefs are abstractions and thus create difficulty in translating them into action plans. Behaviour is more concrete compared to attitudes and can be targeted for change. Lingard, Blismas and Wakefield (2005: 4) argue that to achieve long-term change in H&S related performance, it is necessary to change both individual behaviour and attitudes. Thus, a change in attitudinal behaviour among the key project leaders is highly desirable.
The theory of Reasoned Action by Fishbein and Ajzen (1975) cited by Lingard and Rowlinson (2005: 12) indicates that behaviour can be predicted if observers know:

- The person's attitude to a particular behaviour;
- The person's intention to perform the behaviour, and
- If the person believes in the consequences of performing that behaviour and the social norms that govern it.

Thus, predictions can be made by satisfying each of the conditions. Therefore, examining a key project leaders' behaviour relative to project H&S will help to understand the root causes of worker unsafe behaviour. Krause (1997: 3), the originator of the behaviour-based H&S concept, states that the method seeks to identify and operationally define critical safety-related behaviour, observe and gather data regarding the frequency of that behaviour provide feedback and use the gathered data for continuous improvement. Hopkins (2006: 585) states that the behaviour-based H&S concept centres on identifying the critical H&S related behaviour of the human factor in an organisation. Therefore, understanding the key project leaders’ behaviour in relation to workplace accidents is the right step for effective H&S management.

Lee and Austin (2011: 46) maintain that behaviour-based H&S involves proactive and objective problem-solving perspectives, which are fostered by identifying human behaviour as it relates to the root causes of workplace accidents. It then analyses the problems before they occur. Thus, this study seeks to examine how the key project leaders, who are creators of workplace H&S culture, influence or contribute to safe or unsafe behaviour of workers.

### 3.3 LEADERSHIP APPROACHES TO BEHAVIOUR-BASED HEALTH AND SAFETY

Around the globe, emphasis for organisational effectiveness is shifting from management to leadership. The premise even exists that legislation and trade unions alone cannot improve

Thus, it be can be argued that effective H&S management is largely dependent on a change of the key project leaders’ attitudinal behaviour and leadership styles (upstream factors), which create the culture of workplace H&S. It is the right step to accident prevention.

Behavioural approaches to H&S management have gained wide popularity, particularly in hazardous industries as part of accident and incident prevention initiatives. Since the 1970s, behaviour-based H&S has been successfully applied around the world in a multitude of countries, cultures and languages. For instance, behaviour-based H&S has been applied in chemical plants (Brauer, 2006: 113), construction processes (Sherratt and Farrell, 2012: 384), manufacturing (DeJoy, 2005: 2), food processing (Komaki, Barwick and Scott, 1978: 434), offshore (O’Brien, 2006: 12) and the nuclear sector (Cox, Jones and Rycraft, 2004: 450). The applications have been noted to have led to significant improvement in H&S performance through effective leadership.

It is worth noting that the unsafe behaviour of leaders as it relates to workplace accidents has continued to receive serious attention of late (Wu and Fang, 2012: 87). Lu and Yang (2010: 123) state that the behaviour of the key projects leaders has been overlooked in most studies with emphasis placed on contactors’ H&S management systems and workers’ unsafe behaviour. In addition, Hinze (2006: 154) states that construction H&S management has been conventionally regarded as the responsibility of contractors. However, this new approach of H&S management called behaviour-based H&S is about observing and gathering data on workers’ unsafe behaviour and identifying the root causes of accidents, as they relate to the leadership and behaviour of the project leaders (upstream actors). Hopkins (2006: 585) and Lees and Austin (2011: 46) state that behaviour-based H&S is not only concerned with observing and gathering data on unsafe acts of workers, but understanding the behaviours of the key actors as they relate to workplace H&S management.

These initiatives were based upon the principle that changing behaviour can facilitate workplace H&S improvement and reduce site accidents and incidents (Paul and Maiti, 2007: 450). Drawing from the above conclusions, it can be argued that a change in the behaviour of the key project leaders can lead to H&S performance improvement. Hence, they are the initiators and creators of the work environment and therefore their critical H&S leadership and behaviour are crucial for effective H&S management. Human Error Theory of Accident Causation of Reason (2007: 12) indicates that improvement and sustainability of H&S in an organisation can only be achieved through attention to the human error mechanism. Heinrich (1931 cited by Wu and Fang, 2012: 2) contends that nearly 88% of industrial accidents were caused by human error based on the analysis of 75,000 accident cases. Williamson and Feyer (1990 cited in Cox et al. 2003: 825) also concluded that 91% of all occupational fatalities from 1982 to 1984 in Australia had connections with human factors. Researchers, who are not limited to Lees and Austin (2011: 1), Krause (2003: 32) and Hopkins (2006: 583), point out that 80-90% of accidents can be attributed to unsafe behaviour and unsafe acts of people involved in construction. The above conclusions can be linked to the poor leadership of the key project leaders (upstream factors) during the project planning phase and on construction sites. Thus, a change in behaviour particularly among the key project leaders (upstream) is highly desirable for optimal H&S performance.
Wu and Fang (2012: 89) argue that behaviour-based H&S application in the construction process will promote a behavioural change of the key project leaders that will, in turn, lead to the prevention of accidents and injuries. Behaviour-based H&S, according to Krause (1997: 7; 2003: 3), applies these four stages for continuous H&S performance improvement as illustrated in Figure 3.1.

![Figure 3.1 Behaviour change process (Adapted from Krause, 1997: 34)](image)

In a similar way, Lees and Austin (2011: 46) also identified the following factors for continuous H&S improvement in construction:

- Determine the controllable behavioural factors involved in injuries and accidents;
- Define these behaviours, processes and conditions precisely enough to measure them;
- Implement procedures to reliably measure the behaviour, processes and conditions to determine their current status and set reasonable goals for their improvement;
- Provide feedback, and
- Reinforce progress.

The usefulness of behaviour-based H&S is noted. But, critics argue that focusing solely on unsafe acts of workers as the only causes of poor H&S without considering the critical H&S leadership of clients, designers, project managers, quantity surveyors and contractors may not result in significant performance improvement over time (Hopkins, 2006: 585). The understanding of the root causes of at-risk work practices or unsafe behaviour of workers can be achieved through identification of critical H&S leadership and behaviour of the key project leaders. Hopkins (2006: 586) further maintains that behaviour-based H&S observers are likely to have their greatest impact if directed
upwards, since it is the behaviour of management that is most critical in creating and sustaining a positive H&S culture in an organisation. Conversely, the strategic or leadership roles of the clients and their professional consultants and contacting organisations’ boards of directors cannot be easily observed through behaviour-based H&S lenses (Wu and Fang, 2012: 90). However, the H&S related behaviour of the frontline managers or supervisors can be identified and observed and data can be gathered for performance improvement (Krause, 1997: 20). Thus, directing attention solely to the unsafe behaviour of workers cannot lead to optimal H&S performance in the industry (Hopkins, 2006: 584, Lees and Austin, 2011: 45). Thus, to achieve optimal H&S performance in the industry, attention should be directed to the key project leaders since it is their H&S leadership and behaviour that determines worker H&S behaviour on site.

3.4 TRENDS IN BEHAVIOUR-BASED HEALTH AND SAFETY APPLICATIONS

The application of behavioural science to industrial H&S management has shown an average of 20-25% per year reduction of injuries and accidents (Lees and Austin, 2011: 5). This new approach to H&S management has shown a tremendous improvement when properly applied. Although many studies on its application in construction H&S management have not been conducted yet, evidence does exist that its adoption and application will bring about H&S performance improvement in the industry. Krause (1997: 32), who is an early proponent of behaviour-based H&S, argues that employee-driven applications and supervisor-driven applications have been successfully applied with positive outcomes such as a reduction of site accidents and incidents leading to an increase in productivity. According to Lees and Austin (2011: 5), behaviour-based H&S application has evolved and progressed through three distinct phases:

- Supervisor-driven applications;
- Employee-driven applications, and
- Leadership-focused approaches.

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The supervisor-driven and employee-driven applications have been successfully implemented in various hazardous industries and results indicate significant improvement in overall project performance. However, there are limited research findings regarding leadership-focused approaches. Nonetheless, Flin and Yule (2003: 45), as well as Lees and Austin (2011: 3), have explored the relevance of leadership in H&S improvement and concluded that management has greater influence on workers' H&S behaviour than supervisors. They further argue that even if direct supervision does not place high value on site H&S management, workers will work safely when management emphasise the reduction of at-risk behaviour. These three phases of behaviour-based H&S applications will be discussed in Sections 3.4.1, 3.4.2 and 3.4.3 with particular emphasis on leadership-focused approaches.

3.4.1 Supervisor-driven applications

The early applications of behaviour-based H&S started with supervisor-driven initiatives. This could be connected to the fact that first line supervisors act as a conduit between senior management and the workforce and they play an important role in shaping workers' behaviour by communicating the priority of H&S to the workgroup (Lingard et al. 2005: 1). Also, supervisors monitor compliance with management directives and provide important feedback concerning the appropriateness of at-risk behaviour of workers (Krause, Groover and Martin, 2010: 47). The first line supervisors usually receive training on behaviour-based H&S processes that empowers them to use observation data to identify at-risk behaviour and then analyse and develop action plans for continuous performance improvement. In fact, supervisors' behaviour and expression of views have a considerable influence on the development of workers' beliefs about management policies and values on H&S (DeJoy, 2005: 106; Hopkins, 2006: 584). Supervisor-driven applications, according to certain research findings (Flin and Yule, 2003: 45; DeJoy, 2005: 105; Lingard et al. 2005: 5), have been successfully applied in many industries with marked performance improvement.
However, Hopkins (2006: 585) and Lees and Austin (2011: 4) point out that in supervisor-driven behaviour-based H&S applications, mid-level managers and executives were largely left out of the picture. Employees were expected to respond to the feedback delivered to them by the supervisors. The criticism of supervisor-driven behaviour-based H&S initiative, according to Lingard et al. (2005:1) and Lees and Austin (2011: 5), often leads to wrong communication of management H&S policy or plan. This, in turn, results in a gap between actual H&S practices and stated management H&S values. Another major drawback of this approach, according to Lees and Austin (2011: 5), is that workers are not consulted and involved in their own H&S matters. Flin and Yule (2003: 46) contend that though supervisors are a decisive factor in workers’ H&S behaviour, it is management that sets the supervisors’ goals, objectives and priorities. In support of this argument, DeJoy (2005: 156) and O’Brien (2006: 23), citing other researchers (Ajzen, 1991; Krause, 1997; Geller, 2001), emphasise the fact that top management has a greater influence on workers’ H&S behaviour than supervisors. In this regard, the need for broader participation that involves workers in workplace H&S management emerged.

3.4.2 Employee-driven applications

Behaviour-based H&S applications revolve on active involvement and participation of employees for continuous H&S performance improvement. Lees and Austin (2011: 5) and Krause (1997 cited by Hopkins, 2006: 585) state that employee-driven behaviour-based H&S applications give work-teams all the resources and support needed to develop and ‘own’ the H&S process so that it works for them. Documented research findings indicate that on sites where workers are recognised and encouraged to participate in their H&S matters, such sites have enhanced employee-management relations, less accidents and incidents and high morale that begets high productivity. It is interesting to note that many people contribute only a small fraction of their full capabilities. This is simply because they do not feel a sense of personal belonging, and because they are bound by a bureaucratic management system in a workplace that does not encourage good participatory
management (Hinze, 2006: 45). In brief, employee-driven, behaviour-based H&S applications have in many respects achieved significant improvement in H&S performance. Zohar and Erev (2007: 274) noted that workers having a say in how their H&S is managed helped to build trust and commitment.

Employee-driven, behaviour-based H&S applications have been extensively implemented in plant and nuclear sectors in the USA and Canada. Results show that it provides a means of motivating workers to change their at-risk behaviour to safe behaviour that leads to a positive H&S performance. Hopkins (2006: 585) and Wu and Fang (2012: 1) criticise employee-driven applications on the ground that they do not recognise the critical H&S related behaviour of upstream actors (clients, designers and contractors’ top management) as the consequent cause in an accident chain of events that lead to poor H&S performance. Cox and Jones (2006: 165), Hopkins (2006: 585), Paul and Maiti (2007: 451) point out another downside of employee-driven applications as mainly concerned with the behaviour of the workers alone and not the behaviour of leaders who are the creators’ of the environment. Research findings emanating from Behm (2005: 3), Gambatese et al. (2008: 438) and Spangenberg (2009: 5) support the above argument and point out that the majority of causes of at-risk work practices can be attributed to poor H&S leadership and behaviour of the key project leaders and participants. This argument points out the importance of leadership and behaviour of the upstream factors (leaders) as the creators of workplace H&S culture.

3.4.3 Leadership-focused approach

The importance of leadership as a key driver of a successful organisation was noted by Achua and Lussier (2010: 9). They assert that there is a significant relationship between organisational success and its commitment to leadership practices. The most effective application of behaviour-based H&S hinges on a leadership-driven model that identifies all key project leaders that are involved in the
process of developing and executing construction project H&S. Storey (2006: 41) and Yukl (2010: 3) opine that leadership is the personal values that lead to outstanding managerial performance. Yukl (2010: 45) and Flin and Yule (2003: 45) point out that improvement of H&S performance requires effective leadership at all levels of management. The relevance of leadership in today’s competitive world is evident in all areas that require strategic planning. Lees and Austin (2011: 3) and Hopkins (2008: 148) assert that the ultimate success of behaviour-based H&S rests on leadership. It has been noted that it is the behaviour of top leaders that drives organisational success and sustainability of H&S culture.

Flin and Yule (2003: 47) contend that leadership has been found useful in improving H&S performance in high risk industries. In a similar manner, Cooper (2010: 18) states that top leaders’ behaviour impact on workers’ H&S practices or at-risk behaviour both directly and indirectly. The indirect effect relates to the establishment of rules and norms concerning workplace practices and procedures that lead to H&S culture. The direct effect relates to managers’ and supervisors’ H&S leadership styles and behaviour. Lees and Austin (2011: 4) assert that the key project leaders are the critical drivers that bring about the desired H&S behavioural change needed in the industry. Leadership and leaders’ commitment to workers’ H&S are critical for effective H&S management in any organisation. Hopkins (2006: 589) and Lees and Austin (2011: 5) argue that leadership is not a panacea to all management problems and state that leaders have been found to often lose focus and become overwhelmed. Nonetheless, leaders have the ability and personality to direct, influence and motivate groups or workers and employees to achieve organisationally set goals. Thus, organisational effectiveness including H&S performance has been linked to leadership.

3.5 LEADERSHIP

Leadership is as old as society itself. This, however, means that there are diverse meanings attached to leadership. According to Western (2008: 23) leadership is similar to beauty; you will
know it when you see it. In this case, leaders and leadership are defined by the eye of the beholder. Thus, leadership is defined and understood according to the context and situation (Achua and Lussier, 2010: 12). Barnard (1991 cited in Western, 2008: 23) states that the word lead is both a noun and a verb. As a noun, lead could mean to be in charge of an organisation and ahead of others, while as a verb, it could mean to guide people and encourage them to follow. Yukl (2010: 23), in terms of his work regarding leadership in organisations, explains that leadership is used to describe a certain type of social interaction between people, while the term leader is used to denote a person who has influence over others. On the other hand, Northouse (2010: 12), in terms of leadership theory, states that leadership is used to describe personality traits, behaviour, power and influence. Thus, the complex nature of human interactions makes it difficult to have a single definition of leadership (Naoum, 2011: 152). In this regard, leadership is defined according to context and situation.

However, in an attempt to explain what leadership is, Northouse (2010: 13) identifies four common themes: leadership as a process, leadership involves influence, leadership occurs in a group context and leadership involves goal attainment. Northouse (2010: 20) sums up and defines leadership as “a process whereby an individual influences a group to achieve a common goal.” Leadership is not limited to individuals in formal leadership positions such as government departments, political parties and churches. Leadership could include the influence a principal architect or engineer or quantity surveyor demonstrates in discharging his professional duties. This influence entails direction, inspiration, guidance, control, trust, motivation, persuasion, commitment and empathy towards followers and employees. Thus, improving construction H&S performance is largely dependent on key project leaders who are willing to exhibit or demonstrate these qualities of a good leader and create a workplace free from harm.
3.5.1 Leadership theories

In the early 20th century, a number of studies attempted to answer the question ‘what makes a good leader and who is a bad leader? Answering this question has led to different theories regarding leadership. Leadership theories, according to Hofmann and Morgeson (2004: 56) and Northouse (2010: 34), are classified into: trait theory, behavioural theory, contingency theory and power or influence theory. Before the 1970s, the main leadership approaches or theories were trait, behavioural and contingency.

Trait theories focus on identifying personality characteristics associated with good leaders, commonly referred to as ‘great man theory’ (Northouse, 2010: 12). Trait theory assumes that leaders have certain qualities that distinguish them from others. For example, Naoum (2011: 152 citing Luthans, 1988) identifies qualities associated with effective leaders as: integrity, empathy, assertiveness, good decision-making skills and likability. However, none of these traits or any specific combination of them will guarantee success as a leader (Yukl, 2010: 123). Studies have shown that there are qualities and characteristics that make a good leader. Northouse (2010: 45 citing Glendon et al. 2006) argues that honesty, desire to lead and job-related knowledge are associated with good leadership. The search for effective leaders led to behavioural theory.

Behavioural theories or approaches focus on identifying the type of leadership behaviour a good leader would exhibit or enact. Thus, unlike trait theory behavioural theory focuses on the leaders’ behaviour and actions (Luthans, 1988 cited in Naoum, 2011: 154). However, by the early 1950s research was conducted by the Ohio State University and Michigan University, which identified two types of leadership behaviour associated with behavioural theory: consideration and initiating structure (Glendon, 2006 cited in Northouse, 2010: 35). The findings concluded that leaders who exhibit considerate leadership behaviour tend to focus on building good relationships and two-way communication, are attentive and have good feelings towards subordinates. On other hand, leaders
who exhibit initiating structure behaviour tend to focus on planning, communicating and allocating tasks (Northouse, 2010: 35). In finding answers to leadership behaviour that are appropriate for effective management, Blake and Mouton (1964 cited in Northouse, 2010: 43) developed the best known model of managerial behaviour called Managerial Grid. The model focused on two leadership behaviours: task-oriented and people-oriented behaviour. The task-oriented leaders are concerned with production, while people-oriented leaders are concerned with developing trust and ensuring good working conditions. However, the construction process is different from steady or stable organisations such as those in manufacturing. On this note, it can be argued that different leadership behaviour may be employed at the design stage and at the construction site to achieve organisational goals.

Contingency theories or approaches focus on understanding the circumstances or situations where leaders’ behaviour will be effective (Northouse, 2010: 43). The basic principle of contingency theories is that the effectiveness of leadership is context-specific (Yukl, 2010: 2). Contingency theories were developed on the understanding that there is no one best leadership style and that the best leadership depends on the situation. The complex nature of construction and its peculiar contractual arrangement or relationship demands that the key project leaders can employ different leadership styles at different stages. For instance, project managers can employ a democratic type of leadership in integrating and coordinating project H&S plans during the design stage and can also employ autocratic leadership to enforce H&S rules and regulations on site.

Power or influence theories or approaches focus on the ways that leaders can influence subordinate decisions or behaviour. The two dominant approaches are leader-member exchange theory (Dansereau, Green and Haga, 1975 cited in Northouse, 2010: 34) and transformational or transactional leadership (Bass, 1985 cited in Northouse, 2010: 56). The leader-member exchange focuses on the development of qualitatively different relationships with subordinates ‘in group’ or ‘out group’ (Northouse, 2010: 35). The quality of relationships between a leader and a subordinate
influence the extent to which a subordinate is considered as part of an ‘in group’ or ‘out group’ (Northouse, 2010: 56). The ‘in group’ or ‘out group’ of a subordinate is determined by the extent to which the a leader is able to work well with the subordinate and also the extent to which a subordinate is willing to carry out activities beyond his or her normal job description (Liden and Green 1985 cited in Bass and Bass 2008: 4). Bass and Bass (2008: 5) identify the following characteristics that exist between leader and subordinate ‘in group’ relations as mutual trust and respect and liking. However, a leader and subordinate ‘out group’ relationship is formal and lacks a sense of common purpose (Yukl, 2010: 23). Nevertheless, Northouse (2010: 57) and Yukl (2010:12) argue that leader-member exchange theory falls short by not fully describing how high quality leader-subordinate relationships can be created and sustained over time.

Transformational and transactional leadership can be considered as behavioural approaches to leadership (Hofmann and Morgeson, 2004). Transformational and transactional are concerned with leaders’ power or influence over subordinates’ attitudes to align them with the organisation’s objectives and strategies. Transformational leadership was first introduced into political literature by Burns (1978 cited in Bass and Bass, 2008: 23) who defines it as the ability of leaders to inspire individuals to meet organisational goals beyond their self-interest. However, later work of Bass (1985 cited in Northouse, 2010: 56) expanded and refined the model to include transformational and transactional leadership.

Transformational leaders, according to Fin and Yule (2003: 46) and Yukl (2010: 56), act as role models, inspire and mentor subordinates and challenge employees to think outside the box. Research work of Inness, Turner, Barling and Stride (2010: 2) on transformational leadership and employee safety performance concluded that transformational leadership is associated with a number of H&S related benefits, including reduced site injuries and incidents. On the other hand, transactional leaders are concerned with motivating employees to attain performance standards and meet task objectives in exchange for rewards (Northouse, 2010: 57).
Table 3.1: Historical development of four major leadership theories

<table>
<thead>
<tr>
<th>Important Dates</th>
<th>Theory</th>
<th>Arguments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930s</td>
<td>Trait</td>
<td>Leaders are ‘born’ rather than made; focus on innate characteristics and qualities that distinguish good leaders from bad ones (Hoffman and Morgeson cited in Northouse, 2010: 53)</td>
</tr>
<tr>
<td>1940-1950s</td>
<td>Behavioural</td>
<td>Concern about what leaders do; distinguish effective leadership from ineffective leadership behaviour. Emphasise task-oriented and people-oriented leadership behaviour (Luthan, 1964 cited in Naoum, 2011: 157)</td>
</tr>
<tr>
<td>1960-1970s</td>
<td>Contingency</td>
<td>Leadership effectiveness depends on the context; leadership styles will be best suited to different context and situations (Fiedler, 1967 cited in Northouse, 2010: 76)</td>
</tr>
<tr>
<td>1970s</td>
<td>Power or influence (Leader-member exchange)</td>
<td>Leader develops qualitatively different relationships with subordinates (‘in group’ and ‘out group’) (Dansereau, Green and Haga, 1975 cited in Northouse, 2010: 56)</td>
</tr>
<tr>
<td>1970-1980s</td>
<td>Power or Influence (Transformational or transactional)</td>
<td>Focus on leaders behaviour in terms of vision and ability to inspire followers (transformational) Burns (1978 cited in Yukl, 2010: 67); leaders define performance standards and offer rewards for meeting task objectives (Bass, 1985 cited in Yukl, 2010: 75)</td>
</tr>
</tbody>
</table>

(NAoum, 2011: 156)

They are less concerned with inspiring employees or attending to their individual needs. However, at the operational level, site managers and supervisors who exhibit transactional leadership styles can actively monitor workers’ behaviour to ensure that they comply with expected H&S behaviour and standard performance. Table 3.1 presents a historical development of the four identified leadership theories and provides arguments for each.

However, the four major identified leadership theories or approaches have their merits and disadvantages. It can be argued that leadership styles and behaviour exhibited by leaders are dictated by tasks, organisational structure and situations.
3.5.2 Leadership versus management

Naoum (2011: 153) states that the terms leadership and management are often used interchangeably, but there are fundamental differences between the two. He further states that management is concerned with dealing with short-term problems that take place within the internal hierarchical structure of the organisation. Management functions according to Henri Fayol (1949 cited in Naoum, 2011: 10) include planning, organising, commanding, coordinating and controlling employees to achieve organisational set goals. However various authors, inter alia, Madlock (2008: 67) have added staffing and motivating employees to the functions of management. Drawing from the above functions of management, managers in any organisation have duties and responsibilities to establish clear targets, define standards, encourage staff development, undertake appraisal, conduct analysis of short-term problems and make short-term decisions for organisational effectiveness.

A leader is a person who has the ability and personality to direct and guide people, influence their thoughts and behaviour and motivate and control them to work towards goals that are regarded by the group and organisation as desirable and achievable (Naoum, 2011: 152). Achua and Lussier (2010:12) argue that a leader is a charismatic person who is prepared to take risks and bring about long-term change in people’s attitudes, behaviour and culture, as evident in Gandhi, Martin Luther King and Nelson Mandela. These people have in the course of history, demonstrated qualities of a good leader. They further maintain that managers do things right while leaders do the right things. This statement is supported by Adair (1988 cited in Naoum, 2011: 152) who states that leadership is about a sense of direction. Thus, the high demand for leaders rather than managers in managing construction projects particularly in the areas of workers’ H&S is on the rise. It has been agreed that effective leadership is a key component of a successful organisation.
3.5.3 Leadership influence on H&S management

Leadership in terms of construction H&S is a very complex and often subjective issue. However, an understanding exists that ‘good H&S is good business’ and the tenet that productivity and H&S are influenced by leadership remains unproven (Flin and Yule, 2003: 46). As noted by researchers such as Flin and Yule (2003: 45), Krause (2003: 1), Geller (2008: 26), Howarth and Watson (2009: 128), Spangenberg (2009: 1), Sunindijo and Zou (2012:12), poor leadership impacts on overall project performance and stakeholders profit margins. They also note that it has a major negative impact on workers’ H&S behaviour. The cidb (2011: iii) report on Construction Quality in South Africa: A Client Perspective notes that the lack of integrity and openness among leaders in management manifest in poor construction quality, cost overruns and workers’ poor H&S performance.

Leaders have a responsibility to establish the best practice standards to which an organisation must adhere. Lutchman et al. (2012: 78) argue that the leadership quality exhibited by the clients and their appointed consultants sets the best practice standards for contracting organisation to meet workers’ H&S needs and compliance with the national regulatory agencies and industry standards. Commitment of clients and project consultants is very important. On this note, Flin and Yule (2003: 45) contend that no amount of detailed regulation for H&S improvement could make up for deficiencies in effective leadership. Therefore, the right attitude and behaviour must come from the clients, designers and engineers, project managers and quantity surveyors for optimal H&S performance. A positive change at the upstream will manifest at the downstream (safe behaviour of workers).

An organisation’s operating procedures and H&S work practices are developed and approved by the clients and their appointed consultants (Sunindijo and Zou, 2012: 3). The behaviour of the key project leaders must demonstrate consistency, accountability and openness relative to workers’
H&S (Cooper, 2010: 19). In addition, Sunindijo and Zou (2012: 4) further argue that transparency, empathy and openness regarding workers’ H&S management are essential. These are qualities associated with leadership that are highly desirable among the key project leaders.

Accountability for performance against set H&S goals and objectives is a critical leadership role of the key project leaders (Lutchman et al. 2012: 78). Geller (2008: 27) contends that investment in H&S should be justified on a similar basis as other competing project parameters such as cost, quality and time. Clients, through their appointed cost advisers, should ensure that adequate financial resources are allocated for H&S. Similarly, contractors tendering for a construction project must adequately provide for H&S in their tenders. Transformational leadership styles epitomise accountability by leaders. Thus, lack of accountability in discharging professional duties will result in inadequate facilitation of financial provision for H&S in the bills of quantities. The consequences will be a lack of funds for H&S intervention on sites. Therefore, non-adherence to this by quantity surveyors is poor H&S leadership and unethical behaviour.

Lu and Yang (2010:125) state that leadership resides on effective control and supervision of the organisational standards and procedures. Transactional leadership styles and behaviour can be employed by leaders to ensure that adequate control and supervision are given to all workers under their control. On the other hand, transformational leadership styles and behaviour that encourage trust and openness create a work environment characterised by workers. Thus, certain anomalies such as shortcuts and taking chances among the workforce will disappear (Lu and Yang, 2010: 131). Effective control and supervision of the workforce is very important for maintaining and sustaining organisational H&S standards and compliance.

3.6 TYPES OF LEADERSHIP

Northouse (2010: 131) and Naoum (2011: 152) state that the differences in various leadership styles hinge on a leader’s behaviour. Behavioural leadership theories attempt to explain distinctive
styles used by effective leaders and to define the nature of their work (Achua and Lussier, 2010: 16). Many research studies have examined the relationship between leadership and measures of leadership effectiveness. Achua and Lussier (2010: 16) assert that there is no agreement on one best leadership style for all management situations. They further argued that Mintzberg’s leadership theory is of advantage for training leaders. Williams (2003 cited in Northouse, 2010: 26) opines that there are two generic dimensions of leader ‘behaviour: task and people oriented leadership, which account for leadership effectiveness. As discussed previously, Ohio State University researchers (1950, cited in Northouse, 2010: 12) identified two types of leadership: consideration and initiating structure. Hopkins (2008: 148) asserts that whichever type of leadership style is used, construction managers must be able to motivate employees and create favourable conditions that promote the health, safety and welfare of workers and employees. However, there is a general consensus that leadership is crucial for a safe organisation. Findings from all major injury incident investigations point to poor leadership at management levels as the root cause of poor H&S performance. However, there are considerable studies on leadership, but very few address construction H&S.

3.6.1 Autocratic leadership

Mangham (2006: 43) and Yukl (2010: 34) describe autocratic leadership as one where power or authority is centrally controlled and all decisions are taken by the leader. Autocratic leaders are seen as the bosses who control the organisation with little or no input from subordinates. Achua and Lussier (2010: 145) argue that organisation size, structure, climate, goals and technology could favour autocratic leadership style and behaviour. This argument could be true to a certain degree when size of existing small and medium enterprises in the construction industry is considered (Madlock, 2008: 62).

However, where H&S is concerned, autocratic leaders who value workers’ health, safety and well-being could produce positive results (Lutchman et al. 2012: 86). They further argue that, presently,
autocratic leadership and behaviour continue to thrive in many developing countries in contrast to developed countries. The prominence of autocratic leadership in developing countries could be connected to culture and the poor state of economic development. This autocratic type or style of leadership is evident among the key project leaders due to the size and number of employees in their organisations. For instance, a firm of architects and engineers may have two to five employees. This contention also applies to quantity surveying firms and project managers. The consequence of the existence of these small size firms has been lack of commitment and unaccountability that often leads to poor project management including H&S. Table 3.2 shows the strengths and weaknesses of autocratic leadership styles and behaviour.

Table 3.2 Strengths and weaknesses of autocratic leaders

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Look after the H&amp;S of workers and welfare</td>
<td>Relies on threats and punishment to influence workers</td>
</tr>
<tr>
<td>Return structures to poorly managed areas</td>
<td>Will not trust workers and employees</td>
</tr>
<tr>
<td>Make decisions quickly</td>
<td>Workers inputs not allowed</td>
</tr>
<tr>
<td>Credited for running a tight shift</td>
<td>Limits workers creativity</td>
</tr>
<tr>
<td></td>
<td>Workers are not motivated</td>
</tr>
<tr>
<td></td>
<td>Experienced and competent workers are not retained</td>
</tr>
</tbody>
</table>

(Lutchman et al. 2012: 86)

Drawing conclusions from Table 3.2, the autocratic leadership style and behaviour can be best employed by site supervisors to enforce site H&S rules and performance standards. However, the democratic leadership becomes ideal in motivating and building team spirit among workers.
3.6.2 Democratic leadership

Yukl (2010: 58) and Storey (2006: 18) state that the democratic leadership styles exist where there is intense team-building and team decision-making. However, construction processes involve interplay of different independent organisations (principal contractors’ personnel and many subcontractors on one site). The complex interplay between these independent organisations makes it difficult to define who is a leader. Notably, democratic leadership encourages a participatory form of management that involves middle and site managers and supervisors in organisations’ decision-making processes (Lu and Yang, 2010: 133). This involvement and participation of the line management in decision-making has been noted to promote trust, credibility and transparency that lead to better organisational performance. Proper application of democratic leadership styles by contracting organisations could lead to H&S performance improvement.

In construction organisations for instance, the head offices are often far from the sites and, in particular, operations are undertaken by a multitude of different subcontractors with different management styles and cultures that could create problems of unity in decisions. Notably, decision-making processes become very lengthy and cumbersome and may result in increases to overall costs of doing business (Lutchman et al. 2012: 87). These are common on major construction project sites. The consequences have been poor project coordination and monitoring that lead to poor H&S. Table 3.3 presents the strengths and weaknesses of democratic leadership.
Table 3.3 Strengths and weaknesses of democratic leaders

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can maintain high quality and productivity over long periods of time</td>
<td>Mistakes can be quite costly</td>
</tr>
<tr>
<td>Workers like the trust they receive and respond with cooperation, team spirit and high morale</td>
<td>The decision-making process can be very lengthy as leaders try to get everyone on board</td>
</tr>
<tr>
<td>Often democratic leaders will recognise and encourage achievements</td>
<td>The lengthy decision-making process adds to the overall cost of doing business</td>
</tr>
<tr>
<td>Generally democratic leaders encourage workers to grow on the job and be promoted</td>
<td>Opportunities may be lost while leaders engage other stakeholders to gain support for decisions</td>
</tr>
</tbody>
</table>

(Lutchman et al. 2012: 86)

However, democratic leadership has shown more strength in areas of building trust, team spirit among workers and recognising workers’ achievements in terms of promotion and rewards for exemplary H&S behaviour. It is also evident from Table 3.3 that democratic leadership encourages lengthy decision-making processes that may not be suitable for construction site operations.

3.6.3 Servant leadership

Servant leadership is suited to an environment where the workforce is homogenous (Lutchman et al. 2012; 87). This type of leadership style cannot be ideal in the construction industry given that many characteristics such as gender, cultural affinity, education and age differences can be found among the work group. In some instances, construction site workers are normally people with little or no education and cases of rural migrant workers with cultural differences are rampant (Okorie and Smallwood, 2011: 133). However, the goals of servant leaders are to ensure that the behaviour of workers aligns with the organisational goals and objectives. Lutchman et al. (2012: 88) point out
that the servant leadership promotes worker empowerment and builds mutual trust among them. Trust is noted to enhance workers belief in what management proposes. Lu and Yang (2010: 127) concur and state that in a working environment where leaders build trust and confidence among workers, there will be improved performance. Table 3.4 shows the strengths and weaknesses of servant leadership.

Table 3.4 Strengths and weaknesses of servant leaders

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promote empowerment and mutual trust</td>
<td>Cannot perform in volatile work environment</td>
</tr>
<tr>
<td>Possess skills of listening, empathy, appealing, awareness, persuasion, foresight and commitment to workers growth</td>
<td>Need clear goals for performance</td>
</tr>
<tr>
<td>Skilled in consensus making, ethical decision making and conflict resolution</td>
<td>Requires strong relationships between leaders and workers</td>
</tr>
</tbody>
</table>

(Lutchman et al., 2012: 88)

Although, the servant leadership style promotes workers’ empowerment and builds mutual trust among workers, it can be argued that in a task oriented work environment like construction, the servant leadership style may not be suitable.

3.6.4 Situational and transactional leadership

Situational leadership was first developed by Blanchard and Hershey (1972 cited by Wefald and Katz, 2007: 105; Northouse, 2010: 30). According to Northouse (2010: 35), the situational leadership model of Blanchard and Hershey is widely used today for developing interpersonal skills of managers and supervisors. It has been argued that the development of leadership skills among frontline managers and supervisors could influence their leadership qualities. This would create a better manner of dealing with workers and would result in high productivity and H&S improvement in the workplace.
Situational and transactional leaders, as argued by Achua and Lussier (2010: 310), are leaders who offer incentives and/or punishment that are contingent on the followers’ performance on meeting agreed standards. Situational leaders gain compliance from followers, set goals and obtain agreement on what is to be accomplished, monitor performance and administer reinforcement. It is argued that a proper application of situational leadership can enhance workers H&S as this approach involves directing, supporting, coaching and delegating responsibilities to workers. However, situational leadership cannot be effectively applied in a diverse workforce such as construction sites where there are many different cultures working together (Lutchman et al., 2012: 88). This view is shared by Geller (2008: 61) who states that situational leadership styles may not be ideal in construction due to the diversity of cultures.

Table 3.5 shows the strengths and weaknesses of situational leadership styles and behaviour.

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop employees to high levels of maturity</td>
<td>Can misinterpret the maturity state of the workers leading to unintended consequences</td>
</tr>
<tr>
<td>Create motivated workers</td>
<td>Can lead to situations where employees quit due to poor leadership behaviour</td>
</tr>
<tr>
<td>The maturity of workers influence the leadership behaviour leading to better understanding</td>
<td>Can potentially discriminate against some cultures in a diverse workforce</td>
</tr>
<tr>
<td>Can maintain high productivity</td>
<td>Leaders may not effectively operate in all stages of workers’ development</td>
</tr>
</tbody>
</table>

(Lutchman et al. 2012: 88)

Situational and transactional leaders, as noted, offer incentives and punishment that are contingent on the followers’ performance in meeting agreed standards. This is highly desirable for site
supervisors to enforce site rules and compliance of performance standards. However, situational and transactional leadership can frustrate workers and result in worker absenteeism and resignation of appointment.

3.6.5 Transformational leadership

Transformational leadership was first articulated by Burns (1978) and later expanded by Bernard in 1990 (Achua and Lussier, 2010: 203). The theory was developed from an earlier work on charisma in political leaders. It postulates three components of leadership: transactional, transformational and laissez-faire. Transformational leaders are charismatic, inspiring, stimulating and considerate. They provide followers with a sense of purpose, portray an image of success, self-confidence and self-belief. These leaders articulate shared goals, develop mutual understanding and describe an attractive future (Achua and Lussier, 2010: 203). This is also known as behavioural leadership (Northouse, 2010:3).

Transformational leadership is dominant in many western workplaces today (Lutchman et al. 2012: 89). Leaders, who exhibit transformational leadership qualities, show genuine concern, are transparent, act with integrity, resolve complex problems and support a developmental culture that is needed in the construction industry to promote H&S performance. However, transformational leaders are lacking in developing countries and this can be attributed to poor H&S performance in the construction industry. Alimo-Metcalfe and Alban-Metcalfe (2006: 174) describe transactional leadership as managers and transformational leadership as leaders. They further argue that leaders rated as transformational are described as influential, inspirational and charismatic, whereas leaders rated as transactional are described as task-and reward-oriented. Achua and Lussier (2010: 310) point out that the differences between transactional and transformational leadership are at opposite ends of a single continuum of leadership. Documented research findings indicate that both are valid approaches for achieving organisational objectives, with transformational leadership being
the most preferred leadership. Northouse (2010: 38) points out that a transformational leader emphasises the importance of group values and is focused on the collective interest of the organisation. This type of leadership is highly needed for effective construction H&S management.

The adoption and application of transformational (behavioural) leadership by key project leaders in the construction industry will be of great value, particularly to promote and sustain positive H&S performance. Figure 3.2 illustrates the four components of transformational leadership.

**Figure 3.2: Four behaviour dimensions of transformational leadership (Adapted from Achua and Lussier, 2010: 306)**

Achua and Lussier (2010: 306) affirm that transformational leaders demonstrate exemplary commitment to organisational shared visions and values. Bass and Avilio (1994 cited by Achua and Lussier, 2010: 306) state that transformational leadership theory is composed of four behaviour dimensions and refer to them as ‘four I’s’, namely: idealised influence, inspirational motivation, individual consideration and intellectual stimulation, as shown in Figure 3.2. They claim that the ‘four I’s’ have been successfully used in other disciplines and cultures to explain the relationship between effective leadership (transformational leaders) and their subordinates. Table 3.6 presents the strengths and weaknesses of transformational leadership.

Drawing from Table 3.6, it can be argued that the transformational leadership style and behaviour is suited for effective H&S management. For instance, project managers, designers and senior managers can employ the transformational leadership style and behaviour during project negotiation and documentation. In addition, site supervisors can also employ the transformational leadership style and behaviour to build trust and motivate workers on site
Table 3.6 Strengths and weaknesses of transformational leaders

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
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<tbody>
<tr>
<td>Will create an organisational environment that encourages creativity,</td>
<td>Leave a void in the organisation if followers and workers are not</td>
</tr>
<tr>
<td>innovation, proactivity, responsibility and excellence</td>
<td>developed to assume a role</td>
</tr>
<tr>
<td>Have moral authority derived from trustworthiness, competence, sense of</td>
<td>Leaders may lose focus</td>
</tr>
<tr>
<td>fairness, sincerity, purpose and personality</td>
<td></td>
</tr>
<tr>
<td>Will create a shared vision, promote involvement consultation and</td>
<td></td>
</tr>
<tr>
<td>participation</td>
<td></td>
</tr>
<tr>
<td>Lead through periods of challenges and intense competition or high</td>
<td></td>
</tr>
<tr>
<td>growth periods</td>
<td></td>
</tr>
<tr>
<td>Promote intellectual stimulation</td>
<td></td>
</tr>
<tr>
<td>Usually consider individual capabilities of employees</td>
<td></td>
</tr>
<tr>
<td>Are willing to take risks and generate management change</td>
<td></td>
</tr>
<tr>
<td>Lead across cultures and international borders</td>
<td></td>
</tr>
<tr>
<td>Build strong teams while focusing on macro management</td>
<td></td>
</tr>
<tr>
<td>Are charismatic and motivate workers to strong performance</td>
<td></td>
</tr>
</tbody>
</table>

*(Lutchman et al. 2012: 89)*

3.7 THE IMPORTANCE OF TRANSFORMATIONAL LEADERSHIP TO H&S MANAGEMENT

It has been suggested that transformational leadership may be an appropriate model for improving construction workers’ H&S performance. It is equally prudent to state that no single leadership style has the solution for a complex industry such as construction (Lee and Austin, 2011: 8). Studies by Krause (1997: 105; 2003: 3), Flin and Yule (2003: 45), Geller (2008: 26), Lee and Austin (2011: 3),
Sunindijo and Zou (2012: 4) and Lutchman et al. (2012: 323) have established the existence of a strong link between leadership and workers’ H&S behaviour.

Autocratic, democratic and situational or transactional leadership styles when properly applied can positively influence workers’ H&S behaviour. As noted, there are important behaviours associated with these leadership styles that would theoretically be associated with high levels of worker H&S performance. For instance, situational or transactional leaders may develop workers to higher levels of maturity and maintain high productivity and in particular, develop interpersonal skills among site managers and supervisors. In contrast, leaders who take action when something goes wrong and do not encourage workers to develop their potential and contribute to decision-making processes may not properly align with the cooperation needed for effective construction H&S management.

Examining the relevance or theoretical rationale for transformational leadership styles and behaviour will reveal that it is highly applicable to influencing the H&S behaviour of workers. This is because transformational leadership encourages workers to subscribe to group and organisational goals in preference to personal gain. It is well-known that sustainability of high H&S performance and culture is highly dependent on the trust that workers perceive from management. Transformational leaders set examples for workers, which are consistent with the organisational values and expectations, through exemplary behaviour (Achua and Lussier, 2010: 307). Geller (2008: 148) argues that a workplace culture that promotes employees’ distrust of instructions from management is one that cannot develop a productive H&S culture. For instance, when a worker bypasses H&S standards to improve production and this is ignored by management, workers are lead to believe this is acceptable to management. This is in parallel with transformational leadership principles.

Lees and Austin (2011: 3) state that the military command (top-down) approaches for H&S management no longer achieve the desired results, and consequently injuries and accidents
continue to occur at alarming rates. The transformational leadership models, in which leaders’
behaviour is aimed at encouraging and building teamwork among workers, could realise H&S
performance improvement at all levels in an organisation. Further behaviour-based H&S
management emphasises up-down flow of communication, free environmental accident reporting
and investigation.

Lutchman et al. (2012: 30) emphasise that workers always look toward leaders for guidance,
especially in their quest to emulate the exemplary qualities of their leaders. Honesty and integrity
of organisational leaders are absolute requirements for creating a motivated workforce and
improving workplace H&S culture. Transformational leaders empower followers and workers by
challenging them to think ‘outside of the box’ and to re-examine old methods of doing things
(Lutchman et al., 2012: 45). Empowering workers through H&S education and training will result in
greater job satisfaction, organisational commitment and higher productivity (Geller, 2008: 49).
Undoubtedly, investing in workers’ education and training will lead to better project performance
including workers’ H&S.

Transformational leadership, according to Lutchman et al. (2012: 323), entails support and
commitment by leaders at all levels of management, encourages up-down communication, with
leaders demonstrating being good role models and mentors for workers. In addition, leaders must
demonstrate genuine care for all workers and make H&S a part of the organisation’s work culture
(Luria, 2011: 1289). Transformational leadership, as argued by Northouse (2010: 67), emphasises
a participatory or collaborative work environment that involves all workers in finding the right
solutions to workplace H&S. Thus, suboptimal H&S performance can be attributable to leaders who
cannot inspire workers by rewarding behaviour that supports safe work and creates a continuous
learning environment.
3.8 CHALLENGES OF TRADITIONAL BEHAVIOUR-BASED HEALTH AND SAFETY IMPLEMENTATION IN CONSTRUCTION

The application of behaviour-based H&S has proved to work well within fixed work environments such as manufacturing (Geller, 2003: 45), nuclear plants (DeJoy, 2005: 105) and food processing (Komaki, Kenneth and Scott, 1978) in contrast to a changing work environment such as construction. In support of the argument, Wu and Fang (2012: 4) maintain that these environments are in complete contrast to construction sites, where work involves a chain of complex activities and different, independent participants often have unique behaviour. They further argue that the majority of the work on construction sites is often undertaken by subcontractors and casual workers.

In a similar manner, Hopkins (2006: 585) points out that the construction industry is not considered in the traditional behaviour-based H&S programme. Wu and Fang (2012: 5) concur that there are features of the construction industry that are unique when compared to fixed work environments and further list the following challenges in implementing behaviour-based H&S on construction:

- Lack of root cause analysis of unsafe behaviour;
- Neglect of the role organisational factors play in employees’ unsafe behaviour;
- A relatively poor H&S culture in organisations and projects, especially with subcontractors;
- A low level of H&S training among construction workers;
- Complicated workplace and environments;
- The high liquidity of construction labour market, and
- The diversity in employees’ background and experience.

These are good grounds for behaviour-based H&S critics who contend that these approaches or systems can never work well in the construction industry. However, the work of Komaki (1978), who first applied behavioural science analysis in her friend’s family food processing factory, shows that if behaviour-based H&S is effectively applied, it will realise a significant improvement in production
and lower accidents and injuries in the workplace (Wu and Fang, 2012: 1). In addition, behaviour-based H&S management has been successfully used in other countries such as Australia (Spangenberg, 2009: 230) and the UK construction industry (Sherratt and Ferrell, 2012: 372) with a positive outcome in workers' H&S behaviour. Therefore, the researcher is of the view that behaviour-based H&S management will be appropriate in the South African construction industry. It will bring about a behavioural change in both the key project leaders and the workers and will eventually result in H&S performance improvement in the industry.

3.9 LEADERSHIP AND BEHAVIOUR-BASED HEALTH AND SAFETY IMPLEMENTATION

Leadership has been noted as the critical factor that drives organisational H&S performance and culture. Markiewicz (2009: 20) argues that leading H&S and organisational culture change within an organisation requires leadership skills and not only management skills. Thus, implementation of a behaviour-based H&S management system is largely dependent upon leadership commitment in defining an organisation’s H&S philosophy (Lutchman et al., 2012: 48). It is the responsibility of the top leaders to develop standards for each element of the behaviour-based management system and to share these across the organisation to guide the behaviour of all workers. It is the positive behaviour of leaders that sends messages to workers on the value management places on their H&S. Workers’ H&S behaviour will be positively or negatively influenced by leaders’ commitment to project H&S. As stated by the chief executive of BP American oil, ‘workers hear what we say, but what they do reflects on what we do’ (Lutchman et al. 2012: 56). This statement vividly explains the importance of transparency, honesty and trustworthiness as qualities of good leaders. Sunnindijo and Zou (2012: 3) assert that true leadership starts with a good understanding of the impact of one’s own behaviour on followers. Thus, transparency, honesty, integrity, trustworthiness, empathy and the ability to act as a role model for the workers, are essential ingredients for successful implementation of a behaviour-based H&S management.
3.10 STRATEGIES FOR IMPLEMENTING BEHAVIOUR-BASED H&S MANAGEMENT

Lees and Austin (2011: 1) argue that companies may have volumes of written rules and regulations designed to achieve H&S performance improvement. However, on their own these written rules and regulations will not achieve the objectives. A well-written H&S policy without implementation is as good as waste paper in the dustbin. Successful implementation of a behaviour-based H&S management system in an organisation depends on a combination of many factors. Lutchman et al. (2012: 57) identify eight major stages that organisations can adopt for successful implementation of a behaviour-based H&S management system. These include: H&S vision and policy, H&S standards, allocating responsibilities and resources, H&S training of workers, documentation and record keeping, controlling and monitoring the system, maintaining and sustaining the system, and performance management.

3.10.1 Establishing the H&S vision and policy

The H&S policy of an organisation and its mission statement is relative to the value an organisation places on H&S. H&S policy is the guiding principle that defines an organisation's H&S vision and mission in terms of H&S management (Hinze, 2006: 71). The organisation's H&S vision and mission, defined by top leaders, are communicated to workers through constant messaging and are demonstrated through the leaders' behaviour. Successful implementation of a behaviour-based H&S management approach is linked to top management by demonstrating visible leadership and commitment.

3.10.2 Definition of H&S and setting of standards

Effective implementation of a behaviour-based H&S management system requires clearly defined standards free of any ambiguity to guide the behaviour of all workers in the organisation (Geller, 2008: 21). The set standards must be easy to follow, practicable and applicable to all workers and sites. They are the guiding principle to be followed by all departments in the organisation. The
standards must be flexible to allow for revision to meet the needs of any required circumstances. According to Lutchman et al. (2012: 50) a behaviour-based H&S management system should be generally developed to meet or exceed national regulatory standards. Markiewicz (2009: 21) contends that a behaviour-based H&S management system becomes more effective when integrated with national laws, regulations and accepted standards. The key project leaders should develop robust standards in discharging their H&S responsibilities that will, in turn, promote quality. For instance, clients must allocate adequate financial resources for project H&S.

3.10.3 Allocation of responsibilities and resources

Allocation of responsibilities to personnel is vital for successful implementation of a behaviour-based H&S management system in any organisation (Naoum, 2011: 43). The organisation must assign responsibilities to employees who have a passion to drive the organisation’s H&S vision and mission to the desired height. Lutchman et al. (2012: 51) maintain that the team should be empowered and be given all the necessary support in terms of financial resources.

3.10.4 H&S training of all workers

Training of workers is a prerequisite for behaviour-based H&S management system development and implementation (Krause, 1997: 5; 2003: 3). Training has been extensively discussed in Chapter Two of the literature review. Training may vary from general awareness training to training that requires assessment of competency. General H&S awareness training, according to Krause (1997: 45), Sunindijo and Zou (2012: 3), is required for all personnel and those directly involved in the implementation of a behaviour-based H&S management system in the organisation. The training matrix that is required of personnel in the implementation process is specialist training. It requires competency in the use of a computer, particularly in the use of Microsoft Excel spread sheets for entering and analysing observed data (Lutchman et al. 2012: 65). Besides worker specialist training,
general H&S training of workers helps to develop their skills and create awareness of the existence of hazards in the work environment.

3.10.5 Documentation and records keeping

According to Schaechtel (1997 cited in Lutchman et al. 2012: 52), proper documentation and record keeping is a key element of successful implementation of a behaviour-based H&S management system. Well-managed documentation and records fulfil regulatory requirements as the documents can be used in a court of law as evidence that due diligence and care have been followed in case of any unfortunate event occurring (Lutchman et al. 2012: 52). They further argue that documentation and recording are important as they provide a framework for continuous performance improvement and help in improving the behaviour-based H&S management system in the organisation. The importance of documents and records that require proper keeping and management are:

- Training and competency assessment;
- Audits inspection;
- Equipment inspection;
- Incidents and accidents records;
- Incidents and accidents investigation reports;
- Standard operating procedures, and
- Code of practices and corporate policies

These documents and records are vital for behaviour-based H&S management implementation as they can be referred to during incident investigation in a court of law (Lutchman et al. 2012: 53).
3.10.6 Control and monitoring

Monitoring and control of a behaviour-based H&S management system in an organisation is crucial for its overall success. Monitoring and control ensure full compliance with policies, set standards, procedures and codes of practice (Lutchman et al. 2012: 53). Through control measures, management will be able to assess whether a system is achieving the set objectives or not so that proactive action can be taken. Markiewicz (2009: 20) contends that control measures such as an internal audit review is necessary for the sustainability of a behaviour-based H&S management system in any organisation. Thus, control provides corporate leaders with indicators and measures to assess the status of compliance and also for any remedial and corrective action.

3.10.7 Maintenance and sustainability

Behaviour-based H&S management systems require maintenance and sustainability for the system to function effectively (Markiewicz, 2009: 25). The steering committee appointed by management has the responsibility to oversee the effective implementation and sustainability of the system in the organisation and to communicate with management on progress. Visible leadership and commitment are essential for sustaining and maintaining a behaviour-based H&S management system as it is the responsibility of leaders to approve all resources for its day to day running.

3.10.8 Performance management

The final stage of implementation, according to Lutchman et al. (2012: 54), is known as performance management. It is concerned with continuous monitoring of data and information sharing regarding H&S performance at the individual, work group and department levels. These approaches of performance improvement are concerned with the gathering of information about total recordable injury frequency (TRIF), employee recordable injury frequency (ERIF), lost time injuries (LTIs), number of disabling injuries (NDIs) and workmen compensation. Lutchman et al. (2012: 54) argue that these lagging indicators are critical in determining organisation performance in terms of
accident and incident prevention. Musonda et al. (2012: 87) argue that performance management should focus attention on leading indicators as a proactive measure for improving overall H&S performance and culture in an organisation. Lutchman et al. (2012: 54) maintain that performance management helps organisations to be in tune with the daily activities in respect of accidents and incidents and also helps leaders with corrective actions. Figure 3.3 illustrates leadership and strategies for implementing a behaviour-based H&S management system in an organisation.

When comparing these with the key elements of successful H&S management by the UK HSE there are notable variants: These are: definition of H&S standards by all departments, allocation of responsibilities and resources for its effective implementation, H&S training of workers to promote safe behaviour on site and documentation and record keeping relative to site incident investigation. Other variants are: controlling and monitoring to assess whether the system is achieving its set objectives, maintaining and sustaining the system and finally carrying out performance management appraisal on the system. This is a continuous H&S performance improvement. Thus, it can be compared to Deming’s quality management do-plan-check-action. This implies that continuous H&S performance improvement should involve the project leaders (clients, designers, project managers, quantity surveyors and contractors) who are the creators of the work environment.

3.11 LEADERSHIP FUNCTIONS AND H&S STRATEGIES

Leadership functions and strategies for effective construction H&S management are graphically shown in Figure 3.3 below.

Figure 3.3 Implementing a behaviour-based H&S management system (Adapted from Lutchman et al. 2012: 49).
3.12 ELEMENTS OF A LEADERSHIP-FOCUSED APPROACH TO BEHAVIOUR-BASED HEALTH AND SAFETY

Effective application of a leadership-focused approach to behaviour-based H&S management rests on leaders who are involved in H&S processes at all levels of an organisation (Lees and Austin, 2011: 1). The behaviour of leaders contributes to over-all H&S performance. For noting, it is the behaviour of the top leaders that influences or determines the organisational H&S culture. Similarly, the frontline leaders' behaviour is critical as they are the first point of contact between workers and management. Motivating workers not only affects productivity but also impacts on workers’ H&S behaviour (Zin and Ismail, 2011: 742). Thus, a motivated worker is a committed worker. Training and development of workers provide opportunities for organisations to increase not only technical competencies but also their commitment and loyalty. Krause (1997: 3) states that one of the behaviour-based H&S management principles is active involvement of workers in H&S matters. Involvement and active participation of workers in workplace H&S decision-making are critical for continuous improvement. Leadership is about influencing a group to achieve organisationally set goals. Therefore, leaders build strong teams among workers as their different inputs are put into use to attain the set goals.

3.12.1 Top leaders

Effective H&S management and sustainability of organisational H&S culture have been linked to top leaders’ H&S commitment, involvement and participation in their projects’ H&S. Lutchman et al. (2012: 320) maintain that a company’s board of directors (BoDs) should ensure that all board decisions must reflect their H&S intentions and values, as articulated in the organisational H&S policy statements. The BoDs should demonstrate visible leadership and commitment to workers’ H&S through adequate allocation of financial resources for H&S, workers’ H&S education and training and appointing one of the board members as an H&S director (Yukl, 2010: 35). It is arguable that the development and sustainability of any organisational H&S culture is largely dependent on
top leaders commitment and involvement in their projects H&S. Oloke (2010: 40) argues that leadership for H&S must start at the board level, which has the responsibility to allocate the necessary resources and accountability as frontline leaders for effective H&S management.

3.12.2 Frontline leadership

The frontline leaders, according to Markiewicz (2009: 21), are the first point of contact between workers and the management. The behaviour of the frontline leaders influences workers’ H&S behaviour and loyalty to the organisation (Markiewicz, 2009: 21). For instance, at operational level workers' H&S behaviour is often a reflection of the behaviour of the frontline leaders. For example, if the frontline leaders fail to wear PPE or take shortcuts, workers will emulate this behaviour and H&S performance will be marginalised. Research has linked behaviour of the frontline leaders to worker satisfaction and positive H&S performance (Madlock, 2008: 61). It has been argued that lack of training and development of the frontline leaders can impact on their leadership skills and abilities. Lutchman et al. (2012: 203) contend that one of the major factors marginalising H&S improvement is the attitude of management in upgrading the leadership skills of the frontline leaders and supervisors to meet with H&S challenges. For instance, good communication skills should be a criterion in the appointment of site leaders and supervisors, as their duties and responsibilities entail planning, organising, controlling and monitoring daily site activities (Madlock, 2008: 62).

Leadership and interpersonal skills training among construction personnel, particularly frontline leaders according to Sunindijo and Zou (2012: 3), can serve as a guideline or an approach to improve their capabilities and enhance the sustainability of the system. The implications have been that they acquire leadership skills and behaviour that can be transferred to workers.

Lutchman et al. (2012: 204) contend that the behaviour of frontline leaders plays an important role in the implementation of a behaviour-based H&S management, leadership-focused approach. They further state that frontline leaders are responsible for providing H&S induction training to new
employees, ensuring that all workers have access to relevant policies, standards, safety operation procedures (SOPs) and codes of practice (COPs). In addition, they state that frontline leaders are responsible for verifying worker competency by observing workers at work. In a similar manner, Lu and Yang (2010: 128) add that frontline leaders provide adequate supervision to workers, promote involvement, collaboration and feedback on work-related performance and ensure close monitoring and control of H&S sensitive work situations in the workplace. Krause et al. (2010: 47) state that critical H&S practices and regulatory legislation, which are important for effective implementation of behaviour-based H&S management both at the design office and on construction sites, are enforced by frontline leaders. The importance of frontline leader roles cannot be over-emphasised, particularly as they ensure that workers who take shortcuts and fail to follow procedures will be punished.

3.12.3 Motivation of workers

The early work of Elton Mayo (1972 cited by Zin and Ismail, 2011: 742) points out that wages and job characteristics are strong motivators for worker performance. Fair and competitive wages during project execution help to retain workers. Lingard and Yesilyurt (2003: 59) maintain that job characteristics and leadership have been found to be important factors in influencing workers’ productivity. Zin and Ismail (2011: 742) argue that motivation not only affects productivity but also impacts on workers’ H&S behaviour. A motivated worker is a committed worker.

Worker motivation can be affected either positively or negatively by the supervisors’ leadership styles (Lutchman et al. 2012: 97). They further argue that leadership can influence unwelcome behaviour of workers such as absenteeism and lateness. Furthermore, this can lead to unsafe behaviour such as not wearing the PPE, disregard of safety operating procedures, unsafe work practices and shortcuts. Workers are motivated to emulate the behaviour of leaders who demonstrate visible and transparent leadership (Zin and Ismail, 2011: 743). Leaders at design
offices can motivate their workers through creating safe work environments, providing leadership by example and adequate training (Lutchman et al. 2012: 99). At the operational levels, top management, site managers and supervisors can also motivate their workers through the provision of relevant PPE, H&S training, provision of adequate site welfare facilities and being transparent and trustworthy leaders (Naoum, 2011: 105). Arguably, not only do all these factors motivate workers for higher productivity, but they also create a change in their attitudes, behaviour and a better workplace H&S culture.

3.12.4 Worker-training and development

According to Owens (2006: 166), the growing population of generation Y workers in the workplace have continually elevated training and development to the highest level. Workplace training can result in greater job satisfaction and organisational commitment. A study conducted by Little (2006: 23) determines that within a year in organisations with a poor focus on training, labour turnover was 41%, compared to 12% in organisations where training was made a priority by management. He further maintains that when workers’ H&S training needs are ignored there will be low morale among them and the consequence will be an increase in the number of site incidents. The importance of training and development, including H&S, provides opportunities for organisations to increase not only the technical competencies of the workforce but also their commitment and loyalty.

3.12.5 Worker involvement and participation in workplace decisions

The collaboration and involvement of workers in the workplace regarding H&S decisions, influences their loyalty to the organisation (Hopkins and Weathington, 2006: 477). Involvement and active participation of workers in workplace H&S decision making are critical for continuous improvement. According to Krause (1997: 67; 2003: 2) involving workers in organisational H&S has resulted in significant H&S performance improvement. Collaboration and involvement of workers promotes ownership and buy-in into work activities and a greater willingness by workers to get the job done
right (Lutchman et al. 2012: 302). Krause (1997: 147) contends that involvement is more than participation. He further argues that worker involvement happens when the workers are truly involved in planning, making decisions and implementation and this, in turn, leads to ownership and characterises the successful implementation of behaviour-based H&S management a leadership-focused approach.

Workers involvement and participation in H&S epitomises behavioural or transformational leadership qualities that focus on people-oriented leadership styles. Yukl (2010: 156) states that leaders who involve workers in H&S decision-taking win the hearts of workers leading to higher performance. Research has shown that worker involvement in decision-making at appropriate levels contributes to their loyalty and commitment (Hopkins and Weathington, 2006: 478). Involvement and participation of workers in workplace decisions leads to workers feeling more valued by their organisation (Geller, 2008: 20). Thus, it can be argued that involving workers in workplace decisions is a step in the right direction towards increasing worker motivation, productivity, loyalty and H&S performance.

3.12.6 Teamwork

Teamwork is a leading contributor to worker loyalty (Smither, 2003: 21). Teamwork promotes co-worker encouragement, support, advice, listening skills and leads to a more satisfying work environment. According to Smither (2003: 22), teamwork and team-building create a sense of belonging among workers as their different inputs are put into use. Higher organisational productivity has been linked to teamwork and team-building (Smither, 2003: 2). Transformational leadership supports teamwork and the creation of strong unity among workers (Lutchman et al. 2012: 102). In design offices principals and partners should encourage teamwork and team-building. Also, at the operational level, managers and supervisors should adopt and promote teamwork and team-building among their crew members as it will realise trust and loyalty.
3.13 SUMMARY

Accidents and injury rates within the South African construction industry remain a matter of great concern to workers, employers and government alike. The rates have reached a peak that requires urgent interventions. Although the H&S legislation, regulations and organisational policies have achieved success in accidents and injury prevention, it seems that they are not enough to meet the present-day challenges. A more practical and effective leadership and management approach are badly needed to improve the industry H&S performance.

Since poor leadership is the major underlying root cause of construction accidents, a focus on leaders’ behaviour has become imperative. It has been noted that poor leadership by the key project leaders impacts on workers’ H&S behaviour. For instance, clients’ H&S poor leadership and unethical behaviour, which manifest through the appointment and selection of the design team and a lack of due process in contracts procurement, have both a direct and indirect influence on at-risk work practices or unsafe behaviour of workers. Designers’ decisions in not eliminating risks and hazards during design processes have a direct impact on workers’ unsafe behaviour. Also, a lack of visible leadership and involvement by project managers and quantity surveyors marginalises H&S performance. At the operational level, contractors’ H&S inadequacies in terms of poor leadership and lack of commitment to workers’ H&S marginalise H&S performance. In meeting these challenges, contracting organisations need transformational leadership at all levels of management.

However, various leadership styles have their advantages and limitations. In the construction industry, particularly in developing countries, autocratic or situational leadership styles are common among small size contracting organisations. However, it has been noted that site managers who effectively employ autocratic or situational leadership styles can motivate workers. Thus, transformational leadership styles appear to be an appropriate model for improving H&S
performance. The challenge for the construction industry is to identify and then train the leaders who will improve workers’ H&S beyond the current levels.
CHAPTER FOUR: THEORETICAL AND CONCEPTUAL FRAMEWORK

4.1 INTRODUCTION

This chapter presents the perspectives that are critical to conduct this research. It introduces the variables of the research and the framework for data analysis. Anfara and Mertz (2006: xxvii) argue that researchers use theoretical frameworks to present concepts that have been tested to explain a phenomena in new and different ways to what seems to be ordinary and familiar. It is an attempt to develop a general explanation for phenomena such as the critical H&S leadership of the key project leaders and their causal relationships. Leedy and Ormrod (2010: 113) contend that one of the characteristics of scholarly work is the development of sound theoretical perspectives. Theoretical perspectives guide researchers to make valid predictions concerning the problems being investigated. Yin (2009: 54) argues that conceptual framework refers to the structure that holds or supports the research theory.

Kerlinger (1986 cited in Anfara and Mertz, 2006: xix) defines theory as a set of interrelated constructs, definitions and propositions that present a systematic view of phenomena by specifying relationships between the variables with the purpose of explaining and predicting phenomena. It helps researchers to develop the conceptual models of how they make a logical conclusion of the relationship between the variables or factors that have been identified as significant to the problems under investigation. Anfara and Mertz (2006: xivi), contend that through the conceptual framework the phenomena under study are considered and the relationship between the variables are explained. In this regard, the theoretical framework explains why the problem under investigation exists.

4.2 THEORETICAL FRAMEWORK OF THE RESEARCH

A major assumption in poor construction H&S performance is that accidents occur due to poor leadership of the key project leaders. In other words, accidents occur due to failure of management
control. Hinze (2006: 64) argues that accidents are not impersonal events; they all have a cause. Thus, the H&S leadership of clients, designers, project managers, quantity surveyors and contractors shape the circumstances found in the workplace, giving rise to the acts and conditions that, in turn, lead to accidents. Put in this manner, it is the critical H&S leadership of the key project leaders that influences or determines the H&S behaviour of workers on site. As argued by Hopkins (2006: 586), focusing solely on unsafe acts of workers as the only cause of poor H&S, without considering the critical H&S related behaviour of the key project leaders, may not result in significant performance improvement over time. The H&S leadership of the key project leaders is critical for optimal H&S performance.

However, the construction process is a complex set of operations that involves several participants and is affected by environmental factors that generate different kinds of hazards (Oloke, 2010: 29). Besides, the complex nature of construction processes there are other factors contributing to site accidents such as clients’ poor H&S leadership. It has also been noted that the leadership quality exhibited by the key project leaders has a major influence on workers’ H&S behaviour or at-risk work practices on site. Wu and Fang (2012: 89) state that behaviour-based H&S management will have the greatest impact if directed towards the project leaders (upstream factors), since it is their H&S leadership that is most critical in creating and sustaining a positive H&S culture in an organisation. This view is widely supported by findings from most major incident inquiries and investigations, which show that leadership is a key component of a safe organisation. Quality of leadership is the most important factor that determines the success or failure of H&S management systems in an organisation (Krause, 2003: 2; Flin, O’Connor and Crichton, 2008: 129).

Oloke (2010: 30) also asserts that good standards of H&S on any construction project start with the decisions made by the key project leaders during the project planning phase. For instance, clients as one of the project leaders have a responsibility and duty under the law to provide adequate H&S information to the design team, allocate resources for H&S, and appoint competent contractors.
Thus, clients' H&S leadership roles are determinant factors for effective H&S management (Cooper, 2010: 23). In instances where H&S leadership and commitment are lacking in client organisations: violation of rules, unsafe acts and unsafe behaviour manifest on site (Wirth and Sigurdsson, 2008: 589; McAleenan, 2010: 112). Arguably, clients’ H&S leadership and behaviour particularly during the project planning stages are critical for effective H&S management.

Oloke (2010: 30) further emphasises that the design team and the contracting organisations have a substantial influence on the way construction projects are being run. It is vital that decisions they make during the early project planning stage are carefully considered as these will directly and indirectly impact on overall project performance, including H&S. For instance, designers have an important role in designing H&S into the project and also to demonstrate visible leadership in monitoring workers’ H&S on site (Behm, 2005: 562). Project managers as the project leaders have leadership roles in terms of coordinating, integrating and monitoring project H&S plans implementation on site (cidb, 2009: 36). Quantity surveyors have leadership roles in project H&S by facilitating or ensuring that contractors make adequate financial provision for H&S in their tenders (Mbachu and Nkado, 2006: 31, Olatunji et al. 2011: 69). At the operational level, the appointed contractors have duties and responsibilities to plan, organise, control and monitor the project in an efficient manner (Brauer, 2006: 120; Fisk and Reynolds, 2012: 15). This is achievable through visible leadership and commitment at all levels of management.

Leadership commitment is causing a paradigm shift from a traditional command approach of management to effective leadership. Cooper (2010: 34) determines that there is a direct relationship between an organisation’s financial success and its commitment to leadership practices. Storey (2006: 65), Kelloway and Barling (2010: 260) affirm that leaders who show transparency and consistent commitment to workers’ well-being have workers with higher motivation and commitment. On the other hand, a lack of visible leadership and commitment to workers’ H&S by the key project leaders results in at-risk work practices or unsafe behaviour. Pfeffer and Sutton
Achua and Lussier, 2010: 17) argue that managers focus on doing things right, while leaders do the right things. Though, Krause, Groover and Martin (2010: 47) argue that leadership is not a panacea to all management problems as leaders often lose sight and become overwhelmed. On the other hand, Lutchman et al. (2012: 320) argue in support of the importance of leadership and state that leading a H&S and organisational culture change within an organisation requires the skills of a leader not only a manager. Thus, visible leadership is critical for organisational H&S success.

Consequently, the underlying assumption of this research has been based on a paradigm and framework that allows the researcher to link worker behaviour, leadership and H&S performance. A logistic research framework proposed by New and Payne (1995: 45) was modified in this study as graphically presented in Figure 4.1. X representing leadership causes Y worker behaviour, which could be positive or negative, moderate Z H&S performance, and it is only appropriate leadership that promotes H&S performance. Leadership determines worker H&S behaviour: Only appropriate behaviour promotes H&S performance. The behaviour of the key project leaders at different construction project stages gives rise to site accidents and incidents. According to Reason (2007: 13) in his human error theory leaders act as imperious plates with holes that line up at different stages. Poor H&S leadership and behaviour of leaders are the holes in the plates that allow the potential incident to pass through the plate.

**Figure 4.1 Leadership influence on worker behaviour**

Figure 4.1 above illustrates how the leadership of the key project leaders can influence workers' H&S behaviour on construction sites. The clients as the owners and initiators of construction projects have duties and responsibilities in terms of the law to appoint competent professionals.
This is achievable through visible leadership and commitment to workers’ H&S. Musonda et al. (2012: 89) state that construction H&S performance is greatly influenced by clients’ H&S leadership and commitment to project H&S. The appointed designers and engineers have duties in terms of the law to also design H&S into construction. Gambatese et al. (2008: 438) argue that incorporating H&S considerations in the planning and design stages has a positive impact on workers’ H&S. Project managers as project leaders have duties and responsibilities to coordinate, integrate and monitor the implementation of H&S plans on sites by contractors. The absence of H&S plans has a negative impact on site H&S management (Burke, 2003: 23). Quantity surveyors as construction financial experts have duties and responsibilities to ensure that contractors make adequate financial provision for H&S in their tenders and also facilitate financial provision for H&S in the BoQs. Olatunji et al. (2011: 68) argue that inability of quantity surveyors to make adequate financial provision for H&S in the BoQs contributes to contractors’ lack of funds for H&S interventions on site. Contractors have duties and responsibilities under the law to carry out construction activities without causing harm to workers and the general public. These are achieved through planning, organising, controlling and monitoring construction phases and coordinating activities of other contractors (Howarth and Watson, 2009: 132). It is the leadership at all levels of management in the contracting organisations that determine how the construction process will be planned, organised, controlled and monitored to ensure that the H&S of workers are optimised.

4.3 THEORIES OF BEHAVIOURISM

Ivan Pavlov, a Russian animal psychologist is the founder of behaviourist method (Theron, 2003: 7). Pavlov's work in behaviourism dates back to 1897 and won him the Nobel Prize in 1904 (Theron, 2003: 7). Through experiments with dogs, Pavlov demonstrated that behaviour can be conditioned, that is learned by mental associations that occur mechanically by stimulus-response relations. For example, Pavlov found that dogs learned to associate food with other stimuli that were present at the same time, such as light or sound or even the foot-steps of the person who fed them.
In 1913, John B. Watson, an American psychologist developed general principles of behaviour based on control and prediction of overt behaviour. Watson (1913 cited in Theron, 2003: 7) contends that behaviour as a subject matter of psychology should be observable because, only that which is observable can be studied objectively. Watson’s study of behaviour was in parallel with the structuralist that focuses on consciousness and functionalist that focuses on heredity. Watson’s study made no distinction between human beings and animals. He maintained that studying behaviour objectively either in human beings or animals involves a stimuli-response (S-R) approach in psychology. He concluded that environment determines behaviour. He further asserts that humans are merely reactive beings and what they are and become is determined by causes outside themselves. Thus, behaviour can be predetermined by the control of environmental factors. This statement support this research premise that the critical H&S leadership and behaviour of the key project leaders could either positively or negatively influence workers’ H&S behaviour on sites.

In emphasising the importance of environmental factors’ influences on behaviour, Watson made the following classical statement: “that through conditioning, he could train any given infant, regardless of his or her talents or abilities to become a doctor, lawyer, an architect, beggar or thief”. This citation confirms that the key project leaders (clients, designers, project managers, quantity surveyors and contractors), through visible transparent leadership and active commitment to workers’ H&S can change workers’ unsafe behaviour to safe behaviour. This can happen since they are the creator of the work environment that influences or determines workers H&S behaviour.

In the late 1930s, the work of Watson influenced other psychologists such as Skinner. Skinner adhered to the concept that conditioning is a learning process in psychology, but extended the subject matter from observable behaviour to include unobservable behaviour as well. This he called the stimulus-organism-response (S-O-R) approach. Skinner’s work indicates that there are factors within an organism such as memory, thinking, emotions and needs, which are intervening variables that have a direct relationship between the stimulus and response. He concludes that these
variables influence the response. Applying this in a construction site situation, workers’ perception of management H&S commitment and other motivating factors influence their H&S behaviour.

**4.4 INFLUENCE OF LEADERSHIP ON H&S MANAGEMENT**

Leadership theories or approaches were discussed in Chapter 3 Section, 3.5.1 in this thesis. This section seeks to examine the relevance of leadership for effective H&S management by the key project leaders in the industry. Construction operation, by its nature, is complex (Oloke, 2010: 29). By extension the contractual relationship existing between the clients, designers, project managers, quantity surveyors and contractors is quite distinct when compared with the normal (single) contractual relationship between two parties (Naoum, 2011: 134). The clients could be individuals, corporate bodies or government departments. In a building project or civil work, the clients would first contract the designer, engineer or project leader. The designer, engineer or project leader would then engage other professionals like quantity surveyors and contractors who would translate their dream into drawings and eventually a building or civil product. In this type of contractual relationship, clients would do well by employing transformational leadership at the project planning stage. Cooper (2010: 18) argues that a transformational leadership style is suitable to inspire individuals to meet the project goal or even go beyond their self-interest. On the other hand, during the construction phase, a transactional or situational leadership style becomes a better option for clients to ensure that contractors adhere to project H&S plans and comply with national and state H&S regulations. In addition, clients are required to attend site H&S meeting and show exemplary behaviour while on visits to sites. These situations require clients to demonstrate transformational or considerate leadership style. Lu and Yang (2010: 131) state that leaders who exhibit a considerate leadership style build good relationships with workers, promote two-way communication and are attentive to worker needs and feelings. Clients’ visible leadership and commitment to workers’ H&S are absolute requirements for effective H&S management.
The task of designing the structures for a construction project is the sole responsibility of an architect and engineer. In South Africa and other developing countries architectural firms and consulting engineering firms are usually small sized enterprises that are made up of less than twenty employees (cidb, 2011: 3). Naoum (2011: 53) argues that organisational structure and size have an impact on leadership effectiveness. Thus, the architects and engineers may employ different leadership styles ranging from autocratic to democratic, depending on the situations, needs, tasks and stages of development (Nothouse, 2010: 165). However, the differences in task structures require different leadership styles from the designers and engineers. For instance, at the project design stage of contract documentation and contractor selection, the architect or engineer would do well to employ a democratic or transformational leadership style to inspire individuals to meet the project goal. On the other hand, at the construction stage where task structure is well defined, designers and engineers may employ autocratic or transactional leadership styles to attain performance and meet the task objective in exchange for rewards (Yukl, 2010: 65).

Project managers' leadership styles are determined by the contractual arrangement between the firm and the client (SACPCMP, 2006: 3; Fisk and Reynolds, 2012: 77). On a project where the project manager is acting as an agent for the client, his or her role is limited to project coordination, while decisions reside with the architect or engineer and the client. In this circumstance, his or her power position is low. In this situation, project managers can do well by employing a transformational or democratic leadership style to inspire and influence others to achieve the project goal. On the other hand, in a contractual relationship where a project manager has executive power, the project manager undertakes the functions of integrating, coordinating and decision-making. These management functions require him or her to employ a democratic or transformational leadership style. At the construction stage, the project manager would do well to employ an autocratic or situational leadership style to motivate workers to attain performance and task objectives (Yukl, 2010: 145).
Successful completion of any project is largely dependent on the availability of financial resources. Quantity surveyors’ leadership roles entail project financial budgeting and facilitation of financial provision in the project BoQs at the tendering stage (Olatunji et al. 2011: 68). The roles of quantity surveyors at the project planning phase demand that they employ a democratic leadership style. However, at the construction stage, which involves monthly interim valuations by the quantity surveyors, an autocratic leadership style or initiating structure that entails allocating tasks and ensuring they are completed within the deadline to an acceptable standard is more appropriate (Fleishman and Harris cited in Yukl, 2010: 154).

The leadership style demonstrated both at the top level and on the shop floor by contracting organisations has both a direct and indirect relationship with at-risk work practices or unsafe behaviour of workers. Clarke and Flitcroft (2008: 237) examined the impact of the transformational leadership style on employee perceptions of the safety climate. The results indicate that there is a positive association between a transformational leadership style and perception of the safety climate. Similarly, McFaden, Henagan and Gowen (2009: 390) conducted research on the impact of hospital Chief Executive Officers (CEOs) transformational leadership style on patient safety initiatives and outcomes in 212 hospitals; the results indicated that CEOs’ transformational leadership had positive outcomes on the patients’ safety culture. This supports the argument that organisational H&S effectiveness is promoted and sustained by top leaders. Lu and Yang (2010: 134) conducted research regarding safety leadership and safety behaviour in five major container terminal companies. The cross-section of employees revealed two aspects of senior managers: transformational leadership style relative to the reward of safety behaviour and encouraging worker participation and safety motivation (acting as role models). The results of their findings show that when senior managers were perceived by workers as being committed to H&S, workers were more likely to comply with safety rules and procedures. The commitment shown by the workers relative
to the visible commitment demonstrated by the senior managers, illustrates the fact that organisational H&S culture is grown and nurtured by top leaders.

Leadership styles of supervisors were examined relative to job tasks and compliance with site rules and procedures by Zohar and Erev (2007: 274). The results indicated that supervisors who employ transactional or autocratic leadership styles can easily monitor workers behaviour. It can be argued that transactional leadership styles or autocratic leadership is suitable in achieving job standards and enforcing site H&S rules and regulations. On the other hand, transformational leadership styles and democratic leadership exhibited by site supervisors have been found to impact positively on workers’ H&S behaviour. These leadership styles not only resulted in the reduction of site accidents and incidents, but also led to higher productivity (Cooper, 2010: 21). Thus, leadership of site supervisors is very crucial for H&S performance improvement, since workers are likely to emulate the good or bad behaviour exhibited by them.

Drawing from the above discussions, there is no single best fit of leadership style for the key project leaders. Leaders employ different leadership styles to suit the different situations they find themselves (Yukl, 2010: 21, Lu and Yang, 2010: 137). Autocratic leadership styles are, however, prevalent in the whole of the Sub-Sahara region due to cultural affinity and the state of economic development (Lutchman et al., 2012: 12). This argument supports the existence of small and medium sized contracting organisations in the region. In addition, expert leadership styles encourage the existence of independent construction-related organisations (Tijhuis and Fellows, 2012: 27). In this context, it can be argued that leaders feel more content with their small sized enterprises. For instance, a registered professional architect would prefer to own his firm independently rather than going into partnership with a registered civil or structural engineer. The same goes for a chartered quantity surveyor and registered project manager. Nonetheless, the economic burdens associated with poor construction H&S performance around the globe have necessitated the need for leadership skills in areas of construction project H&S management.
4.5 A STRATEGIC LEADERSHIP FOR H&S MANAGEMENT

The strategic view is anchored on clients and their professional consultants’ H&S leadership roles relative to the provision of work places free from harm to workers, the environment and the general public. Oloke (2010: 29) argues that the strategic H&S leadership of clients and their professional consultants during project planning, designing, procurement and contract awards underscores the greatest opportunities for effective H&S management. Given that this study focuses on leadership approaches in construction H&S management, it will be appropriate to examine these variables in two phases. The first phase will deal with clients’ critical H&S leadership, designers’ H&S decisions and project managers’ and quantity surveyors’ H&S leadership. The clients and their professional consultants’ H&S leadership are at the macro-level (project planning) and can be termed strategic. The second phase will focus on the appointed contractors’ H&S management systems and leadership at the micro-level (operational level).

4.5.1 Clients’ critical H&S leadership

Construction H&S performance is susceptible to the extent that clients are willing to assume leadership pertaining to H&S matters (Behm, 2005). Gambatese et al. (2008: 438) and Oloke (2010: 30) assert that the duties and responsibilities for H&S begin and end with clients. It is the client who establishes the strategic objectives of a project, who selects and appoints competent designers, project managers, quantity surveyors and contractors who translate his vision into reality (McAleenan, 2010). Client inability to ensure compliance with H&S requirements and statutory regulations when selecting and appointing professionals and contractors indicates a low level of clients’ H&S leadership and a lack of commitment to project H&S.

The South Africa Construction Regulation (Republic of South Africa, 2003: 8) details comprehensive duties of clients in terms of H&S. Clients are expected to, *inter alia*:

- Provide adequate H&S information to the design team including an H&S specification;
- Provide adequate financial resources for H&S;
- Prequalify contractors in terms of H&S;
- Ensure that the principal contractors (PCs) made provision for H&S costs in their tenders;
- Ensure that sufficient H&S information and resources are available to the PCs where changes to design or construction are made;
- Ensure that hazardous materials are not specified;
- Address H&S matters during contract negotiation or tendering process, and
- Monitor adequately to ensure that contractors comply with the H&S plan.

Construction researchers confirm clients’ vital role in promoting a positive construction H&S (Behm, 2005: 3; Smallwood, 2006: 1; Suraji et al. 2006: 34; Hinze, 2006: 231; Lund and Aaro, 2008: 3). The researchers contend that construction H&S performance can be successfully improved by the clients’ contribution to the process. The contribution could be related to choice of procurement systems and realistic project duration (Fisk and Reynolds, 2012: 112). Musonda et al. (2012: 91) also highlight clients’ strategic H&S leadership relative to provision of adequate financial resources for H&S and project H&S information.

Clients’ early involvement and participation in construction project H&S is a very important aspect of H&S management. A positive construction H&S performance will remain elusive without active involvement of the client (Musonda and Smallwood, 2008: 112). Clients’ visible leadership and proactive management of H&S entail that H&S measures are adopted before injuries occur (Hinze, 2006: 56). Clients have a legal and moral responsibility to inform contractors of existing hazards on their sites and take reasonable care to prevent workers’ injury and disease. They also need to ensure that contractors recognise and adhere to their contractual responsibility to work in a healthy and safe manner (HSE, 2008: 2; Huang and Hinze, 2006: 21).
Lingard and Rowlinson (2005: 2) advocate the use of H&S plans and method statements that detail how each activity will be executed relative to project H&S. Safe work procedures, in turn, empower people to do a job consistently and in an H&S manner. A good standard of H&S starts with the decisions made early by the client who procures the construction project (Huang and Hinze, 2006: 2). Few strategies are required to improve upstream H&S performance including those involving clients at early project stages, as shown in the Figure 4.2.

Figure 4.2 Clients’ mind map to implement H&S plan (Adapted from Brauer, 2006: 342)

Figure 4.2 illustrates how construction project H&S can be improved through clients’ visible leadership from the project design stage. This can be achieved by providing adequate H&S information to the design team (Behm, 2005; 3). At the tendering stage, clients are required to demonstrate a high level of commitment to workers’ H&S by ensuring that contractors make adequate financial provision for H&S in their tenders (Musonda et al. 2012: 81). Also, when awarding a contract, clients are expected to demonstrate visible leadership and transparency through the appointment of a competent contractor with good H&S records (cidb, 2011: ii). In addition, clients’ critical H&S leadership is more evident through their involvement and participation when they attend site H&S meetings and ensure that contractors comply with the H&S plan (Burke, 2003: 10). However, a review of literature confirms that clients’ H&S leadership, commitment to, involvement and participation in project H&S management is almost absent. Research conducted among general contractors in South Africa by Smallwood (2002: 2) confirms that clients focus mainly on the three project parameters of cost, time and quality, while neglecting H&S. Smallwood (2002: 1) argues that the major agencies of client influence have been prescriptive, regulatory or coercive measures as opposed to upstream proactive measures such as early involvement in project procurement, design related factors, detail, specification and hazard identification. Notably, clients do not spend enough resources in addressing H&S during a projects conception stage;
rather they tend to address the problem following the occurrence of accidents or incidents on site (Hinze, 2006: 114). Thus, clients’ poor H&S leadership such as pre-qualifying contractors on H&S and a lack of transparent leadership in contract procurement and award has been linked to poor H&S performance.

4.5.2 Due diligence in the award of contracts by client organisations

One of the cardinal characteristics of a good leader is transparency. A successful procurement policy requires visible commitment and transparency by clients and their professional advisers (McAleenan, 2010: 111). The South Africa Construction Regulation (2003: 13) requires that clients must ensure that the contractors they employ to carry out their construction projects have the necessary resources and competencies. The cidb (2011: 12) notes with dismay that clients, particularly in the South African public sector, collude with contractors to circumvent the construction procurement guideline. This can attributed to corruption, nepotism and political interference in awarding contracts to contractors without adequate H&S records. In 2010, a case of fraud to the value of R25 billion in respect of a tender and procurement related matter was reported and is under investigation by the South African Police Service (cidb, 2011: 29). Furthermore, the cidb (2011: iii) notes that a lack of transparency in leadership relative to the award of contracts in both the public and private sectors compromised construction quality. It also led to an increase in the number of site fatalities and serious injuries that have been reported around South Africa. Poor leadership in all aspects is a serious challenge to construction project performance including H&S. Thus, it can be argued that leadership commitment and transparency in clients’ organisations, particularly during the contract procurement process, will lead to the award of contracts to contractors with the requisite competency and good H&S records. This behaviour will lead to improved project performance including H&S.
4.5.3 Clients leadership in monitoring project H&S

Clients as the owners and financiers of construction projects have a legal obligation to monitor and ensure that the principal contractors have put in place all arrangements with respect to a construction phase H&S plan on site. Lingard and Rowlinson (2005: 163) maintain that effective H&S management entails adequate monitoring and reporting of performance and process for reviewing performance and making improvements. Monitoring provides the information needed to review activities and decide how to improve performance. It has been noted that most site fatalities and injuries have been linked to clients’ poor H&S leadership in terms of inadequate monitoring of contractors’ H&S plan on sites (Hinze, 2006: 121).

Musonda et al. (2012: 111) identify two types of monitoring: active monitoring and reactive monitoring. Active monitoring involves regular inspection and checking to ensure that standards are being implemented and management control is working. It is a requirement that clients be proactive in monitoring to ensure that best practice standards are observed and implemented on their project sites. Reactive monitoring takes place when accidents and incidents have occurred (Musonda et al. 2012: 111). Reactive monitoring could be termed learning from mistakes. However, active and reactive monitoring is useful for the identification of situations that create the risk and help client organisations to review these for feedback.

4.5.4 Designers’ H&S critical decisions

Haupt (2010: 157) argues that the thrust of designing for H&S leads to a reduction of the risk of injury, illness and fatalities by integrating decisions affecting workers’ H&S in all stages of the design process. He further states that designers can use their knowledge and influence to design-in H&S features that will improve the actual construction of the facility itself, as well as its maintenance after completion, as a part of making the job fit the worker.
Research conducted in South Africa shows that design-related aspects can negatively affect construction sites H&S performance (Smallwood, 2006: 2). Hughes and Ferrett (2009: 67) concur with the aforementioned and state that construction of a new building is, by its very nature, a problem in ergonomics as construction requires work at floor and ceiling level. This results in keeling, bending, reaching out, twisting and in general adopting uncomfortable work postures. These ergonomic problems can be mitigated through designers’ H&S decisions. They further state that construction materials are heavy and present manual materials handling problems. Mechanical devices can reduce manual materials handling problems. Despite the influence of designers on H&S and the legislative support that exists in almost all countries, designers tend to perceive construction H&S as the responsibility of the contractor (Haslam et al. 2005: 411). This myth is a challenge to H&S improvement. Designers should take up their responsibility of designing H&S into construction projects and contribute to the mitigation of site accidents, fatalities and injuries.

4.5.5 Project managers’ H&S leadership

Project managers, in terms of their contractual relationship with clients have important leadership role to play in managing construction project from inception to completion. The South Africa Construction Project Manager Identification of Work and Scope of Services (SACPCMP, 2006: 3) details a range of duties and responsibilities for project managers. In addition, Regulation 6 of the South African Construction Regulations (Republic of South Africa, 2003: 4) also empowers clients to appoint project managers as an agent relative to project H&S management. Research conducted by Smallwood and Venter (2002: 57) among member practices of the Association of Construction Managers in South Africa determined that project managers can influence construction project H&S. Project managers as project leaders can influence construction H&S during the upstream phases of project design (cidb, 2009: 19). It has been noted that on projects where project managers were not involved during the upstream decisions, these projects encountered problems such as cost

The SACPCMP (2006: 3) identifies project manager activities that can influence construction project H&S performance:

- Review of concept design and design coordination meetings;
- Design reviews, including details and schedules;
- Review of project H&S plans;
- Facilitation of financial provision for H&S during project planning phase;
- Pre-qualification of contractors on H&S;
- Advice regarding choice of procurement system;
- Hazard identification and risk assessment, and
- Estimation of project duration.

The scope of work places important H&S leadership roles on the shoulders of project managers. However, the cidb (2009: 20) report notes that a project managers’ leadership role is more visible on project sites when they monitor contractors’ project H&S plans, conduct H&S site meetings and inspections and ensure that quality standards are maintained. It can be argued that a lack of commitment to workers’ H&S by project managers relative to inadequate monitoring of project H&S plans, lack of H&S induction and irregular site meetings are manifestations of poor leadership resulting in poor H&S performance.

4.5.6 Quantity surveyors H&S leadership

A quantity surveyor as a member of a project design team has a direct influence on construction H&S (cidb, 2009: 20). According to the cidb (2009: 20), quantity surveyors have a duty and responsibility to ensure that principal contractors make adequate financial provision for H&S in their tenders. Adequate financial provision for H&S in the BoQs, to be used at the project tendering
stage, is important for contractors H&S management on site (cidb, 2009: 20). Furthermore, quantity surveyors can facilitate financial provision through the inclusion of a provisional sum for H&S in the BoQs, which can alleviate most of the H&S problems encountered on site (cidb, 2009: 20). Olatunji et al. (2011: 68) determined that a lack of funds for project H&S has a negative impact on contractors H&S interventions. A quantity surveyor’s leadership role and commitment in ensuring that adequate financial resources are provided during the tender evaluation is highly desirable (Olatunji et al. 2011: 70).

Quantity surveyors have other duties and responsibilities that can influence construction H&S performance. These include, *inter alia*, preparation of preliminary estimates, cost plans and schedules, tender adjudication and evaluation, expert advice regarding contractor selection and procurement systems, and drafting and compiling contract documentation (Olatunji et al. 2011: 67). Quantity surveyors are involved in financial management such as monthly interim valuations (Olatunji et al. 2011: 67). The important financial role of quantity surveyors, particularly interim valuations during construction operations, ensures that contractors have steady cash-flow for site H&S interventions.

### 4.6 CONTRACTOR LEADERSHIP TO H&S MANAGEMENT

At the operational level, the appointed principal contractor has duties and responsibilities in terms of the Construction Regulations (Republic of South Africa, 2003: 8) to ensure that the work is carried out without risk to the workforce. This is achieved through planning, organising, controlling and monitoring the construction phases and coordinating activities of other contractors (Howarth and Watson, 2009: 132). It is leadership at all levels of management that plans, organises, controls and monitors the construction process to ensure that the H&S of workers is optimised. In addition, top leadership has substantial influence on an organisation’s H&S management and outcomes through enactment of H&S policy (Flin et al. 2008: 147). Research has shown that senior management has an important impact on the behaviour and attitudes of other management. For instance, senior
managers’ H&S behaviour influences the values placed on organisational H&S by other management such as frontline leaders’ H&S behaviour and commitment (Luria, 2011: 1289).

An organisation’s H&S management should be holistic in terms of pre-construction planning and project scheduling (Hughes and Ferrett, 2009: 287), workplace planning (Hinze, 2006: 202), and materials-related problems in respect of worker exposure to hazardous chemical substances before the commencement of work (Coke and Sridhar, 2010: 149). The leadership styles of managers at all levels in any contracting organisation have a direct influence on workers’ H&S behaviour.

4.6.1 Top management H&S leadership

Top management H&S leadership is very important in any construction organisation. Madlock (2008: 61) argues that visible leadership of top management is a prerequisite to achieving optimal H&S performance and a H&S culture in any organisation. The leadership role and behaviour, particularly of the top leaders, is a critical factor that drives organisational H&S performance and culture (Markiewicz, 2009: 20). Markiewicz (2009: 21) further maintains that effective H&S management in any construction organisation largely depends upon top management commitment and visible leadership. For instance, top leaders develop organisational H&S policy; assign responsibility, authority and accountability to managers and supervisors. Thus, leadership styles and behaviour of senior managers influence the H&S behaviour of the site supervisors that directly impacts on workers’ H&S behaviour. According to Geller (2008: 30), the key to world-class H&S performance improvement is leadership. H&S leaders are enthusiastic and passionate, show respect and appreciation to the workforce they lead. Cox and Jones (2006: 585) argue that H&S leadership and management commitment to H&S is reflected through leaders that inspire, stimulate, involve and actively participate in all site H&S matters. It has also been noted that no amount of H&S regulations and management theories can make up for deficiencies in effective H&S leadership (Flin et al, 2008: 140).
The research finding of Innes, Turner, Barling and Strider (2010: 279) conclude that a lack of visible H&S leadership and commitment by top management impacts on an organisation’s H&S outcomes. Howarth and Watson (2009: 129) opine that regardless of the size of an organisation, it is vital that they and their project activities are operated with systematic H&S management. Effective H&S management is essential for all types of projects, mainly at the operational level where most of the work is carried out with high risk propensity and in hazardous environments. In this regard, H&S should be an integral part of the board management (Cooper, 2010: 18). Top management commitment and visible leadership is highly desirable for effective H&S management in any organisation. Teo, Haupt and Feng (2008: 485) conducted a comparative study among South African and Singaporean contractors regarding H&S practices. The results of their findings indicate that South African contractors perform worse in H&S practices in the following areas:

- Management commitment to H&S;
- Supervisory environment;
- Workers’ H&S training and competence;
- Workers’ involvement and participation in workplace H&S management, and
- Work pressure.

This gap can be linked to poor leadership and a lack of commitment to H&S by top leaders. The cidb (2009: ii) report on the status of construction H&S in South Africa indicates that poor H&S leadership at the organisational and site level is attributable to poor construction H&S performance.

4.6.2 Managers H&S leadership

Many H&S scholars have acknowledged the importance of frontline managers’ H&S leadership and behaviour for effective H&S management (Krause, 1997: 21; 2003: 1; Cox and Jones, 2006: 585; Howarth and Watson, 2009: 153; McAleenan, 2010: 30; Lutchman et al. 2012: 33). Frontline managers’ H&S leadership and behaviour are the most important variables in changing unsafe behaviour of workers (Geller, 2008: 30). Lutchman et al. (2012: 97) point out that transparency in
frontline managers’ behaviour can influence undesirable worker behaviour and at-risk work practices, such as absenteeism, lateness, fatigue, non-compliance to site rules and poor housekeeping. Geller (2008: 32) contends that managers who demonstrate visible leadership qualities, build trust and promote safe behaviour on site are good leaders. Thus, workers are motivated to emulate the behaviour of leaders who show genuineness and trustworthiness leading to safe behaviour.

4.6.3 Workplace H&S planning

There is a relationship between workplace H&S planning, materials-related issues and worker H&S behaviour. Workplace planning and materials-related issues can be integrated into project H&S during the planning and design stages. Notably, this research seeks to examine the influence of the H&S leadership of key project leaders that directly and indirectly impact on workers’ H&S behaviour. With effective leadership and commitment to workers’ H&S during the project planning and design stage, management inadequacies such as poor workplace planning and materials-related issues can be adequately planned and controlled by both contracting organisations and designers. On this note, both H&S workplace planning and materials-related issues are discussed.

Construction site accidents, injuries and disease remain a significant problem due to poor workplace planning (cidb, 2009: 8; Hughes and Ferrett, 2009: 112). Inadequate planning of the workplace and a lack of site supervision have been attributed to be major causes of site accidents and incidents (Mthalene et al. 2008: 2;cidb, 2009: 3; Haupt, 2010: 147). Lack of management commitment to H&S has been linked to inadequate H&S workplace planning (Hughes and Ferrett, 2009: 406). For instance, many accidents and incidents have occurred on construction sites due to poor site conditions such as muddy soil, debris resulting in the overturning of a crane and a mobile plant accident. Haslam et al. (2005: 401) assert that adequate site H&S planning and effective placement of facilities within a construction site improves the movement and manoeuvrability of vehicles and
materials. This results in a decrease of site hazards and accidents and also improves the H&S of workers on site. A well planned site is likely to be a safe site.

However, a lack of adequate provision for site welfare facilities has been recognised to impact on workers’ health (Hughes and Ferrett, 2009: 223). The South Africa Construction Regulation (Republic of South Africa, 2003: 12) require contractors make adequate provision for site welfare facilities. Brauer (2006: 547) asserts that there is a significant relationship between adequate provision of site welfare facilities and positive improvement in workers’ ill health and work-related diseases. Inadequate provision of site welfare facilities on construction sites can negatively affect production and increase the number of work-related diseases and workers’ absenteeism.

### 4.6.4 Materials related issues

Hazardous chemical substances pose a serious health hazard to workers on sites (Brauer, 2006: 139; HSE, 2008: 2; Hughes and Ferrett, 2009: 320). Notably, most materials containing hazardous chemical substances have inadequate H&S information on their packaging (Hughes and Ferrett, 2009: 320). Material safety data sheets are very useful sources of information for hazard identification (Hughes and Ferrett, 2009: 234). It has been noted that management commitment to workers H&S and site supervision in terms of control is inadequate (Hughes and Ferrett, 2009: 223). For instance, poor leadership in terms of enforcement with respect to the use of PPE and a reduction of exposure time to hazardous chemical substances by site supervisors have an impact on workers’ H&S behaviour. The use of PPE has been useful in protecting workers from hazards. Other sources of workers’ ill health can be weight and the sharp edges of some materials (Hughes and Ferrett, 2009: 145). Coke and Sridhar (2010: 135) also point out that some sites or projects could be a source of workers’ ill health and disease due to, for example, sewage waste.

It has also been noted that workers can be exposed to health hazards through the use of some construction materials such as wet concrete, mortar, paint, cement and even regular water (Hughes
and Ferrett, 2009: 145). Coke and Sridhar (2010: 136) note that wet concrete and mortar can cause skin problems such as dermatitis and other skin diseases. Also, asbestos causes lung cancer (ILO, 2007: 1; Hughes and Ferrett, 2009: 145). Haupt (2010: 149) argues that visible leadership and commitment to workers’ health, both at the design stages and site management levels, can mitigate exposure and its consequences to workers. Thus, materials-related issues can be eliminated through design and management commitment.

4.7 THE RELEVANCE OF LEADERSHIP TO EFFECTIVE H&S MANAGEMENT

Flin and Yule (2003: 45) argue that no amount of regulations can make up for deficiencies in the way that H&S is managed by organisational leaders. Leadership commitment is a paradigm shift from traditional command approaches to H&S management to effective leadership (Storey, 2006: 12; Flin, et al. 2008: 129). It has been determined that there is a direct relationship between an organisation’s financial success and its commitment to leadership practices (Achua and Lussier, 2010: 5). Oloke (2010: 30) asserts that good standards of H&S on a construction project starts with the decisions made by the board of directors who have a financial interest in the organisation.

The relevance of leadership in today’s competitive world is evident in all areas that require strategic planning. The demand for leadership skills over the past two decades is on the rise. In support of the importance of visible leadership in an organisation, Northouse (2010: 58) states that leadership is now associated with an organisation’s success, including H&S. This suggests that leadership skills and abilities are relevant for organisational H&S effectiveness. For instance, investigations into major accidents in the energy sector in the 1990s reveal that a key organisational factor in maintaining H&S in high risk industries is the quality of leadership. Also, the case of the Piper Alpha oil platform that involved 167 fatalities indicates failure of management. Similarly, investigation into the Chernobyl accident in the nuclear power industry shows that deficiencies in the H&S culture of the organisation were to be blamed. Further examples are the recent incidents that occurred in the
BP and Transocean oil rig explosion in the Gulf of Mexico and the explosion and fire at the Tesoro refinery in Anacortes, Washington DC in 2010, where a total of 207 lives were lost including 1105 various injuries. Investigation into these major catastrophes indicated poor leadership and clumsiness (Lutchman et al. 2012: 74). Mangham (2006: 41) observes that leadership is a personal value that leads to outstanding managerial performance. Flin and Yule (2003: 45) and Northouse (2010: 57) point out that continuous improvement of H&S performance requires effective leadership at all levels of management.

Studies by Krause (1997: 105, 2003: 3), Cox and Jones (2006: 164), Hopkins (2006: 585), Lutchman et al. (2012: 323) and Geller (2008: 30) establish that there is a strong relationship between leadership and workers’ trust and credibility in the workplace. Cooper (2006: 111) states that there is very little empirical work on the impact of leadership on H&S improvement. However, there is evidence that top leadership determines the behaviour and attitudes of middle managers, site managers and workers, which ultimately reflects on the workplace at-risk practices. Hinze (2006: 201) asserts that management commitment to H&S is a demonstration of their behaviour aimed at accident prevention. Geller (2008: 30) explains that successful H&S leaders ensure that goals are shared and made clear, examples are set, trust is created by trusting people, and mistakes are viewed as learning opportunities rather than creating a blame culture. Leadership has become relevant in modern organisational H&S management, as it has proved that exceptional organisational performance has been achieved through leaders’ traits and qualities.

4.8 BEHAVIOUR-BASED H&S MANAGEMENT IN CONSTRUCTION

Behaviour-based H&S management is a new concept in managing workplace H&S (Wu and Fang, 2012: 2; Sherratt and Farrell, 2012: 2; Paul and Maiti, 2007: 447). Unlike the traditional command-and-control approaches to occupational H&S, behaviour-based H&S management entails a systematic analysis of the root causes of accidents. It has the same principle of Deming’s total
quality management. According to Hopkins (2006: 587) and Lees and Austin (2011: 2), behaviour-based H&S management should not focus solely on the unsafe acts of workers as the only causes of poor H&S, as argued by the critics. They state that attention should be directed to the critical H&S related behaviour of the project leaders, since it is their H&S decisions that shape the workplace H&S culture. In a similar manner, Wu and Fang (2012: 34) state that observing and gathering data regarding workers’ unsafe behaviour or acts may not result in a significant improvement over time. It is the behaviour of the key project leaders (upstream factors) that give rise to accidents rather than workers’ unsafe acts (Hopkins, 2006: 589). Thus, workers lack the resources to manage and control the workplace hazards. Behaviour-based H&S initiatives empower workers and employees to take control of their own H&S performance (Cox, Jones and Rycraft, 2004: 825) and give workers the skills that satisfy their urge to feel more effective (Geller, 2008: 26). However, it can be argued that understanding the root causes of site accidents will lead to better H&S management.

Geller (2008: 36) argues that effective risk control depends, in part, on focusing on the behaviour of the key project leaders (actors) at all levels of management in an organisation. Thus, behaviour-based H&S management can be described as people-focused initiatives. Overall, application of behavioural techniques for the management of H&S in a workplace is an objective problem-solving mechanism (Paul and Maiti, 2007: 450). They further argue that behaviour-based H&S management focuses on people behaviour rather than the number of accidents, given that between 80% and 90% of all workplace accidents and incidents are attributable to unsafe behaviour (HSE, 2008: 1). Thus, examining the leadership and behaviour of the key project leaders in accident causation is highly desirable.

Behavioural approaches to H&S management are now commonplace (Cooper, 2008: 1) and are designed to improve H&S by promoting behaviour deemed critical to H&S and risk control (Spangenberg, 2009: 3; Sherratt and Farrell, 2012: 3). Behaviour-based H&S approaches, as
discussed in Chapter Three, Section 3.5, have been widely used in many hazardous industries with positive H&S outcomes. Lingard and Yesilyurt (2003: 59), Krause (1997: 12, 2003: 3), Geller (2002: 34), Cox and Jones (2006: 164) and De Joy (2005: 34) point out that it has been effective in reducing workplace accidents and injuries. Krause (2003: 31) states that the success of behaviour-based H&S management systems largely depends on understanding the critical H&S related behaviour of the leader (upstream). These new approaches recognise the critical H&S leadership role of top management’s involvement and participation for optimal organisational H&S performance (Lutchman et al. 2012: 47). They further maintain that visible leadership and organisational commitment are essential components for effective H&S management. However, Hopkins (2006: 583), Lee and Austin (2011: 3) and Wu and Fang (2012: 2) argue that in the absence of management commitment and visible leadership at all level, behaviour-based H&S management is doomed to failure. On this note, Geller (2008: 35) argues that the success of behaviour-based H&S management systems is largely dependent upon leadership commitment as leaders have critical role in allocating resources, and securing worker participation and involvement for continuous H&S performance improvement. Leadership commitment can be demonstrated through hazard identification and risk assessment, regular site inspections, worker competency and H&S training and incident reporting and investigation (Writh and Sigurdsson, 2008: 589). It can be argued that transparent leadership, commitment to workers’ H&S and active participation and involvement are essential ingredients for the successful implementation of behaviour-based H&S management systems in any organisation.

The continuing levels of incidents, accidents, injuries and illness occasioned through construction operations worldwide have compelled construction stakeholders to have a rethink and adopt behaviour-based H&S management systems (Hopkins, 2008: 147). The importance of behaviour-based H&S management cannot be understated. Its efficacy has been tested and findings show that it has resulted in a 30% reduction in accidents and incidents particularly in hazardous industries.
such as the oil and gas sectors (Paul and Maiti, 2007: 451; Hopkins, 2008: 148; Sherratt and Farrell, 2012: 2). Behaviour-based H&S encourages down-up communication in contrast to other H&S management systems (Geller, 2008: 3). The workers must be able to communicate freely with the supervisors who in like manner communicate with managers. Furthermore, departments must be able to communicate and cooperate with each other as witness in terms of quality improvement. Notably, application of behaviour-based H&S techniques in hazardous industries has shown a remarkable improvement in the reduction of site accidents and incidents.

Cooper (2006: 1), Sherratt and Farrell (2011: 3) and Wu and Fang (2012: 2) argue that behaviour-based H&S management approaches encourage workers to act safely. Workers love to behave well and work in an environment that will not expose them or their colleagues to hazard. Cox et al (2004: 831) emphasise that behaviour-based H&S approaches entail an increase in the H&S awareness of workers through training and a culture that promotes down-up communication. Lees and Austin (2011: 3) also state that behaviour-based H&S is about sharing knowledge, learning from mistakes and increasing the interaction between workers and supervisors. Cooper (2010: 32) argues that leadership effectiveness in regard to behavioural measurement, motivation of workers and feedback for improvement is the fundamental key to improve workers’ H&S behaviour and culture in the workplace. In a similar manner, Krause (2003: 3) emphasises the importance of leadership, involvement, participation and commitment to workers’ H&S as the driving mechanism behind on-going H&S performance improvement. Thus, there is a general consensus that leadership is a key component or factor for an organisation’s performance including H&S.

4.9 THE NEED TO IMPROVE CONSTRUCTION PROJECT H&S PERFORMANCE

The economic burden of poor construction H&S performance is a serious concern to all the stakeholders. The necessity for construction-related organisations to adopt sound H&S polices before being appointed or selected for a contract has been subjected to increased questioning and investigation (Howarth and Watson, 2009: 2). Interestingly, good business management suggests
and the law demands that clients and those undertaking the role of designing and managing construction projects should change their behavioural attitudes toward workers’ H&S (Hinze, 2006: 23; Spangenberg, 2009: 2; Howarth and Watson, 2010: x).

Lutchman et al. (2012: 41) suggest that effective H&S management must extend beyond the prescriptive H&S legislation and organisational policies to include behaviour-based H&S management systems for continuous improvement. In this regard, the key project leaders should demonstrate visible leadership, transparency and commitment to workers’ H&S in discharging their H&S duties. As noted by Lutchman et al. (2010: 41) and Cooper (2010: 32), visible leadership is required by clients and their appointed consultants and contractors to achieve sustainable H&S performance improvement in the industry. In addition, contracting organisations and designers should change their attitudinal behaviour relative to H&S workplace planning and materials-related issues. Furthermore, workers involvement and participation in H&S matters should be encouraged.

Beside the economic issues, there are moral obligations. An employer should not cause harm to an employee (cidb, 2009: 4). According to the ILO (2009: 2) report, approximately 50-105 persons die on construction sites globally every day. The human costs are beyond unacceptable. Over 3.25 trillion US dollars are spent annually on costs such as lost working time, workers’ compensation, and medical expenses (ILO, 2009: 1). These have a detrimental impact on the national economy. There are also legal responsibilities to ensure that every working man and woman returns home after a day’s work (ILO, 2009: 2). Furthermore, adverse publicity associated with poor site H&S performance affects organisations’ reputations, which may hinder the ability of these organisations from obtaining future work (cidb, 2011: xx). These are clearly compelling reasons to improve construction H&S performance.

Hughes and Ferrett (2009: 49) assert that the costs of investment in H&S cannot be compared with what it saves. Similarly, Hinze (2006: 121) argues that a project that was completed within cost,
time, and quality with flaws in H&S is said to be unsuccessful. According to Hughes and Ferrett (2009: 57), improved construction H&S performance will invariably reduce the costs associated with site accidents and incidents leading to an increase in productivity and financial saving. Oloke (2010: 31) maintains that there is a need for a change in behaviour and leadership styles among the key construction participants, particularly the clients who appoint or select the design team. Howarth and Watson (2009) argue that for the industry to compete commercially, it is imperative that the key project leaders demonstrate that they possess suitable experience and competence along with a good H&S record prior to being considered for appointment to carry out construction work.

Relevant knowledge and skills in design, leadership qualities, interpersonal skills, substantial site experience and good practice are all important to improve construction H&S performance. Howarth and Watson (2009: x) maintain that without suitable experience, competencies, financial resources and good H&S records, construction-related organisations should be excluded from further consideration for commercially attractive work. Hopkins (2008: 30) maintains that leadership commitment to H&S improves the H&S of workers. He also maintains that it provides a fertile ground for meeting all the due diligence requirements for compliance with existing H&S legislation and promotes safe behaviour among workers. Visible leadership and positive commitment to and involvement of the key project leaders are highly desirable for continuous H&S performance improvement.

According to Storey (2006: 7) and Achua and Lussier (2010: 306), transformational leadership styles and behaviour are highly desirable in an organisation that is experiencing a crisis such as the construction industry in terms of its poor H&S performance. Researchers inter alia, Flin and Yule (2003: 46) and Sunindijo and Zou (2012: 3), highlight the leadership qualities of transformational leaders that can transform or change the H&S behaviour of construction site workers to safe behaviour. In a similar manner, Lutchman et al. (2012: 361) and Lees and Austin (2011: 45) state that construction organisations are in dire need of leaders, not managers, to
transform workplaces to safer sites. They state that legislation and regulations are not enough to protect workers from injuries and ill-health. It becomes apparent that improving construction H&S performance is largely dependent on a behavioural change of the key project leaders, which entails visible leadership, commitment, involvement, and participation and due diligence in discharging their H&S duties.

4.10 SUMMARY

Accidents are not impersonal events. They occur due to the poor leadership of the key project leaders. Construction by its nature is a complex operation and, by extension, there is a distinct contractual relationship between clients and other independent parties such as designers, project managers, quantity surveyors and contractors. The aforementioned factors make the management of construction H&S difficult. Despite the above arguments about the complex nature of construction, it has been noted that with visible leadership and commitment to workers’ H&S by the key project leaders, workers unsafe behaviour can be changed to safe behaviour. The view that leadership is a key component of a safe organisation is generally supported by findings from almost all major incidents inquires and investigations. Thus, application of leadership skills to the management of construction H&S could lead to performance improvement in the industry.

There are compelling reasons for behavioural and attitudinal change among key project participants towards their H&S duties and responsibilities. The economic burden of poor construction H&S is a serious concern to workers, organisations, government and the general public. Poor construction H&S performance has serious economic consequences for contracting organisations and government. Millions of Rand are spent annually for medical care as a result of construction accidents. This is detrimental to the national economy. Interestingly, good business management suggests and the law demands that clients and those undertaking the role of designing and managing construction projects should exercise due care and be committed to workers’ and the general public’s H&S.
CHAPTER FIVE: RESEARCH STRATEGY

5.1 INTRODUCTION
This chapter presents the philosophy and methodology that underpin the conduct of research. It briefly examines philosophical assumptions that support the research strategy for this study by starting with an explanation of methodology. It presents brief discussions pertaining to quantitative and qualitative research reasoning and proceeds to the research position and justification. The chapter also discusses the research design and methods and concludes with the research validity, reliability and ethical consideration.

5.2 RESEARCH METHODOLOGY
Generally, the search for and gathering of data for advancement of knowledge is referred to as research. A methodology refers to the principle and procedure of logical thought process that is applied to a scientific investigation (Anfara and Mertz, 2006: xxi). Yin (2009: 4) defines research as a “combination of techniques used to enquire into a specific situation”. Research methodology therefore means the overall strategy designed to achieve the aim and objectives of the research. It includes the procedures and techniques of investigation for effective and reliable conduct of research.

Research methods on the other hand are tools used in gathering and analysing data. They are also a subset of the research methodology. Thus, within a research methodology, different research methods or tools may be used to achieve the aim and objectives of the research. Creswell and Clark (2007: 5) argue that the selection of research methodology and methods in management and social sciences depends upon the researcher’s assumptions about the nature of the social world and his experience on the subject matter. The assumptions or paradigms are essential for research because the researcher’s chosen method must reflect the context of the underlying assumptions that underpin the research philosophy.
5.3 PHILOSOPHY UNDERPINNING RESEARCH

The science of research has its root in philosophy. The philosophy of research can be viewed as an approach to research and how the real world, empirical data, models and theories relate to one another. A research methodology is driven by certain philosophical assumptions about the reality of the social world (Anfara and Mertz, 2006: 23). Research philosophy refers to the philosophical assumptions or undertakings that implicitly or explicitly guide an enquiry in a study or research. Dainty (2008: 16) argues that understanding the philosophical issues in research can enable a researcher to refine and specify the research. This includes the evidence gathered and its origin. The way the evidence is evaluated or interpreted will help the researcher to evaluate different methodologies and methods to avoid inappropriate use and unnecessary work. Collins (2010: 12) states that the nature of philosophical assumption and methodology encourages in-depth thinking and often generate further question in relations to the topic under investigation. It is of great importance to understand the philosophical issues as they provide a sound basis for methodological argument of the research. A literature survey on the various philosophical research assumptions or methodology revealed two most prevalent positions: the ontological and epistemological. These two philosophical research assumptions are briefly discussed below.

5.3.1 Ontological assumptions

Ontology explains the nature of knowledge and assumptions about reality (Pathrage, Amaratunga and Haige, 2008: 23). It is concerned with methods that examine people and their social behaviour. It is rooted in social sciences and sees the world as a world of meanings. From an ontological viewpoint, there is a fundamental difference between the subjective matter of the natural and the social sciences.

Natural sciences deal with matter that lacks consciousness and its behaviour can therefore be explained as a reaction to stimuli (Pathrage et al. 2008: 23). But this cannot be said of human...
beings. Human beings see, interpret and experience the world in terms of meanings and actively construct their individual social reality (Pathrage et al. 2008: 23). Meanings are not independent in their existence, but rather constructed and reconstructed by actors in course of social interaction (Dainty, 2008: 12). This explains why the ontology and epistemology perspectives employ different research methods. However, the ontological view or assumption guides a researcher to position or answer a question about the reality under investigation. This assumption about the nature of the world complements the formulation of the research philosophy and so influences the selection of an appropriate research approach and method. According to Sutrisna (2009: 45), the ontological assumptions see the real or external world as ‘realistic’ and ‘idealistic’. Sutrisna (2009: 45) further argues that realists experience external reality with a predetermined nature and structure; whereas idealists assume that different observers may have different viewpoints and that what counts for the truth varies in space and time. This view is consistent with the proposition of Anfara and Mertz (2006: xi), which states that a research method can be positioned by taking realist and idealist ontologies into account.

5.3.2 Epistemological assumptions

Epistemology refers to the claims of what is assumed to exist and can be known. This term is derived from the ancient Greek word ‘episteme’ that means knowledge and ‘logos’ that means account. It looks at the theory of knowledge with reference to its methods, validation and possible ways of gaining knowledge in the assumed reality. Dainty (2008: 12) suggests that epistemology describes what is known about reality and assumptions about how knowledge should be acquired and accepted. Epistemology therefore is concerned with how and what a researcher knows and the questions about how and what it is possible to know (Dainty, 2008: 12).

The philosophical assumptions that underlie the epistemological research paradigm revolve around two schools: positivism and interpretivism sometimes referred to as objectivism and subjectivism (Anfara and Mertz, 2006: xii). Collins (2010: 360) and Fellows (2010: 11) in their review of research
philosophies refer to the two ends of epistemological assumptions as positivism and constructionism. The positivists believe that the social world exists externally and that its properties should be measured through objective measures, with the observers being independent of what is observed. Social constructivism on the other hand believes that social reality is not objective and exterior. They believe that it is socially constructed and given meaning by people who are conscious, purposive actors with ideas about their world who attach meanings to what is going on around them (Pathrage et al. 2008: 36). Positivism mainly takes objectivism as mainly takes the basis of understanding the objective reality experienced by all (Sutrisna, 2009: 32), while interpretivism constructivism as the basis of understanding the reality that is constructed individually and differently (Pathrage et al. 2009: 37). These two fundamentally different and competing schools of thought demonstrate the complexity of issues embodied in ontological and epistemological assumptions. However, these two assumptions or views, the ontology and epistemology research paradigms, are relevant to this study particularly as the field of construction management falls in the centre of natural and social sciences. Therefore, the two approaches will guide a researcher to take a position on the real world as they relate to one another.

5.4 RESEARCH METHODS

Research as an endeavour, fundamental (natural) or applied, is either undertaken to develop a frontier of knowledge and contribute to the existing body of theories or to solve a practical problem through scientific inquiry. According to Anfara and Mertz (2006: xx), research method is the logic through which a researcher accomplishes the research objectives. Dainty (2008: 11) contends that the study of organisations or social setting may be based on the positivist or constructivist paradigm such as:

- Deductive and inductive research, and
- Quantitative and qualitative research.
5.4.1 Deductive research method

Yin (2009: 89) argues that deductive research is based on research theory that has been tested by empirical observations. Deductive research traditionally sets out by exploring existing literature in the field of study and then provides the context of the research. Leedy and Ormrod (2010: 67) assert that deductive research is concerned with the development of a theoretical and conceptual framework prior to evaluating a proposition through observation. Deductive research therefore proceeds from theory to data. According to Yin (2009: 89), deductive research is predominant in the natural sciences where laws present the basis of explanation, allow the anticipation of the phenomena, predict their occurrence and permit them to be controlled.

Deductive research can be viewed in line with objectivism and positivism due to its reliance on the current body of knowledge in formulation of research hypotheses. Sutrisna (2009: 43) asserts that there is only one objective truth and therefore a researcher’s investigation can be based on the existing body of knowledge that has been proved and represents the objective truth.

5.4.2 Inductive research method

Inductive research pertains to developing the research theory from observation of empirical reality (data collection, methods, theory) in contrast to deductive research that proceeds from theory to data (Yin, 2009: 81). However, in this research method, the researcher moves from observation to statement of generality or law or theory. Explanations and theories are then developed from the observations of the empirical world, which are based on data collected. Leedy and Ormrod (2010: 91) argue that theory developed out of a systematic observation of empirical reality is more likely to fit into the data and is useful in explanation of social phenomena. Thus, the outcome of induction can be theory.
Induction is the dominant research method in the social sciences. Yin (2009: 85), Gill and Johnson (2002: 23) and Morgan (2007: 48) argue that the inductive research method is justified for a social setting, as explanation of social phenomena is better studied through systematic observation and experience that support the ontological and philosophical paradigm. Sutrisna (2009: 45) concurs and states that the modern justifications for taking an inductive method in social sciences research revolve on these two arguments; the explanation of social phenomena grounded in observation and experience, and criticism of some of the philosophical assumptions embraced by the positivism paradigm.

The difference between deductive and inductive research lies in the use of the current body of knowledge and use of collected data. Deductive researchers formulate hypotheses based on the current body of knowledge and then conduct data collection and analysis to test the hypotheses. Inductive research conducts data collection and analysis to come up with findings while using the current body of knowledge to form their data analysis (Sutrisna, 2009: 56).

Another fundamental difference between deductive and inductive research methods is rooted in the matter of social and natural sciences. Fundamentally, there is a distinction between human beings and objects or things (Gill and Johnson, 2002: 34; Morgan (2007: 49). Human beings experience the world, whereas objects or things do not. Therefore, inductive research is mainly concerned with subjectivism or interpretivism. Table 5.1 presents the differences between deductive and inductive research.
Table 5.1 Difference between deductive and inductive research

<table>
<thead>
<tr>
<th>DEDUCTIVE</th>
<th>INDUCTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moves from theory to data</td>
<td>Moves from data to theory</td>
</tr>
<tr>
<td>Common with natural sciences</td>
<td>Common with social sciences</td>
</tr>
<tr>
<td>Approach is highly structured</td>
<td>Approach is flexible and amenable to change (less structured)</td>
</tr>
<tr>
<td>Explain causal relationships</td>
<td>Explanation is based on understanding of meaninngs attached to events by human beings</td>
</tr>
<tr>
<td>variables</td>
<td></td>
</tr>
<tr>
<td>Select samples of sufficient size</td>
<td>Pay less attention to the need to generalise</td>
</tr>
<tr>
<td>to generalise conclusions</td>
<td></td>
</tr>
<tr>
<td>Reliability is high</td>
<td>Reliability is low</td>
</tr>
<tr>
<td>Formulate hypotheses and test</td>
<td>Develop ideas through induction from data</td>
</tr>
<tr>
<td>them</td>
<td></td>
</tr>
</tbody>
</table>

(Adapted from Sutrisna, 2009: 56)

Table 5.1 highlights the fundamental differences between deductive and inductive research methods. This study is both deductive and inductive. The rationale behind the adoption of the deductive and inductive methods is:

- **Deductively:** The research moves from theory to data. This is evident in the review of related literature on construction H&S management and behaviour-based H&S management (Chapters 2 and 3). In addition, hypotheses are formulated to facilitate testing and explanation of causal relationships between the variables identified in the research problems statement as shown in Sections 1.3 and 1.4.

- **Inductively:** From the induction perspective, focus group discussions and interviews were conducted. This helped the researcher to obtain information and perceptions on the critical H&S leadership behaviour of the key participants prevalent in South African construction.

### 5.4.3 Quantitative research method

This type of research method emphasises the importance of systematic techniques employed in the natural sciences that involve data collection and analysis (Leedy and Ormrod, 2010: 121). It
focuses on the process of testing hypotheses. The quantitative research method, according to Leedy and Ormrod (2010: 121), seeks to gather factual data and study the relationships between them. The information derived is in the form of numbers that can be quantified and summarised. The analysis of data collected yields empirical results and conclusions are drawn from the observation of the results based on theory and surveyed literature.

In quantitative research, the researcher is always a neutral observer of the phenomena in question to maintain distance or objectivity from the research subject. This implies that quantitative research is based on the positivist paradigm that believes that mathematics is the perfect tool to understand the worldly creation. Sutrisna (2009: 57) argues that quantitative research emphasises measurements and analysis of causal relationships between variables. Sutrisna (2009: 58) furthers states that charts and graphs are used to illustrate the results in quantitative research and commentators employ words such as variables, populations and results as part of their daily vocabulary.

In this regard, quantitative research involves the use of standardised measures such as structured questionnaires to accommodate the varying perspectives of people in a limited number of predetermined response categories to which numbers scales are assigned (Sutrisna, 2009: 57). In this view, quantitative research is supported by positivists or scientific paradigms that refer to the world as made up of observable and measurable facts.

5.4.4 Qualitative research method

Qualitative research methods use a naturalist approach to understand phenomena in their context-specific settings. Qualitative research is commonly employed in studying complex situations, particularly research involving human beings (Sutrisna, 2009: 57). Qualitative research focuses on qualities of phenomena under investigation rather than numeric measurement. In this method, the researchers believe that the real world phenomena need to be assessed from within the context of
that reality. In broad terms, any kind of research that produces findings that are not obtained from statistical procedures or other quantitative means can be regarded as qualitative research.

The qualitative research approach is based on the assumption that there is no singular objective reality. Thus, the observed reality is related to the researcher’s interaction with the phenomena (Sutrisna, 2009: 58). In this regard, qualitative research naturally emerges from the constructionism paradigm. The use of interviews and observations are the most common tools employed by the qualitative researchers. The methods dominant in qualitative research include:

- Grounded theory;
- Case study;
- Phenomenology;
- Ethnography, and
- Historical research.

The various research methods dominant in the qualitative approach support the argument that there is no singular objective reality. This could be true to an extent as qualitative researches are commonly employed in studying complex situations, particularly research involving human beings (Sutrisna, 2009: 57).
5.5 THE ADOPTED RESEARCH POSITION

The method adopted for this study is both quantitative and qualitative in nature. This is also referred to as mixed method research. The assumptions underlying the quantitative and qualitative methods to research represent the two extremes of data continuum (Morgan, 2007: 48; Sutrisna, 2009: 34). The quantitative method is linked to the deductive-objective-generalising domain, while the qualitative method is associated with the inductive-subjective-contextual domain (Sutrisna, 2009: 34). However, research problems are better understood by employing both methods and using them in a complementary manner (Yin, 2009: 57; Collins, 2010: 57). It is common to adopt both the quantitative and qualitative methods in research because a mixed method benefits from the advantages associated with each, while at the same time avoiding their respective weaknesses. Put in more succinct way, the weakness of one method is compensated by the strengths of the other.

<table>
<thead>
<tr>
<th>QUANTITATIVE METHOD</th>
<th>QUALITATIVE METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed in the natural sciences to study natural phenomena</td>
<td>Developed in the social sciences to study social and cultural phenomena</td>
</tr>
<tr>
<td>The researcher is positioned as observer of the phenomena</td>
<td>No singular, observed reality is related to researcher’s interaction with phenomena</td>
</tr>
<tr>
<td>Method is based on positivist ideal</td>
<td>Method is based on an ontological viewpoint focused on meanings and perceptions</td>
</tr>
<tr>
<td>Is deductive by nature</td>
<td>Is inductive by nature</td>
</tr>
<tr>
<td>Methods used are survey, laboratory experiments and mathematical models</td>
<td>Methods used are action research, case studies and ethnography</td>
</tr>
<tr>
<td>Findings are focused on numeric measurements/quantitative data</td>
<td>Findings are focused on illuminating the qualities of phenomena</td>
</tr>
<tr>
<td>Approaches are repeatable, capable of isolation and therefore generalisable</td>
<td>Yields rich results and so not easily isolated or generalised</td>
</tr>
<tr>
<td>Credibility depends on construction of data collection instruments and criteria</td>
<td>The researcher is the instrument and so validity depends on the rigour, thoroughness and appropriateness of method</td>
</tr>
</tbody>
</table>

(Adapted from Sutrisna, 2009: 67)
Supporting the adoption of mixed methods in research, Brewer and Hunter (2006: 4) argue that the fundamental objective of a mixed method is to attack a research problem with a compendium of methods that have no overlapping weakness, in addition to their complementary strengths. Dainty (2008: 12) concurs that employing a mixed method helps a researcher benefit from a world view of social reality that encompasses the assumptions underlying both methods. The mixed method provides a researcher with the freedom to use all methods that are suitable to the research problem. Both quantitative and qualitative techniques may be used in combination with deductive and inductive reasoning. In addition, the mixed method allows a researcher to be flexible and practical in the use of procedures for data collection and analysis.

Therefore, the mixed method is considered appropriate for this study. Solutions to research problems based on the mixed method approaches are likely to have a stronger empirical base and greater theoretical scope as both methods may be grounded in different paradigms (Brewer and Hunter; 2006: 15; Dainty, 2008: 11; Sutrisna, 2009: 101; Zou, Sunindijo, and Dainty, 2011: 953). The study assumptions underlying the mixed methods are based on a blend of both quantitative and qualitative assumptions to provide a view of the nature of the social world and nature of knowledge. The multiple views present the researcher with a better understanding of the issues relative to leadership and behaviour-based H&S management within the study context. Table 5.4 shows a summary of the basic features of quantitative and qualitative approaches.
Table 5.3 Summary of basic features of quantitative and qualitative research methods

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>QUANTITATIVE</th>
<th>QUALITATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic viewpoints and beliefs</td>
<td>The world is external and objective; the observer is independent and science is value-free</td>
<td>The world is socially constructed and subjective; the researcher is part of what is observed and science driven by human interest and motives</td>
</tr>
<tr>
<td>Method of research</td>
<td>Focus on fact; reduces phenomenon to the simplest elements and formulates hypotheses and tests them</td>
<td>Focus on meanings, understand what is happening and develop ideas through inductions from data</td>
</tr>
<tr>
<td>Research design</td>
<td>Structural, formal and specific detailed plan</td>
<td>Evolving and flexible</td>
</tr>
<tr>
<td>Involvement of the researcher</td>
<td>A researcher remains distanced from material being researched</td>
<td>The researcher gets involved with the phenomenon being researched</td>
</tr>
<tr>
<td>Preferred strategy</td>
<td>Operationalisation of concepts so that they can be measured</td>
<td>Use of multiple methods to establish different views of phenomena</td>
</tr>
<tr>
<td>Sampling</td>
<td>Large sample and numbers selected randomly</td>
<td>Small samples investigated in-depth or small numbers of cases chosen for reasons</td>
</tr>
<tr>
<td>Data collection method</td>
<td>Experiments, surveys, structured interviews and observations</td>
<td>Observations, documentation, open-ended and semi-structured</td>
</tr>
<tr>
<td>Research instrument</td>
<td>Questionnaires, scales, test scores and experimentation</td>
<td>Interviews and focus groups discussions</td>
</tr>
<tr>
<td>Strengths</td>
<td>Provides wide coverage of the range of situations</td>
<td>Ability to look at change processes overtime</td>
</tr>
</tbody>
</table>

(Adapted from Sutrisna, 2009: 77)

The above argument is that the use of mixed methods produces more distinct data than a single method and this data fits in well with the world of reality. In addition, Zou et al. (2011: 953) contend that mixed method research that integrates the realms of theory and practice is desirable for conducting construction H&S research. However, a mixed method requires a high level of competence and skill in data collection and analysis (Yin, 2009: 87). The mixed method gives a
researcher the opportunity to compare results and findings from data sets. This implies that they must be employed with caution as the prior use of one method may affect the data collection strategy of the other method.

5.6 THE RESEARCH DESIGN

A research design refers to the guidelines that link the various elements of the research methodology. Leedy and Ormrod (2010: 101) argue that research design relates to the method of data collection. Research design is a broad plan of how a researcher intends to go about answering the research questions (Yin, 2009: 83). Thus, research design guides a researcher to obtain the type of information required for a study and draw inferences concerning the causal relationship among its variables. According to Yin (2009: 84), the various issues involved in research design include the type of the investigation, the sample method to be used, data collection method and analysis, theory testing and evidence necessary to answer the research question. Research design is therefore used by a researcher as a blueprint for data collection, prior to the actual study.

5.7 DATA

Leedy and Ormrod (2010: 93) describe data as a link between absolute truth and the researcher’s inquiring mind. They further state that ‘data is like ore’. It contains pieces of truth, but in a rather unrefined state that needs to be refined and presented in a recognised research format. Data used for scientific research such as this study are classified as either primary or secondary. This classification is based on the two possible sources, namely, primary and secondary.

5.7.1 Primary data

The primary data were obtained through responses from the research participants using a structured questionnaire, focus group discussions and interviews. The investigation was conducted in three stages. In the first stage structured questionnaires were posted to the identified sample from the targeted population. The objective was to obtain an appropriate set of data to test the
research hypotheses and generalisation of findings (Leedy and Ormrod, 2010: 93). In the second and third stage, focus group discussions took place and interviews were conducted with the built environment professionals.

A behaviour-based H&S management system is still a developing field of knowledge in the construction industry. In South Africa, there is little or no research in this area. As a result of this, a focus group discussion was considered appropriate for the study. Focus group discussions, sometimes called group interviewing, are largely a qualitative method of research based on structured, semi-structured or unstructured interviews. They provide a researcher with an opportunity to question or interview a group of people together, thereby prompting a discussion (Babbie, 2005: 316). In addition, as a data collection instrument, it gathers people of similar background or experience to discuss a specific topic of interest with the researcher. In this regard, the focus group discussion intended to stimulate and elicit thoughts and honest opinions of the clients, designers, project managers, quantity surveyors and contractors. This provided detailed information as the participants shared opinions regarding their H&S leadership and behaviour.

5.7.2 Secondary data

The secondary data were located in the literature. Most of the information was obtained from various South African and international sources, *inter alia*, journals, conference articles, books, theses and reports. Literature on behaviour-based safety was mainly from the USA, UK, Canada and Australia as they have embraced the concepts of behaviour-based H&S for decades. Reports emanating from it indicate that behaviour-based H&S management has contributed significantly to worker H&S performance improvement when appropriately implemented.

5.8 STUDY POPULATION AND SAMPLING TECHNIQUES

A researcher is interested in studying the nature of phenomena as exhibited by a group of subjects. Due to time constraints and costs, there is a need to devise a method that ensures better
understanding of the phenomena. This is done by studying a sample or samples drawn from the population (Yin, 2009: 76; Leedy and Ormrod, 2010: 123).

5.8.1 Population

A population according to Yin (2009: 76) is made up of all conceivable elements, subjects and observations related to a particular phenomenon of interest to a researcher. Elements or subjects are individual items that make up the population. In this study, four out of nine provinces in South Africa were chosen as the study population. The four provinces are: Eastern Cape, Gauteng, KwaZulu-Natal and Western Cape. The populations under investigation were categorised as:

- Clients (public and private): public sector clients include provincial and municipal departments of public works and private clients are those from the South African Property Owners Association (SAPOA);
- Architects that are registered in the South African Institute of Architects (SAIA) database;
- Project managers that are registered in the Association of Construction Project Managers (ACPM) database;
- Quantity Surveyors that are registered in the Association of South African Quantity Surveyors (ASAQS) database;
- Engineers, including consulting engineers, who are members of the Consulting Engineers of South Africa (CESA);
- Contractor members of the Master Builders Association (MBA), and
- Contractors who are members of the South African Federation of Civil Engineering Contractors (SAFCEC).

5.8.2 Sampling
A sample is a part of the population. The procedure of drawing a sample from a population is known as sampling (Leedy and Ormrod, 2010; 123). There are various types of sampling techniques that are employed in the selection of samples from a given population:

- Simple random;
- Stratified random;
- Systematic;
- Cluster sampling, and
- Purposive sampling

The principle behind each of these sampling techniques is to ensure that every member of the population has an equal chance of being selected. On this note, all the registered architects, engineers, project managers, quantity surveyors and contractors in these four provinces cannot be surveyed. Thus, an appropriate sampling technique was required to balance the objective of the study and the data collection processes. A simple random sampling technique was employed in the study. Random sampling uses the principle of randomisation that is a procedure of giving every subject or element in the population an equal chance of being selected (Leedy and Ormrod, 2010: 112). Yin (2009: 89) argues that a random sampling technique is the most fundamental method of probability sampling. Thus, a researcher can take a sample that is the sub-set of a population of interest and make a generalisation about the entire population. This is based on the fact that the sample is truly representative of the population (Leedy and Ormrod, 2010: 113). According to Leedy and Ormrod (2010: 141), the following criteria are observed when determining a sample of a given population under investigation.

1. For a small population, less than 100 people or elements no need for sampling.
2. For a population size of 500, 50% of the population to be sampled.
3. For a population size of about 1500, 20% of the population to be sampled.
4. Beyond a certain point (approximately) 5000 or more a sample size of 400 is adequate.
However, this method of determining a sample size from a population is advantageous when the study is purely quantitative. A study of this nature that centres mainly on human behaviour (leadership influence of key project leaders) needs to be complemented with a qualitative method. Based on this fact, the use of qualitative data gathering instruments becomes desirable.

Qualitative research is commonly employed in studying complex situations, particularly research involving human beings (Sutrisna, 2009: 57). Qualitative research focuses on qualities of phenomena under investigation rather than numeric measurement. Thus, focus group discussions and interviews were employed to complement the questionnaire survey for this study, due to the nature of phenomena under investigation. In addition, Mingers (2001) cited in Zou et al. (2012: 958) states that mixed method research design provides an alternative to mono method research which may enrich and generate more reliable research results.

5.8.3 Purposive sampling technique

Purposive sampling is a non-probability technique a researcher uses to select experienced participants as a representation of the wider phenomena under investigation. Time, cost, experience and a small sample needed for the group discussion were the special circumstances that were considered in the choice of the purposive sampling technique for this study (Sutrisna, 2009: 71). A purposive sampling technique enables a researcher to select participants with experience, knowledge and expertise for the phenomena under investigation.

5.8.4 Sampling by electronic selection

The MS Excel software package was used to operationalize the selection of the samples from the databases of the study organisations and associations. Once the programme is opened, the menu “Data” is clicked and it will display another menu in which “Data Analysis” is clicked. A dialogue box titled “Data Analyses” will be opened. The opened dialogue box displays various analysis tools such
as random number generation. The “Random Number Generation” prompt was clicked. Then the required information regarding the samples was captured and ‘OK’ clicked. The required sample numbers were displayed on the Excel spread sheet and randomised into one decimal number figure. This ensured that there was no decimal number figure in the samples. On completion, the numbers were arranged according to names and organisations.
The choice of the population size for the electronic sampling was influenced by the fact that there were other data collection instruments (focus group discussion and interviews). The complementary use of purposive sampling techniques for this study was necessitated by the fact that insightful knowledge about leadership practices and behaviour of the key project participants can be better gained if the researcher personally interacts with the stakeholders. On this note, Zou et al. (2011: 953) contend that mixed method research, which integrates the realms of theory and practice, is desirable for conducting construction H&S research.

### 5.9 THE TREATMENT OF THE DATA

Samuels, Witmer and Schaffner (2012: 40) contend that descriptive statistics, which is a method for summarising data in the form of average, percentage and graph, are used for data analysis due to the following reasons:

- Design, which refers to planning on how to obtain data;
- Description, which is concerned with exploring and summarising patterns in data, and
- Inference, which refers to making decisions or predictions based on the obtained data.

<table>
<thead>
<tr>
<th>Respondent group</th>
<th>Population size</th>
<th>Sample size</th>
<th>Sample as % of population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public sector clients</td>
<td>110</td>
<td>67</td>
<td>60.9</td>
</tr>
<tr>
<td>Private sector SAPOA</td>
<td>62</td>
<td>21</td>
<td>33.9</td>
</tr>
<tr>
<td>Members of SAIA</td>
<td>310</td>
<td>111</td>
<td>35.8</td>
</tr>
<tr>
<td>Members of ACPM</td>
<td>80</td>
<td>37</td>
<td>46.5</td>
</tr>
<tr>
<td>Members of ASAQS</td>
<td>150</td>
<td>67</td>
<td>44.7</td>
</tr>
<tr>
<td>Members of CECSA</td>
<td>102</td>
<td>39</td>
<td>38.2</td>
</tr>
<tr>
<td>Members of MBA</td>
<td>320</td>
<td>117</td>
<td>36.6</td>
</tr>
<tr>
<td>Members of SAFCEC</td>
<td>210</td>
<td>101</td>
<td>48.10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1 344</strong></td>
<td><strong>560</strong></td>
<td></td>
</tr>
</tbody>
</table>
Samuels et al. (2012:40) argue that statistical methods provide ways and means to measure and understand variability of data. A variable is the uniqueness that is recorded for subjects in a study. Data values observed for a variable are referred to as the observations. In this research, the variables in the quantitative aspect are discrete in nature while the qualitative aspect is narrative in nature. Thus, analysis of data directly depends on the types of variables observed.

5.10 METHOD OF DATA ANALYSIS

The Statistica (version 10.0) statistical analysis software package was used by the Nelson Mandela Metropolitan University (NMMU) Unit for Statistical Support to generate the descriptive and inferential statistics. The Microsoft Excel Ranking function was used to compute the rank of mean scores recorded in the data analysis. This ranking method enabled the researcher to evaluate the importance of problems, parameters and individual statements relative to each other. The ranking was limited to percentage responses of five-point Likert type-scale. The Likert-scale questions or statements in the questionnaire required respondents to indicate their opinions by ticking the statements or questions, ranging from minor (1) to major (5) with options of ‘unsure’ and ‘does not’. The ‘unsure’ and does not’ options were provided for respondents who may not have been familiar with a particular question or statement.

The $p$ value, which is the level of significance for the t test was 5%. The $p$ value, which was calculated by presuming that the null hypothesis $H_0$ is true, is the probability that the test statistics equal the observed values or a value even more extreme (Samuels, et al. 2012: 45).

5.11 TESTS OF ASSOCIATION

Samuels et al. (2012: 222) argue that association exists between two variables if the value for one variable is more likely to occur with certain values of the other variables. The occurrence of a value for one particular variable or the likelihood of such occurrence is dependent on the values of other variables. The inferential statistics that used the tools of confidence interval and significance t-tests
to provide inference about the p-value described the strength of the evidence that support or reject the null hypothesis.

5.12 INDEPENDENCE AND DEPENDENCE

Two categorical variables are independent if the population conditional distributions for one of them are identical at each category of the other, while the variables are dependent or associated if the conditional distributions are not identical (Samuels et al. 2012: 223). Thus, a variable is any characteristic that is recorded for subjects in a study. It is called categorical when each observation belongs to one set of categories and quantitative when observations take numerical values that represent different magnitudes of the variables (Samuels, et al., 2012: 223). Two categorical variables can be classified as either independent or dependent through a significance t-test. The hypotheses for the t-test are:

H₀: The two variables are independent, and
H₁: The two variables are dependent (association).

5.13 DATA VALIDITY, RELIABILITY AND ETHICAL CONSIDERATION

It is good practice for researchers to demonstrate credibility for data collection. This involves the provision of sufficient information on the methods used in the research and justification for their use. To evaluate the credibility of research findings, validity, reliability and ethical issues are commonly used as the criteria (Yin, 2009: 54).

5.13.1 Reliability

Reliability is a measure of consistency, not truthfulness. Yin (2009: 540) maintains that reliability seeks to achieve the same result if the research is repeated in another environment. Leedy and Ormrod (2010: 29) contend that each event of observations and interviews are unique. It is impossible to create the very moment of interaction. The uniqueness of the moment requires that each occasion is validated on its own merit. However, to ensure reliability in this study, care was
taken that sincerity and credibility was demonstrated with regard to response consistency. In addition, interaction between the researcher and the focus group participants and interviewees were conducted with honesty and integrity. Also researcher ensured that the correct phenomenon was measured.

5.13.2 Validity

Validity refers to the degree to which research findings are interpreted in the correct manner. Furthermore, validity determines whether the identified inputs within their attributes actually produce the expected result (Sutrisna, 2009: 71). It is the extent to which the results of a study can be verified against the stated objectives. Validity may be content, construct or criteria related. According to Yin (2009: 142), validity is evaluated internally or externally:

- Internal validity refers to whether the identified inputs within their attributes actually produce the expected results. In this study, internal validity was achieved based upon the research findings that were weighed against other research findings and literature examining the same issues and subjects. Secondly, the arguments made on the basis of the findings of this research are valid, indicating that good internal validity was achieved.

- External validity refers to the extent to which any research findings can be generalised beyond the immediate research sample upon which the study was conducted. The selection of focus group participants and site managers with years of experience in construction contracts and administration can be acceptable for external validity. Secondly, expert opinions in the form of feedback from the built environment professionals during the model validation provides an opportunity to state that good external validity was also achieved for this research.
5.13.3 Ethical consideration

Ethical issues or consideration is important in research where human subjects were involved. All the organisations or individuals that formed the subjects for this study during the focus group discussions gave their consent. In adhering to ethical consideration in research, the names of the organisations and individuals or groups of people were not disclosed. Furthermore, this work is the author’s personal effort and all authors whose works were used in the literature reviews were appropriately referenced.

5.14 SUMMARY

This chapter presented the strategy adopted for the conduct of the research. It also provided a brief discussion on the philosophical assumptions underpinning the research. The research design that described data techniques, population and sampling were highlighted and then issues related to validity, reliability and ethical consideration were discussed. The next chapter presents units of data analysis and results of the research findings.
CHAPTER SIX: DATA PRESENTATION, RESULTS AND ANALYSIS

6.1 INTRODUCTION

This chapter presents and discusses the findings of a survey that examines the contributions of key project leaders’ H&S behaviour relative to poor H&S performance. This is to explore H&S improvement interventions based on leadership influences. It is concerned with the analysis of behaviour that motivates as well as constrains organisations from practices that could bring about H&S performance improvement in South African construction.

The chapter presents data from the responses to the questionnaires and from the narratives and quotations obtained from the focus group discussions and interviewees. Interviews were conducted with managers and site supervisors in large and small size construction organisations. The questionnaire, focus group discussion and interview results are presented as descriptive summaries of the data analysis. Inferential statistics were used to evaluate the research hypotheses.

6.2 RESPONSE RATE

Table 6.1 indicates the response rate of the questionnaire survey. A total of five hundred and sixty (560) questionnaires were sent out, and a total of one hundred forty three (143) were returned. This represents a 25.5% response rate. Dainty (2008: 11), Zou, Sunindijo and Dainty (2011: 956) state that response rates that are as low as 25.5% for questionnaire surveys in the construction industry are not unusual. This view is supported by similar response rates that are documented in the literature (Table 6.2).
Table 6.1 Response rate of questionnaire survey

<table>
<thead>
<tr>
<th>Respondent group</th>
<th>Population size</th>
<th>Sample size</th>
<th>Response rate</th>
<th>% response rate of target group</th>
<th>% response rate of sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public sector clients</td>
<td>110</td>
<td>67</td>
<td>21</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Private sector SAPOA</td>
<td>62</td>
<td>21</td>
<td>9</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Members of SAIA</td>
<td>310</td>
<td>111</td>
<td>15</td>
<td>23</td>
<td>10</td>
</tr>
<tr>
<td>Members of ACPM</td>
<td>80</td>
<td>37</td>
<td>14</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Members of ASAQS</td>
<td>150</td>
<td>67</td>
<td>25</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>Members of CECSA</td>
<td>102</td>
<td>39</td>
<td>8</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Members of MBA</td>
<td>320</td>
<td>117</td>
<td>31</td>
<td>23</td>
<td>22</td>
</tr>
<tr>
<td>Members of SAFCEC</td>
<td>210</td>
<td>101</td>
<td>20</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1 344</strong></td>
<td><strong>560</strong></td>
<td><strong>143</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The response rate achieved for this research is similar to the response rates achieved in other surveys (Sutrisna, 2009: 84; Collins, 2010: 43). It could be inferred from Sutrisna (2009: 56) and Dainty (2008: 6) that performing a statistical analysis in a survey with response rates equal to or above the threshold of thirty (30) is acceptable. Thus, 143 responses achieved in this survey provide reasonable data for analysis.

The combination of focus group discussions and informal interviews conducted with managers and site supervisors in construction organisations added to its acceptability. Zou et al. (2011: 954) suggest that mixed methods research that integrates the realms of theory and practice in conducting construction H&S research is desirable. Zou et al. (2011: 954) further state that mixed method research design provides an alternative to mono method research and may enrich and generate more reliable research results. More appropriately, in the context of this research, the qualitative research methods enabled the researcher to interact with the stakeholders in the areas of H&S practices and behaviour. In addition, it is acceptable in view of the comprehensiveness of the questionnaire (see attached Appendix A), and the fact that major cities and provinces in South
Africa were included. Table 6.2 illustrates the response rate achieved in other surveys, which in fact indicates that response rate of 25.5% achieved for this study is acceptable.

### Table 6.2 Response rate achieved in other surveys

<table>
<thead>
<tr>
<th>Citation</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digwu (2008: 155)</td>
<td>26.9%</td>
</tr>
<tr>
<td>Holt and Kockelbergh (2003: 681)</td>
<td>10.3% (149 useable response out of 1 450 questionnaire distributed)</td>
</tr>
<tr>
<td>Ankrah (2008: 144)</td>
<td>15.4%</td>
</tr>
<tr>
<td>Smallwood (1998: 184)</td>
<td>6.2%</td>
</tr>
</tbody>
</table>

### 6.3 REPRESENTATIVENESS OF POPULATION VERSUS SAMPLE

Table 6.3 illustrates the representativeness of the population under investigation and the sample size. One thousand three hundred and forty-four (1 344) names of organisations and associations and individuals were identified from the database of the targeted population and samples of five hundred and sixty (560) were generated through electronic sampling selection as discussed in Chapter 5, Section 5.8.3 of this thesis.

### Table 6.3 Representativeness of population versus sample

<table>
<thead>
<tr>
<th>Respondent group</th>
<th>Population size</th>
<th>Sample size</th>
<th>% response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public sector clients</td>
<td>110</td>
<td>67</td>
<td>5</td>
</tr>
<tr>
<td>Private sector SAPOA</td>
<td>62</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>Members of SAIA</td>
<td>310</td>
<td>111</td>
<td>8</td>
</tr>
<tr>
<td>Members of ACPM</td>
<td>80</td>
<td>37</td>
<td>3</td>
</tr>
<tr>
<td>Members of ASAQS</td>
<td>150</td>
<td>67</td>
<td>5</td>
</tr>
<tr>
<td>Members of CECSA</td>
<td>102</td>
<td>39</td>
<td>3</td>
</tr>
<tr>
<td>Members of MBA</td>
<td>320</td>
<td>117</td>
<td>9</td>
</tr>
<tr>
<td>Members of SAFCEC</td>
<td>210</td>
<td>101</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1 344</strong></td>
<td><strong>560</strong></td>
<td><strong>43</strong></td>
</tr>
</tbody>
</table>
Analysis of the representativeness of the sample size drawn from the population indicates 43% of the total population. The 43% achieved for the questionnaire survey in this research relative to sample size drawn from the targeted population is acceptable. In addition, a purposive sampling technique (focus group discussions and informal interviews) was used in a complementary manner as a data collecting instrument for this research. The sample criteria for the focus group participants and interviewees were selected from people with management positions in the public departments and managers in construction organisations currently working on construction sites around South Africa.

6.4 EFFORTS TO IMPROVE THE RESPONSE RATE

Low response rates in construction industry surveys are not unusual (Zou et al. 2011: 956). Thus, to mitigate this, the following steps were taken:

- Respondents were assured of the confidentiality of their responses;
- The covering letter made a benign appeal to respondents;
- The length of the questionnaire was kept to a minimum, and
- Phone calls were constantly made to remind the respondents about completing the questionnaires.

6.5 INTERPRETATION OF THE RESULTS

The interpretation and discussion of the results were based on the measurement scale and, where appropriate, percentages were used, with the exception of the inferential statistics used for testing of postulated research hypotheses.
The percentages listed in Table 6.4 were used for the discussion about ordinal data for this study. Given the descriptive nature of the results, the use of grading noted with ordinal data was considered appropriate for presenting the results. Samuels et al. (2012: 46) contend that the use of percentages for ordinal data in behavioural science research is essential.

The Likert-scale type statements were discussed based upon measurement scales indicated in Table 6.5. The discussion conforms to the argument that ordinal data should not be treated as interval data, even though they may be ranked, yet intervals between values cannot be taken to be equal (Creswell, 2008: 81). Thus, the terms used in the interpretation and discussions of the research statistical findings are simple terms for ease of understanding and readability.
6.6 PRESENTATION OF THE QUANTITATIVE RESULTS

The results are presented in two sections: the demographic information of the respondents and the data emanated from the questionnaire responses.

6.6.1 Demographic information (Section 1 of the questionnaire)

This section presents the demographic information of the respondents surveyed in this research. It depicts their experience, gender, educational qualification, age, kind of organisation they work for and their status. The findings are discussed below.

6.6.1.1 Organisation by sector

Figure 6.1 indicates the sector distribution of the respondents. The result of the data analysis revealed that the majority of the respondents work in the public sector with 66% of the total sample.

Figure 6.1 Organisation by sector distribution of respondents

6.6.1.2 Number of years organisation involved in construction

Figure 6.2 indicates the frequency distribution of the number of years the respondents’ organisations have been involved in the construction business. The data analysis showed that 31.4% of organisations in the study have been in the construction business for between 16-30 years while 29.2% have been in business for more than 31 years. It can be concluded that the respondents’ perceptions of these organisations can be deemed to be reliable.

Figure 6.2 Number of years organisation involved in construction
6.6.1.3 Number of years respondents involved in construction

Figure 6.3 indicates the frequency distribution of the respondents’ actual number of years they have been involved in construction. The data analysis showed that 24% of the respondents have 5-9 years’ experience while 16% represent those with 10-14 years of experience. The results analysis showed that over 50% of the respondents have been involved in construction for over 15 years. Therefore, they have the experience to make good judgements.

Figure 6.3 Number of years respondents involved in construction

6.6.1.4 Gender distribution

Figure 6.4 reveals that the male gender predominates with 90% in both the public and private sector. This supports the general preconception that construction is a male dominated industry.

Figure 6.4 Gender distribution of respondents

6.6.1.5 Respondents’ age

Figure 6.5 indicates the respondents’ age distribution. The respondents that are over the age of 30 predominate. This group of respondents made up 77.6%. The respondents within the age of twenty and thirty years were 22.4%. It can be concluded that the respondents are mature and understand the dynamics of their work environment.

Figure 6.5 Distribution of respondents’ age
6.6.1.6 Respondents highest qualification

Figure 6.6 indicates the highest qualification of the respondents. The analysis showed that 26.6% of the respondents have B.Tech degrees, followed closely by 23.1% with Bachelor degrees. Respondents with Honours and diplomas ranked third with 15%. The percentage of respondents with Matric as the highest qualification was 8.4%, while a total of 6.9% had Master and Doctoral degrees. The analysis indicates that the respondents were academically qualified to comprehend the questions and that their judgements are reliable.

Figure 6.6 Respondents’ highest qualification distribution

6.6.1.7 Respondents discipline

Figure 6.7 indicates respondents' practicing discipline. Analysis of the findings indicates that 23.1% of the respondents practice civil engineering, while 17.5% practice quantity surveying. The percentage of the respondents that practice construction management was 14.5%, while 10.5% practice architecture. The others with 13.3% were trade-tested artisans. The data analysis reveals that the respondents' disciplines fall within the core of built environment professions and therefore have a high probability of making good judgements and providing reliable and valid data.

Figure 6.7 Distribution of respondents' discipline

6.6.1.8 Respondents constituency

Figure 6.8 indicates respondents’ constituency. The respondents who worked for clients were 23.8%, while those who worked for general building contractors were 20.3%. Designers were 14.7% and project managers 2.3%. General civil contractors counted 10.5%. Quantity surveyors counted
7.7% and others counted 11%. The data analysis reveals that the respondents fall within the key project participants and therefore their perceptions can be deemed reliable and valid data.

Figure 6.8 Distribution of respondents’ constituency

6.6.1.9 Respondents position in the organisation

Figure 6.9 indicates respondents’ position in their organisations. Managers made up 30.8% and managing members and principals 22.4%. The other 21.7% were not in managerial positions. The analysis reveals that those with management positions formed 62.2% of the respondents that took part in the survey. Therefore they have a high probability of making good, reliable judgements.

Figure 6.9 Distribution of respondents’ position

6.7 SECTION TWO: QUESTIONNAIRE ANALYSIS, FOCUS GROUP DISCUSSIONS AND INFORMAL INTERVIEWS

This section presents data from the responses to the questionnaire and the narratives and quotations from the focus group discussions and interviews results.

A five-point Likert-scale questionnaire that provides for ‘unsure’ or ‘does not’ was used to examine the contributions and behaviour of the key project leaders to poor H&S performance. Table 6.6 to 6.15 indicate the perceived behaviour or contributions of the key project leaders to poor construction H&S performance (at-risk work practices or unsafe behaviour).
#### 6.7.1 Identified factors contributing to poor construction H&S performance

<table>
<thead>
<tr>
<th>Factor</th>
<th>Unsure</th>
<th>Minor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate supervision</td>
<td>0.7</td>
<td>5.6</td>
<td>8.4</td>
<td>22.4</td>
<td>37.1</td>
<td>25.9</td>
<td>3.69</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>H&amp;S rules not adhered to</td>
<td>2.1</td>
<td>3.5</td>
<td>10.5</td>
<td>27.9</td>
<td>34.3</td>
<td>21.7</td>
<td>3.60</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>H&amp;S regulations not complied with</td>
<td>2.1</td>
<td>6.3</td>
<td>7.6</td>
<td>27.5</td>
<td>35.2</td>
<td>21.1</td>
<td>3.57</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Lack of H&amp;S training</td>
<td>1.4</td>
<td>4.2</td>
<td>9.1</td>
<td>34.3</td>
<td>31.5</td>
<td>19.6</td>
<td>3.50</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Poor H&amp;S culture</td>
<td>2.1</td>
<td>3.5</td>
<td>13.3</td>
<td>29.4</td>
<td>30.8</td>
<td>20.9</td>
<td>3.50</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Inadequate budgeting for H&amp;S by contractors</td>
<td>4.2</td>
<td>4.2</td>
<td>16.1</td>
<td>24.5</td>
<td>30.8</td>
<td>20.3</td>
<td>3.47</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Workers use drug and alcohol</td>
<td>4.9</td>
<td>8.4</td>
<td>12.6</td>
<td>30.8</td>
<td>16.1</td>
<td>27.3</td>
<td>3.41</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Lack worker involvement</td>
<td>3.5</td>
<td>4.2</td>
<td>8.4</td>
<td>22.4</td>
<td>37.1</td>
<td>10.5</td>
<td>3.41</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Inexperienced workers</td>
<td>1.4</td>
<td>4.9</td>
<td>19.6</td>
<td>33.6</td>
<td>17.5</td>
<td>3.39</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate maintenance of plant and equipment</td>
<td>2.1</td>
<td>5.6</td>
<td>12.6</td>
<td>40.6</td>
<td>26.6</td>
<td>12.6</td>
<td>3.28</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Use of inappropriate construction techniques</td>
<td>1.4</td>
<td>8.3</td>
<td>21.6</td>
<td>18.9</td>
<td>34.3</td>
<td>15.4</td>
<td>3.27</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Poor housekeeping</td>
<td>2.8</td>
<td>6.5</td>
<td>18.8</td>
<td>31.4</td>
<td>27.9</td>
<td>11.8</td>
<td>3.19</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Transient workforce</td>
<td>16.9</td>
<td>7.0</td>
<td>14.1</td>
<td>26.8</td>
<td>26.8</td>
<td>8.5</td>
<td>3.15</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Use of non-conforming materials</td>
<td>7.0</td>
<td>9.8</td>
<td>22.5</td>
<td>26.7</td>
<td>23.9</td>
<td>9.9</td>
<td>3.01</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Inadequate client H&amp;S information</td>
<td>5.6</td>
<td>9.2</td>
<td>23.2</td>
<td>31.6</td>
<td>21.8</td>
<td>8.5</td>
<td>2.97</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.6 indicates the respondents’ perceptions of the extent to which identified factors contribute to poor construction H&S performance in terms of percentage responses to a scale of 1 (minor) to 5 (major) and a mean score (MS) ranging between 1.00 and 5.00. It is notable that 14 MSs out of 15 identified factors were above the midpoint of 3.00, which indicates that the respondents can be deemed to agree with the factors. The respondents indicate that inadequate client H&S information contributes significantly to at-risk work practices or unsafe behaviour of workers in South African
construction. This supports the literature, which states that there is inadequate provision of H&S information to the design team by clients. This is one of the major behaviours identified as poor leadership in client organisations that contributes to at-risk work practices or unsafe behaviour among workers on sites (Behm, 2005: 2; Huang and Hinze, 2006: 174)

### 6.7.2 Client related behaviour contributing to poor construction H&S performance

**Table 6.7 Client related H&S behaviour contributing to poor construction H&S performance**

<table>
<thead>
<tr>
<th>Behaviour/Contributions</th>
<th>Unsure</th>
<th>Minor</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to ensure that contractor has made adequate financial provision for H&amp;S</td>
<td>2.1</td>
<td>7.0</td>
<td>11.2</td>
<td>23.8</td>
<td>32.9</td>
<td>23.1</td>
<td>3.54</td>
<td>1</td>
</tr>
<tr>
<td>Inadequate monitoring to ensure that contractors comply with the H&amp;S plan</td>
<td>1.4</td>
<td>6.3</td>
<td>16.9</td>
<td>22.5</td>
<td>30.3</td>
<td>22.5</td>
<td>3.46</td>
<td>2</td>
</tr>
<tr>
<td>Non facilitation of financial provision for H&amp;S</td>
<td>4.2</td>
<td>7.7</td>
<td>12.6</td>
<td>28.0</td>
<td>30.1</td>
<td>17.5</td>
<td>3.37</td>
<td>3</td>
</tr>
<tr>
<td>Inadequate addressing of H&amp;S matters during contract negotiation or tendering process</td>
<td>2.5</td>
<td>3.5</td>
<td>18.9</td>
<td>31.5</td>
<td>23.1</td>
<td>19.6</td>
<td>3.36</td>
<td>4</td>
</tr>
<tr>
<td>Lack of prequalification of contractors on H&amp;S</td>
<td>2.8</td>
<td>4.9</td>
<td>18.2</td>
<td>28.7</td>
<td>28.0</td>
<td>11.2</td>
<td>3.35</td>
<td>5</td>
</tr>
<tr>
<td>Inadequate provision of financial resources for H&amp;S</td>
<td>0.7</td>
<td>8.4</td>
<td>16.8</td>
<td>26.6</td>
<td>30.1</td>
<td>17.5</td>
<td>3.31</td>
<td>6</td>
</tr>
<tr>
<td>Inadequate H&amp;S specification provided to the design team</td>
<td>3.5</td>
<td>9.8</td>
<td>18.9</td>
<td>28.7</td>
<td>28.0</td>
<td>11.2</td>
<td>3.12</td>
<td>7</td>
</tr>
<tr>
<td>Inadequate project duration</td>
<td>3.5</td>
<td>14.0</td>
<td>16.8</td>
<td>28.7</td>
<td>20.3</td>
<td>16.8</td>
<td>3.09</td>
<td>8</td>
</tr>
<tr>
<td>Poor choice of procurement system</td>
<td>6.3</td>
<td>8.4</td>
<td>19.6</td>
<td>34.3</td>
<td>18.9</td>
<td>12.6</td>
<td>3.08</td>
<td>9</td>
</tr>
<tr>
<td>Inadequate provision of H&amp;S information to the design team</td>
<td>5.6</td>
<td>8.5</td>
<td>25.4</td>
<td>32.4</td>
<td>17.6</td>
<td>10.6</td>
<td>2.96</td>
<td>10</td>
</tr>
<tr>
<td>Poor project brief provided to the design</td>
<td>4.2</td>
<td>12.0</td>
<td>21.1</td>
<td>32.4</td>
<td>19.0</td>
<td>11.3</td>
<td>2.96</td>
<td>11</td>
</tr>
</tbody>
</table>

Table 6.7 indicates the respondents’ perceptions of the extent to which identified behaviour related to clients’ H&S leadership and behaviour contributes to at-risk work practices or unsafe behaviour.
It shows this in terms of percentage responses to a scale of 1 (minor) to 5 (major) and an MS ranging between 1.00 and 5.00. It is notable that nine MSs were above the midpoint of 3.00, which indicates that the respondents perceive that client related H&S behaviour contributes to at-risk practices or unsafe behaviour of workers on site. The findings indicate that the respondents perceive that the following can be deemed to contribute significantly to at-risk work practices:

- Failure to ensure that clients have made adequate financial provision for H&S;
- Inadequate monitoring to ensure that contractors comply with the H&S plans;
- Non-facilitation of financial provision for H&S; and
- Inadequate addressing of H&S matters during contract negotiation/tendering process.

Though inadequate provision of H&S information to the design team and poor project brief provided to the design team have the lowest MSs in the table, these critical client leadership roles should not be over looked in this context.
6.7.3 Designer related behaviour contributing to poor construction H&S performance

Table 6.8 Designer related H&S behaviour contributing to poor construction H&S performance

<table>
<thead>
<tr>
<th>Behaviour/Contributions</th>
<th>Unsure</th>
<th>Minor</th>
<th>Response (%)</th>
<th>Major</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design hazard identification and risk assessment not conducted</td>
<td>4.2</td>
<td>9.9</td>
<td>11.9</td>
<td>28.7</td>
<td>27.9</td>
<td>17.5</td>
</tr>
<tr>
<td>Complex design</td>
<td>9.1</td>
<td>8.4</td>
<td>13.3</td>
<td>30.8</td>
<td>23.1</td>
<td>15.4</td>
</tr>
<tr>
<td>Design and construction method statements not provided</td>
<td>3.5</td>
<td>9.8</td>
<td>15.4</td>
<td>33.6</td>
<td>26.6</td>
<td>11.2</td>
</tr>
<tr>
<td>Specification of hazardous materials</td>
<td>3.5</td>
<td>6.9</td>
<td>20.3</td>
<td>35.6</td>
<td>21.7</td>
<td>9.8</td>
</tr>
<tr>
<td>H&amp;S information not incorporated into design</td>
<td>5.6</td>
<td>12.6</td>
<td>18.2</td>
<td>25.2</td>
<td>23.1</td>
<td>15.4</td>
</tr>
<tr>
<td>Faulty permanent works design</td>
<td>7.7</td>
<td>6.9</td>
<td>20.3</td>
<td>32.2</td>
<td>22.4</td>
<td>10.5</td>
</tr>
<tr>
<td>Maintenance realities not incorporated into design</td>
<td>10.5</td>
<td>6.9</td>
<td>20.3</td>
<td>28.7</td>
<td>23.8</td>
<td>9.8</td>
</tr>
<tr>
<td>H&amp;S information not recorded on drawings, schedules and specifications</td>
<td>5.6</td>
<td>11.9</td>
<td>16.2</td>
<td>29.4</td>
<td>25.9</td>
<td>10.9</td>
</tr>
<tr>
<td>Constructability reviews not conducted</td>
<td>5.6</td>
<td>9.8</td>
<td>18.2</td>
<td>33.6</td>
<td>21.7</td>
<td>11.2</td>
</tr>
<tr>
<td>Late generic information</td>
<td>11.9</td>
<td>10.5</td>
<td>16.5</td>
<td>33.6</td>
<td>18.9</td>
<td>11.2</td>
</tr>
</tbody>
</table>

Table 6.8 indicates the respondents’ perceptions of the extent to which identified behaviour related to designer H&S critical decisions contribute to at-risk work practices or unsafe behaviour. It shows this in terms of percentage responses to a scale of 1 (minor) to 5 (major), and an MS ranging between 1.00 and 5.00. It is notable that all the identified critical H&S behaviour is above the MS midpoint of 3.00, which indicates that, in general, the respondents can be deemed to perceive that the following to contribute significantly to at-risk work practices:

- Complex design;
- Design hazard identification and risk assessment not conducted;
• Design and construction method statements not provided;
• Specifications of hazardous materials, and
• H&S information are not incorporated into design.

The findings indicate that the respondents perceive that designer H&S critical decisions and behaviour contribute to a larger extent to at-risk work practices or unsafe behaviour of workers on site. The findings support the works of Gambatese, Behm and Rajendran (2008: 438) that designers have important roles to play in eliminating site hazards through their design decisions.

6.7.4. **Project manager related behaviour contributing to poor construction H&S performance**

Table 6.9 indicates respondents’ perceptions of the extent to which identified project manager related leadership roles and behaviour contribute to at-risk work practices or unsafe behaviour. The table shows this in terms of percentage responses to a scale of 1 (minor) to 5 (major), and an MS ranging between 1.00 and 5.00. It is notable that all the MSs were above the midpoint of 3.00. This indicates that the respondents were of the opinion that project managers’ related leadership behaviour can be deemed to contribute to a greater extent to at-risk practices or unsafe behaviour of workers on site. The findings indicate that inadequate attention to H&S during site inspections, inadequate monitoring to ensure that contractors comply with H&S plans and inadequate hazard identification and risk assessment occur more frequently than other factors. This poor H&S behaviour of project managers amplifies their poor leadership regarding poor construction H&S.

The findings also support research conducted by Smallwood and Venter (2002: 57) among member practices of the Association of Construction Project Managers. It states that the lack of implementation of quality management systems in design and construction among project managers in South Africa marginalise H&S performance.

**Table 6.9 Project manager related behaviour contributing to poor H&S performance**
<table>
<thead>
<tr>
<th>Roles/Behaviour</th>
<th>Unsure</th>
<th>Response (%)</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Minor .......</td>
<td></td>
<td>Major</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Inadequate attention to H&amp;S during site inspections</td>
<td>2.1</td>
<td>5.6</td>
<td>8.4</td>
<td>26.6</td>
</tr>
<tr>
<td>Inadequate monitoring to ensure that contractors comply with H&amp;S plan</td>
<td>2.1</td>
<td>6.9</td>
<td>8.4</td>
<td>28.7</td>
</tr>
<tr>
<td>Inadequate hazard identification and risk assessment</td>
<td>2.8</td>
<td>3.5</td>
<td>11.9</td>
<td>32.9</td>
</tr>
<tr>
<td>Failure to ensure that contractor has made adequate financial provision for H&amp;S</td>
<td>4.2</td>
<td>6.9</td>
<td>9.8</td>
<td>31.5</td>
</tr>
<tr>
<td>Lack of prequalification of contractors on H&amp;S</td>
<td>2.8</td>
<td>4.9</td>
<td>11.2</td>
<td>32.2</td>
</tr>
<tr>
<td>Inadequate attention to H&amp;S during project progress meetings</td>
<td>1.4</td>
<td>6.9</td>
<td>11.9</td>
<td>27.9</td>
</tr>
<tr>
<td>Inadequate project duration</td>
<td>4.9</td>
<td>9.8</td>
<td>14.7</td>
<td>27.3</td>
</tr>
<tr>
<td>Inadequate attention to H&amp;S during design coordination meetings</td>
<td>4.9</td>
<td>13.9</td>
<td>14.7</td>
<td>30.1</td>
</tr>
<tr>
<td>Inadequate provision of H&amp;S information to the design team</td>
<td>6.3</td>
<td>10.5</td>
<td>11.9</td>
<td>30.8</td>
</tr>
<tr>
<td>Poor choice of procurement system</td>
<td>7.7</td>
<td>6.3</td>
<td>18.9</td>
<td>28.7</td>
</tr>
<tr>
<td>Constructability reviews not conducted</td>
<td>7.7</td>
<td>9.8</td>
<td>14.8</td>
<td>29.4</td>
</tr>
<tr>
<td>Poor coordination of design delivery</td>
<td>7.8</td>
<td>12.6</td>
<td>13.3</td>
<td>30.8</td>
</tr>
<tr>
<td>Poor coordination of design team</td>
<td>6.3</td>
<td>13.9</td>
<td>17.5</td>
<td>30.1</td>
</tr>
<tr>
<td>Poor coordination of design</td>
<td>6.3</td>
<td>11.9</td>
<td>14.7</td>
<td>30.1</td>
</tr>
</tbody>
</table>
6.7.5 Quantity surveyor related behaviour contributing to poor construction H&S performance

Table 6.10 Quantity Surveyor related behaviour contributing to poor H&S performance

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Unsure</th>
<th>Minor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to ensure that contractor has made adequate financial provision for H&amp;S</td>
<td>4.2</td>
<td>6.3</td>
<td>11.9</td>
<td>25.2</td>
<td>29.4</td>
<td>23.1</td>
<td></td>
<td>3.51</td>
<td>1</td>
</tr>
<tr>
<td>Inadequate facilitation of financial provision for H&amp;S in the BoQ</td>
<td>9.1</td>
<td>4.9</td>
<td>9.8</td>
<td>27.9</td>
<td>27.9</td>
<td>20.3</td>
<td></td>
<td>3.49</td>
<td>2</td>
</tr>
<tr>
<td>Non-inclusion of an H&amp;S section in the BoQ</td>
<td>7.7</td>
<td>5.6</td>
<td>14.7</td>
<td>23.1</td>
<td>28.7</td>
<td>20.3</td>
<td></td>
<td>3.43</td>
<td>3</td>
</tr>
<tr>
<td>Inadequate hazard identification and risk assessment</td>
<td>8.4</td>
<td>7.7</td>
<td>10.5</td>
<td>27.9</td>
<td>31.5</td>
<td>13.9</td>
<td></td>
<td>3.34</td>
<td>4</td>
</tr>
<tr>
<td>Lack of prequalification of contractors on H&amp;S</td>
<td>6.3</td>
<td>5.6</td>
<td>11.9</td>
<td>40.6</td>
<td>12.7</td>
<td>13.9</td>
<td></td>
<td>3.27</td>
<td>5</td>
</tr>
<tr>
<td>Inadequate H&amp;S information in BoQ</td>
<td>5.6</td>
<td>9.1</td>
<td>12.6</td>
<td>29.4</td>
<td>32.2</td>
<td>11.2</td>
<td></td>
<td>3.24</td>
<td>6</td>
</tr>
<tr>
<td>Inadequate project duration</td>
<td>7.0</td>
<td>9.9</td>
<td>16.9</td>
<td>26.1</td>
<td>24.7</td>
<td>15.5</td>
<td></td>
<td>3.19</td>
<td>7</td>
</tr>
<tr>
<td>Poor choice of procurement system</td>
<td>7.7</td>
<td>6.9</td>
<td>18.2</td>
<td>30.8</td>
<td>27.3</td>
<td>9.1</td>
<td></td>
<td>3.13</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 6.10 indicates respondents’ perceptions of the extent to which quantity surveyor identified behaviour contribute to at-risk work practices or unsafe behaviour. The table shows this in terms of percentage responses to a scale of 1 (minor) to 5 (major) and an MS ranging between 1.00 and 5.00. It is notable that all the MSs were above the midpoint of 3.00, which indicates that the respondents were of the opinion that the listed behaviour can be deemed to contribute to a greater extent. The results suggest that though failure to ensure that adequate financial provision for H&S is ranked 1st, the following can be considered to be contributing to a larger extent to at-risk work practices or unsafe behaviour of workers on site:

- Inadequate facilitation of financial provision for H&S in the BoQs;
- Non-inclusion of an H&S section in the BoQs;
• Inadequate hazard identification and risk assessment;
• Lack of pre-qualification of contractors on H&S;
• Inadequate H&S information in the BoQs, and
• Lack of prequalification of contractors on H&S

The findings correlate with the work of Olatunji et al. (2011: 2) who found that a lack of commitment and involvement in project H&S by quantity surveyors in terms of adequate financial provision for H&S in the BoQs marginalises H&S performance.

6.7.6 Contractor H&S management systems contributing to poor construction H&S performance

Table 6.11 indicates the respondents’ perceptions of the extent to which identified contractor related H&S management practices and leadership contribute to unsafe workers’ behaviour. The table indicates this in terms of percentage responses to a scale of 1 (minor) to 5 (major) and an MS ranging between 1.00 and 5.00. It is notable that all the MSs were above the midpoint of 3.00, which indicates that the respondents were of the opinion that contractors’ H&S management related practices and leadership contribute to a larger extent to the unsafe behaviour of workers. The findings suggest that the respondents perceive that the following can be considered to contribute to a major extent to at-risk work practices on site:
• Inadequate site management commitment to H&S;
• Non-conformance to H&S plans;
• Inadequate enforcement of H&S rules and regulations;
• Inadequate provision of financial resources for H&S, and
• Inadequate H&S training.
The findings also indicate that the respondents were of the opinion that the following were related at varying degrees to the poor leadership of contractors and contribute to at-risk work practices or unsafe behaviour of workers in South African construction:

- Inadequate middle management commitment to H&S;
- Poor H&S planning;
- Inadequate site inspections;
- Inadequate H&S induction;
- Infrequent H&S meetings;
- Lack of an alcohol and substances abuse programme, and
- Lack of H&S recognition and awards.

The findings support parallel research conducted in South Africa and Singapore by Teo, Haupt and Feng (2008: 487). This research found that South African contractors lack H&S management systems in the following areas: lack of management commitment at all levels, poor H&S supervisory environment, poor H&S training of workers and lack of worker involvement and participation in H&S matters.
Table 6.11 Contractor H&S management systems contributing to poor construction H&S performance

<table>
<thead>
<tr>
<th>Leadership/Behaviour</th>
<th>Unsure</th>
<th>Response (%)</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Minor………….</td>
<td>Major</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Inadequate site management commitment to H&amp;S</td>
<td>3.5</td>
<td>2.8</td>
<td>9.1</td>
<td>25.2</td>
</tr>
<tr>
<td>Non-conformance to H&amp;S plans</td>
<td>2.8</td>
<td>4.2</td>
<td>5.6</td>
<td>27.9</td>
</tr>
<tr>
<td>Lack of an alcohol and substance abuse programme</td>
<td>0.1</td>
<td>4.9</td>
<td>7.7</td>
<td>32.3</td>
</tr>
<tr>
<td>Inadequate provision of financial resources for H&amp;S</td>
<td>3.5</td>
<td>2.1</td>
<td>9.7</td>
<td>30.8</td>
</tr>
<tr>
<td>Inadequate H&amp;S training</td>
<td>2.1</td>
<td>2.1</td>
<td>10.5</td>
<td>28.7</td>
</tr>
<tr>
<td>Inadequate hazard identification and risk assessment</td>
<td>2.1</td>
<td>0.7</td>
<td>11.9</td>
<td>40.6</td>
</tr>
<tr>
<td>Poor H&amp;S culture</td>
<td>2.1</td>
<td>6.3</td>
<td>6.9</td>
<td>27.9</td>
</tr>
<tr>
<td>Inadequate top management commitment to H&amp;S</td>
<td>3.5</td>
<td>3.5</td>
<td>8.4</td>
<td>30.1</td>
</tr>
<tr>
<td>Lack of worker participation and involvement in H&amp;S</td>
<td>1.4</td>
<td>4.2</td>
<td>7.7</td>
<td>32.9</td>
</tr>
<tr>
<td>Inadequate middle management commitment to H&amp;S</td>
<td>2.1</td>
<td>4.9</td>
<td>9.8</td>
<td>27.9</td>
</tr>
<tr>
<td>Poor H&amp;S planning</td>
<td>2.8</td>
<td>4.2</td>
<td>9.8</td>
<td>31.5</td>
</tr>
<tr>
<td>Inadequate H&amp;S site inspections</td>
<td>0.7</td>
<td>6.3</td>
<td>10.5</td>
<td>32.2</td>
</tr>
<tr>
<td>Inadequate H&amp;S plans</td>
<td>4.9</td>
<td>2.8</td>
<td>16.8</td>
<td>32.9</td>
</tr>
<tr>
<td>Poor work organisation</td>
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<td>2.8</td>
<td>15.4</td>
<td>34.3</td>
</tr>
<tr>
<td>Inadequate H&amp;S induction</td>
<td>1.4</td>
<td>5.6</td>
<td>9.8</td>
<td>41.9</td>
</tr>
<tr>
<td>Poor general project planning</td>
<td>0.7</td>
<td>6.1</td>
<td>11.9</td>
<td>40.6</td>
</tr>
<tr>
<td>Infrequent H&amp;S meetings</td>
<td>2.1</td>
<td>6.9</td>
<td>15.4</td>
<td>34.3</td>
</tr>
<tr>
<td>Lack of an alcohol and substance abuse programme</td>
<td>3.5</td>
<td>6.9</td>
<td>15.4</td>
<td>37.8</td>
</tr>
<tr>
<td>Lack of H&amp;S recognition and awards</td>
<td>2.1</td>
<td>11.9</td>
<td>12.6</td>
<td>37.1</td>
</tr>
</tbody>
</table>
### 6.7.7 Workplace planning related factors contributing to poor construction H&S performance

#### Table 6.12 Workplace planning related factors contributing to poor H&S performance

<table>
<thead>
<tr>
<th>Factors</th>
<th>Unsure</th>
<th>Minor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untidy work environment (poor housekeeping)</td>
<td>0.0</td>
<td></td>
<td>2.1</td>
<td>8.4</td>
<td>27.9</td>
<td>40.6</td>
<td>20.9</td>
<td>3.70</td>
<td>1</td>
</tr>
<tr>
<td>Poor working platforms</td>
<td>2.1</td>
<td>4.2</td>
<td>9.8</td>
<td>23.8</td>
<td>34.3</td>
<td>17.9</td>
<td></td>
<td>3.68</td>
<td>2</td>
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<td>Poor site conditions</td>
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<td>13.3</td>
<td>20.9</td>
<td>40.6</td>
<td>20.9</td>
<td></td>
<td>3.64</td>
<td>3</td>
</tr>
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<td>Work pressure</td>
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<td>2.8</td>
<td>11.2</td>
<td>27.9</td>
<td>32.2</td>
<td>23.1</td>
<td></td>
<td>3.62</td>
<td>4</td>
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<tr>
<td>Lifting and handling of heavy materials</td>
<td>1.4</td>
<td>3.5</td>
<td>8.4</td>
<td>28.7</td>
<td>39.2</td>
<td>18.9</td>
<td></td>
<td>3.62</td>
<td>5</td>
</tr>
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<td>Inadequate vertical access</td>
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<td>4.2</td>
<td>6.9</td>
<td>33.6</td>
<td>32.2</td>
<td>20.9</td>
<td></td>
<td>3.59</td>
<td>6</td>
</tr>
<tr>
<td>Poor work organisation</td>
<td>2.8</td>
<td>6.9</td>
<td>10.5</td>
<td>25.9</td>
<td>36.4</td>
<td>17.5</td>
<td></td>
<td>3.47</td>
<td>7</td>
</tr>
<tr>
<td>Poor illumination</td>
<td>1.4</td>
<td>5.6</td>
<td>15.4</td>
<td>28.7</td>
<td>30.8</td>
<td>18.2</td>
<td></td>
<td>3.41</td>
<td>8</td>
</tr>
<tr>
<td>Poor site layout</td>
<td>3.5</td>
<td>5.6</td>
<td>19.6</td>
<td>26.6</td>
<td>27.9</td>
<td>16.8</td>
<td></td>
<td>3.31</td>
<td>9</td>
</tr>
<tr>
<td>Extreme temperatures</td>
<td>2.8</td>
<td>3.5</td>
<td>16.8</td>
<td>36.4</td>
<td>27.9</td>
<td>12.6</td>
<td></td>
<td>3.29</td>
<td>10</td>
</tr>
<tr>
<td>Poor ventilation</td>
<td>2.1</td>
<td>8.4</td>
<td>18.2</td>
<td>24.5</td>
<td>30.8</td>
<td>16.1</td>
<td></td>
<td>3.28</td>
<td>11</td>
</tr>
<tr>
<td>Lack of mechanisation</td>
<td>4.2</td>
<td>7.7</td>
<td>12.6</td>
<td>30.8</td>
<td>34.9</td>
<td>9.8</td>
<td></td>
<td>3.27</td>
<td>12</td>
</tr>
<tr>
<td>Inadequate provision of site welfare facilities</td>
<td>1.4</td>
<td>4.2</td>
<td>14.7</td>
<td>39.9</td>
<td>30.8</td>
<td>9.1</td>
<td></td>
<td>3.26</td>
<td>13</td>
</tr>
<tr>
<td>Excessive noise</td>
<td>1.4</td>
<td>5.6</td>
<td>16.8</td>
<td>42.7</td>
<td>20.9</td>
<td>12.6</td>
<td></td>
<td>3.18</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 6.12 indicates respondents’ perceptions of the extent to which H&S workplace planning contribute to at-risk work practices or unsafe behaviour. It shows this in terms of percentage responses to a scale of 1 (minor) to 5 (major) and an MS ranging between 1.00 and 5.00. It is notable that all the MSs were above the midpoint of 3.00, which indicates that the respondents were of the opinion that contractors’ inadequacies relative to H&S workplace planning contribute significantly to at-risk work practices or unsafe behaviour of workers on site. The findings suggest that the respondents perceive that the following can be considered to be H&S inadequacies relative to workplace planning that impact on workers’ behaviour in South African construction:
- Poor housekeeping;
- Poor working platform;
- Poor site conditions;
- Work pressure, and
- Lifting and handling of heavy materials.

Notably, all these factors are attributable to poor leadership of contracting organisations at all levels of management (Haupt, 2010: 145).

### 6.7.8 Materials-related issues contributing to poor construction H&S performance

**Table 6.13 Material-related issues contributing to poor construction H&S performance**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Unsure</th>
<th>Minor</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharp edges</td>
<td>4.9</td>
<td>5.6</td>
<td>7.7</td>
<td>28.7</td>
<td>33.6</td>
<td>19.6</td>
<td>3.54</td>
<td>1</td>
</tr>
<tr>
<td>Hazardous chemical substances</td>
<td>10.6</td>
<td>7.6</td>
<td>11.3</td>
<td>24.7</td>
<td>23.2</td>
<td>22.5</td>
<td>3.42</td>
<td>2</td>
</tr>
<tr>
<td>Poor packaging</td>
<td>8.4</td>
<td>6.3</td>
<td>16.8</td>
<td>29.4</td>
<td>22.4</td>
<td>16.8</td>
<td>3.27</td>
<td>3</td>
</tr>
<tr>
<td>Lack of information of material safety data sheet (MSDS)</td>
<td>9.1</td>
<td>8.4</td>
<td>14.7</td>
<td>26.6</td>
<td>25.8</td>
<td>15.4</td>
<td>3.25</td>
<td>4</td>
</tr>
<tr>
<td>Rough edges</td>
<td>4.9</td>
<td>9.8</td>
<td>11.2</td>
<td>34.3</td>
<td>24.5</td>
<td>15.4</td>
<td>3.24</td>
<td>5</td>
</tr>
<tr>
<td>Surface areas</td>
<td>12.6</td>
<td>7.7</td>
<td>10.5</td>
<td>34.3</td>
<td>23.8</td>
<td>11.2</td>
<td>3.20</td>
<td>6</td>
</tr>
<tr>
<td>Inadequate information on material safety data sheet (MSDS)</td>
<td>8.4</td>
<td>10.5</td>
<td>16.8</td>
<td>26.6</td>
<td>22.4</td>
<td>15.4</td>
<td>3.15</td>
<td>7</td>
</tr>
<tr>
<td>Mass and density</td>
<td>16.8</td>
<td>7.6</td>
<td>11.3</td>
<td>24.7</td>
<td>23.2</td>
<td>22.5</td>
<td>3.14</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 6.13 indicates respondents’ perceptions of the extent to which identified materials-related issues and factors contribute to at-risk work practices or unsafe behaviour in South Africa construction. It shows this in terms of percentage response to a scale of 1 (minor) to 5 (major) and MS ranging between 1.00 and 5.00. It is notable that all the MSs were above the midpoint of 3.00, which indicates that the respondents’ were of the opinion that materials-related issues and factors
can be deemed to contribute significantly to workers unsafe behaviour. The results suggest that though sharp edges is ranked 1st, hazardous chemical substances, packaging, lack of information on material safety data sheet (MSDS), rough edges, surface areas, inadequate information on material safety sheet and mass and density contributions were viewed as equally significant. The findings correlate with the work of Haupt (2010: 149), Coke and Sridhar (2010:135) that materials-related issues such as edges and chemical substances are attributable to at-risk work practices or unsafe behaviour of workers on site. These are manifestations of poor leadership particularly among designers and contracting organisations.

6.7.9 Statements contributing to poor construction H&S performance

Table 6.14 Statements contributing to poor construction H&S performance

<table>
<thead>
<tr>
<th>Statements</th>
<th>Unsure</th>
<th>Response (%)</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of management commitment, involvement and participation on H&amp;S</td>
<td>2.1</td>
<td>3.5 12.2 25.2 32.9 23.8</td>
<td>3.61</td>
<td>1</td>
</tr>
<tr>
<td>Inadequate financial provision for H&amp;S in the BoQ</td>
<td>2.8</td>
<td>3.5 13.9 25.9 32.9 20.9</td>
<td>3.54</td>
<td>2</td>
</tr>
<tr>
<td>Inadequate construction H&amp;S planning</td>
<td>1.4</td>
<td>2.8 9.8 34.9 38.4 12.6</td>
<td>3.48</td>
<td>3</td>
</tr>
<tr>
<td>H&amp;S is not integrated into the project during planning phases</td>
<td>4.2</td>
<td>4.2 13.3 30.8 31.5 16.1</td>
<td>3.42</td>
<td>4</td>
</tr>
<tr>
<td>Inadequate designing for construction H&amp;S</td>
<td>3.5</td>
<td>6.3 10.5 34.3 30.8 14.7</td>
<td>3.37</td>
<td>5</td>
</tr>
<tr>
<td>Poor client H&amp;S leadership</td>
<td>2.1</td>
<td>7.7 12.6 30.1 30.8 16.8</td>
<td>3.36</td>
<td>7</td>
</tr>
<tr>
<td>Materials issues</td>
<td>9.1</td>
<td>5.6 19.6 35.7 21.7 8.4</td>
<td>3.08</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 6.14 indicates respondents’ perceptions of the extent to which identified statements contribute to at-risk work practices or unsafe behaviour of workers in South African construction. It shows this in terms of percentage responses to a scale of 1 (minor) to 5 (major) and an MS ranging between 1.00 and 5.00. It is notable that all the MSs were above the midpoint of 3.00. This indicates
that the respondents were of the opinion that the statements can be deemed to contribute to major extent to at-risk work practices or unsafe behaviour of workers in South Africa construction. The lack of management commitment, involvement and participation in H&S is ranked 1st. The respondents may therefore be deemed to view the statement to be the greatest behaviour or factor contributing to at-risk work practices or unsafe behaviour of workers in South Africa construction. This is then followed by inadequate financial provision for H&S in the BoQs, inadequate construction workplace H&S planning, H&S not being integrated into the project during the planning phase, inadequate designing for construction H&S, poor client H&S leadership and materials-related issues. The findings correlate with the literature review for this study. Forbes and Ahmed (2011: 45) identify lack of management commitment, involvement and participation as factors contributing to workers unsafe behaviour, while Olatunji et al. (2011: 3) identify inadequate financial provision for H&S in the BoQs. Other factors identified are:

- Inadequate construction workplace H&S planning (Hughes and Ferrett, 2009: 123);
- H&S is not integrated into the project during planning phases (Brauer, 2006: 231);
- Inadequate designing for construction H&S (Huang and Hinze, 2006: 175; Gamgatese, et al. 2008: 675; Spangenberg, 2009: 3);
- Poor clients H&S leadership (cidb, 2011: ii; Lutchman et al. 2012: 57), and

6.7.10 Comments made by respondents regarding ways of improving construction H&S performance

Table 6.15 indicates that 29.5% of the respondents made one comment and 12.5% made two comments. Table 6.16 further enumerates the general comments made by the respondents in the completed and returned questionnaire survey.

**Table 6.15 Percentage of respondents’ comments**
<table>
<thead>
<tr>
<th>Comments (No.)</th>
<th>Response %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>58.0</td>
</tr>
<tr>
<td>1</td>
<td>29.5</td>
</tr>
<tr>
<td>2</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The comments made by the respondents in the questionnaire survey in Table 6.16 support the research findings and reviewed literature for this study. Table 6.6 and Table 6.11 all had H&S training mean scores (MSs) above the midpoint of 3.00, which indicates that the respondents agree to a major extent that poor leadership relative to poor workers' H&S training contribute to worker unsafe behaviour on site.

Table 6.11 and Table 6.14 had lack of management commitment MSs above the midpoint of 3.00, which indicates that the respondents agree to a major extent that lack of management commitment, involvement and participation in H&S contribute to unsafe behaviour of workers. Literature reviewed in this study also supported the statements made by the respondents cidb (2009: I); Howarth and Watson (2009: 24); McAleenan (2010: 101); Lutchman et al. (2012: 56).

Lack of worker participation and involvement was rated high in Table 6.11 with MSs above the midpoint of 3.00, which indicates that the respondents agree to a major extent that lack of worker participation contributes to a major and not minor extent. The research work of Teo, Haupt and Feng (2008: 487) supports this finding that lack of workers involvement and participation in workplace H&S matters in South Africa is a serious challenge to H&S improvement.
Table 6.16 Comments relative to improving construction H&S performance

<table>
<thead>
<tr>
<th>Problem</th>
<th>Comment</th>
</tr>
</thead>
</table>
| Training                 | 1. More training to clients relative to construction H&S.  
2. Regular toolbox talks. More training on site and upgraded in terms of certification.  
3. Regular site induction and H&S training to be compulsory particularly to new employees as many of them are illiterate or uneducated. Induction must be more informative  
4. Awareness training to all contractors and supervisors on H&S to keep everyone at alert on H&S rules and regulations  
5. Trained dedicated H&S supervisors are effective means of improving construction H&S performance.  
6. H&S training to all levels including the top management.   |
| Management commitment    | 1. Integrated H&S management approach. Integrating H&S into construction planning, design and construction.  
2. Commitment from the whole team (clients, consultants, contractors and workers.  
3. Principal contractor to apply H&S rules and regulations equally to all subcontractors.  
4. Adequate supervision and monitoring to ensure team compliance.  
5. Sequence planning that ensures H&S requirements and documentations should be in place before work commences on site. Project H&S plan to be prepared and communicated to all parties.  
6. More emphasis on clients responsibilities in terms of complying with H&S regulations relative to appointment of competent professionals.  
7. Management needs to be transparent about workers’ H&S.  
8. Regular site inspection by management.  
9. There should be regular site inspection by external H&S officers (audits). |
| Table 6.8, Table 6.9, Table 6.10, Table 6.11 and Table 6.12 had inadequate financial provision MSs above the midpoint of 3.00, which indicates that the respondents agree to a major extent that inadequate budgeting or provision of financial resource for projects’ H&S contribute to unsafe behaviour of workers on sites. Olatunji et al. (2011: 3) and Smallwood (2008: 2) state that a lack of financial provision for projects H&S by quantity surveyors marginalise H&S performance. |

6.8 ANALYSIS OF THE FOCUS GROUP DISCUSSION

A focus group discussion was conducted with built environment professionals including: architects, quantity surveyors, project managers and civil engineers. These are people with more than fifteen |
years of experience in construction contract and administration. Among them were the Chief Quantity Surveyor and Chief Architect of the Department of Roads and Public Works, Eastern Cape Province, Port Elizabeth. Fifteen practitioners were approached but only four turned up for the group discussion. This was guided by Gillen, Kools, McMcall, Sum and Moulden (2004: 235) and Babbie (2009: 56), who suggest that three to six participants should be brought together in a typical focus group discussion. Gillen et al. (2004: 23) further contend that smaller groups increase participants’ opportunity to fully express ideas without interruptions.

Table 6.17 Focus group discussion participants

<table>
<thead>
<tr>
<th>Number of invited participants</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants</td>
<td>4</td>
</tr>
</tbody>
</table>

The questions for the focus group were open-ended (see attached Appendix B). They allowed the participants to share as much or as little as they wished with respect to their practices and behaviour that can bring about H&S improvement in South African construction. The discussion session took place at the Department of Roads and Public Works Conference Hall, Eastern Cape, Provincial office, Port Elizabeth.

6.8.1 Focus group discussion session

The session began by briefing the participants on the ethics that govern the conduct of research in terms of assured personal and/ or organisation anonymity. The discussions were recorded on iPhone. The researcher then captured the data on the computer after the group discussion. The captured data was sent to each of the participants in order to vouch for its accuracy and error minimisation. The researcher listened to the recorded responses, opinions and suggestions several times and personally transcribed them. The transcribed versions were also sent to the participants who agreed that an accurate version of the discussion was obtained.

Generally, the following themes emerged from the discussion:

- Contracts award, procurement policies and guidelines;
Designing H&S into construction;
- Monitoring and implementing project H&S plans;
- Financial provision for H&S at the tendering stage;
- Contractors’ H&S management systems and leadership;
- H&S workplace planning and construction materials-related issues, and
- Leadership in H&S management.

6.8.1.1 Contracts award, procurement policies and guidelines

One of the postulated research hypotheses for this study is that clients’ poor H&S leadership and behaviour lead to the award of contracts to contractors with poor H&S records. Based on this rationale, questions related to the first theme were asked. These questions include:

1. Based on your experience, why do you think that contractors without adequate H&S records are awarded contracts?

2. Is it possible that poor leadership and lack of commitment to H&S by clients contribute to the award of contracts to such contractors?

There is a strong link between clients’ involvement and commitment to H&S and the award of contracts to competent contractors (McAleenan, 2010: 112; cidb, 2011: i; Musonda et al. 2012 78). Visible and transparent leadership in clients’ organisations promotes adherence to contract procurement policies and guidelines. However, the reactions and comments in relation to these questions indicate that lack of involvement and commitment to H&S by clients’ organisations often lead to the award of contacts to contractors with poor H&S records. Participants from the public sectors were diplomatic due to the sensitive nature of the question. Comments from the participants were not edited for language and are therefore presented in quotes. One of the participants commented: “We follow due process in the award of contracts in our department”.

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“We ensure that contractors we award contracts have made adequate provisions for H&S in the BoQs”.

These statements were made by the participants from the public sector clients. The cidb (2011: ii) has reports on the investigation of the barriers to quality in construction, which include the traditional barriers with regard to design, procurement and the construction process. The reports note that corruption, political interference and institutional barriers in the appointment of contractors, who were not capable of undertaking the necessary work, could be attributed largely to poor leadership in the procurement process in South African construction. This scenario is not peculiar to the South African construction environment. For instance, in the Philippines a contract for an electricity project was awarded to a foreign organisation or firm not capable of undertaking the project (Lutchman et al. 2012: 12). The above example indicates the extent of poor leadership and unethical behaviour among leaders relative to the construction project procurement process.

The second question was developed to probe the discussion further.

Is it possible that poor leadership and lack of commitment to H&S by clients contribute to the award of contracts to such contractors? Participants answered unanimously “yes”. This generated teasing and laughing. Thereafter, the following comments were made:

“Corruption is too much”.

“Contracts are awarded only to top politicians”.

“The top management are not transparent.”

These comments indicate that clients’ H&S leadership is poor, particularly the public sector clients, as exemplified that contractors without adequate H&S records are awarded contracts. A contractor without adequate H&S records not only increases accident and injury rates on sites, but also fatalities and the high cost of medical care for the government. It could be argued that poor leadership and lack of transparency among the top leaders are possible reasons for the award of contracts to contractors with poor H&S records within the South African construction industry.
Clients, both in the public and private sectors need to demonstrate visible and transparent leadership to project H&S and save the nation from unjustifiable destruction of lives and properties.

6.8.1.2 Designing H&S into construction

The second theme that emerged from the discussion is designing H&S into construction. To address the issue, this question was asked for discussion and comment.

1. Based on your experience, do you think designers’ H&S critical decisions impact on workers’ H&S behaviour on site?

A strong link exists between designs and workers’ H&S behaviour on sites. Gibb et al. (2005: 2) and Haslam et al. (2005: 401) reviewed 100 construction accident cases to examine the possible contribution of design in each incident. The results of their findings indicate that in almost half of the cases (47%), changes in permanent designs would have reduced the likelihood of the accidents.

Incorporating H&S considerations into projects during the project planning and design stages can have a positive impact on workers’ H&S behaviour on site (Huang and Hinze, 2005: 1029). This implies that designers have the responsibility to improve construction site H&S performance through their design decisions, particularly during project planning and design stages.

Participants’ comments:

“H&S information are not incorporated into designs”.

“Hazard identification and risk assessment are not carried out on the intended project”.

The above comments by the participants indicate the extent to which designers’ roles can contribute to at-risk work practices or unsafe behaviour. Designing H&S into construction entails that designers should give due consideration to workers’ H&S during the project planning and design stages. Gambatsee, Behm and Rajendran (2008: 675) argue that designers should carry out design-related H&S and create designs that mitigate the hazards and risks associated with construction in order to improve workers’ H&S.
Workers are exposed to health hazards through the materials they use on construction sites and also come into contact with some hazardous chemical substances that are harmful to their health. Construction workers suffer many diseases such as; lung cancer, skin diseases, skin cancer, kidney problems, blindness, ear drum problems, nervous and reproductive systems and liver problems. Coke and Sridhar (2010: 139) argue that work-related disease has been linked to exposure to chemical substances and construction materials used on sites. Designing H&S into construction should be upheld by designers, by ensuring that H&S information is provided in the drawings, by conducting hazard identification and risk assessment and not specifying any hazardous materials.

6.8.1.3 Monitoring and implementation of project H&S plans

The third theme that emerged from the discussion is monitoring and implementation of project H&S plans. To address the issue, this question was asked for discussion and comment.

1. In most construction projects that you were / are involved, have you encountered the use of an H&S plan?

A project H&S plan is the road map that directs the clients, project managers, engineers and contractors on how the principal contractor set out to manage a particular project’s H&S during construction. Effective project site H&S management is largely dependent upon the comprehensiveness of the H&S plan and its availability on site. The law mandates clients and their appointed agents to monitor and ensure that contractors fully implement the prepared and agreed H&S plan on site. Participants’ comments:

“In major projects, contractors have written H&S plans for the projects”.

“Implementation of H&S plans is the problem”.

These comments indicate that monitoring project H&S plans implementation by clients and their appointed agents is grossly inadequate. Monitoring provides information with regard to performance. Poor monitoring of project H&S plans by clients, designers and project managers will
definitely result in inadequate implementation by the contractors on site. A project H&S plan is very vital for construction sites H&S management as it identifies environmental restrictions and existing on-site risk peculiar to a project. The South African Council for Project and Construction Management Professions (SACPCMP) identification of work and scope of services for construction project managers (2006) places responsibility on project managers relative to construction H&S in the following sections:

- Advise clients relative to appointment of H&S Consultant Section 2.2.2;
- Facilitate design as required by H&S Consultant Section 3.3.7;
- Facilitate and monitor H&S Consultant Specification Section 4.4.4;
- Monitor and approve H&S plans by contractor Section 5.5.11, and
- Monitor the compliance of H&S plans by contractor Section 5.5.13.

With regard to these important functions, project managers need to demonstrate visible leadership relative to coordination, integration and monitoring of project H&S plans in contrast to poor monitoring and implementation by project managers.

### 6.8.1.4 Financial provision for H&S at the tendering stage

The fourth theme is financial provision for H&S during project planning and at the tender stage. To address the issue, this question was asked.

1. _What effect does inadequate financial provision for H&S at the tendering stage have on the ability of contractors to ensure adequate on-site H&S interventions?_

Finance is the live-wire of a project. Inadequate budgeting for financial resources for project H&S during the early planning or at the tendering stage is one of the major factors hindering contractors H&S interventions on site. The inability of the quantity surveyors to facilitate the provision of finances for project H&S in the BoQs or at the project tendering stage is a serious challenge for
effective H&S management. In discussing the above question, the following comments were made by the participants.

“H&S is not considered as important as quality”.

“Contractors price H&S items very low in order to win the tender”.

“Some private clients do not use the services of quantity surveyors”.

The perception that H&S is not considered as important as other project parameters (cost, quality, and time) indicates why clients do not budget or allocate adequate financial resources for H&S in their projects. Contractors tendering competitively often ignore H&S items or price them very low in the BoQs. The consequence is lack of funds for H&S interventions on sites. The most complicated side of this problem is that quantity surveyors who are the construction cost experts are not being used by clients and contractors. Smallwood (2006: 2) and Hinze (2006: 132) argue that H&S should be accorded statuses equal to that of cost, quality, and time, and be included among the criteria used for pre-qualifying and final selection of contractors. In addition, quantity surveyors’ failure to make adequate financial provision for H&S in the BoQs is tantamount to poor leadership and lack of professional ethics.

6.8.1.5 Contractors’ H&S management systems and leadership

The fifth postulated research hypotheses for this study was that contracting organisations lack visible leadership and commitment to workers’ H&S. Based on this rationale, questions related to the fifth theme were asked.

1 To what extent do you perceive that poor leadership and lack of commitment to workers’ H&S by contracting organisations contribute to at-risk work practices or unsafe behaviour?

Organisational success has been linked to the quality of leadership. The traditional approaches to management have given way to leadership skills. On this note, Sunindijo and Zou (2012: 2) state
that construction managers at all levels of management need to develop interpersonal skills and intelligent and transformational leadership qualities to meet up to H&S management challenges. Effective H&S management requires project personnel and leaders to have relevant capabilities. For instance, leaders who demonstrate transformational leadership qualities can inspire or influence individuals to meet organisational goals beyond their own interests and also see the value of meeting such goals (Burns, 1978 cited in Yukl, 2010: 123).

Participants agreed that visible leadership and commitment by leaders are critical for effective H&S management. Visible leadership and commitment by the top management has been noted to have a significant influence on the H&S behaviour of managers and supervisors that finally cascades down to workers. The top leaders set the company’s H&S policy and lead by example. Musonda et al. (2012: 79) state that H&S culture has to start at the top and managers and supervisors nurture it by just reinforcing it every day by example. Thus, a good H&S management system must come from the top. The importance of leadership and commitment to workers' H&S by management at all levels is crucial as it entails promoting and sustaining organisational H&S culture.

Leadership epitomises:

- Having a genuine interest in workers;
- Valuing workers contributions;
- Encouraging questioning of traditional approaches to tasks;
- Showing honest and consistent behaviour;
- Being open to criticism and disagreement;
- Knowing workers by names;
- Having listening ears;
- Being supportive when mistakes are made, and above all
Leading by example or being a role model.

Conversely, poor leadership and lack of commitment to workers’ H&S at all levels of management have negative consequences on H&S outcomes.

The second question was asked to share their views regarding the deplorable conditions on most construction sites around South Africa.

2. To what extent do you perceive that contractors’ inadequacies relative to H&S workplace planning have affected workers’ H&S behaviour on site?

The participants share common views on the effects that H&S workplace planning can impact positively or negatively on workers’ H&S behaviour. However, construction by its nature is hazardous, dangerous, dirty and difficult and sometimes site activities are carried out at heights or even under water. Notwithstanding the hazardous and dangerous nature of construction site activities, major site accidents, injuries and fatalities have been linked to poor site H&S management (Haslam et al. 2005: 401; Hamid et al. 2008: 242; Fisk and Reynolds, 2012: 231). The participants unanimously agreed that poor H&S workplace planning has a negative impact on workers’ H&S behaviour on sites. Participants made the following remarks concerning the conditions of some sites.

“Untidy and unorganised”

“Poor access road”

“Excessive noise”

“Lack in the provision of welfare facilities”

These comments by the participants indicate that some sites are poorly managed. The contractors’ inadequacies in some aspects relative to H&S workplace planning contribute to at-risk practices or unsafe behaviour of workers on sites. Notably, lack of provision of site welfare facilities on some construction sites around South Africa have a negative impact on workers’ health and negate the
tenet that a sound mind contributes to a sound body. The importance of a well-planned site and provision of welfare facilities was noted by Hughes and Ferrett (2009: 278) and Fewings (2010: 168). They state that well-planned worksites will result in: time saving, lower cost, improved work and reduced site accidents and incidents.

6.8.1.6 Leadership in H&S management

This research is aimed at examining behaviour-based H&S management in construction through the lens of leadership. Based on this context, this question, related to leadership attributes that can realise improvement in the area of construction H&S performance, was asked for participants’ comments and discussion.

1. Despite the interventions that have been mentioned in the course of this discussion, do you think that leadership abilities and attributes can improve construction H&S performance?

Leadership qualities and behaviour have been linked to a positive organisational H&S performance and culture. According to Flin et al. (2008: 131), Achua and Lussier (2010: 7), Yukl (2010: 23) and Lutchman et al. (2012: 47), leadership commitments are essential for organisational success. For instance, transformational leadership styles exhibited by the Chief Executive Officers (CEO) of British Petroleum oil (BP) had an indirect and direct impact on H&S outcomes. Effective leadership at all levels of management is the key factor that drives H&S success. The leadership attributes of management at all levels have both indirect and direct relationships with safe and unsafe behaviour on sites. Comments by one of the participants indicate that visible leadership is critical for the promotion and sustainability of site H&S culture. The participant succinctly puts it in this manner:

“We should be a role model when we visit site by wearing our safety hats”

“Talk to workers as human beings”
These comments indicate that there is a need for managers at all levels of management to demonstrate visible leadership when on visits to construction sites, since workers tend to emulate their good or bad behaviour. As one of the Chief Executives put it, workers hear what we say, but what they do reflects on what we do. Leaders' behaviour has a significant influence on at-risk work practices or unsafe behaviour of workers on site (Flin et al. 2008: 132). Therefore, leaders at all levels should demonstrate attributes or qualities that inspire and show trust and respect to workers when on a visit to a site.

6.9 SUMMARY OF THE FINDINGS OF THE FOCUS GROUP DISCUSSION

Comments from the participants in this focus group discussion highlighted their experiences regarding their H&S practices and behaviour. Overall, the participants’ experiences indicate that there is a need for a behavioural change among the key project leaders regarding workplace H&S culture. Comments regarding poor leadership, lack of involvement and commitment to project H&S by clients, their appointed agents and contractors require a behaviour and attitudinal change. The comments of the participants support the argument that causes of poor construction H&S performance are not caused by workers but rather by poor leadership and a lack of commitment to workers’ H&S by the key project leaders (clients, designers, project managers, quantity surveyors and contractors).

In addition the following were highlighted:

- Lack of transparent leadership and unethical standards during projects procurement and contracts award;
- Existence of H&S management inadequacies in contractors’ organisations relative to lack of H&S training of workers;
- Inadequate enforcement of H&S rules and regulations;
- Lack of worker involvement and participation;
• Poor H&S workplace planning, and
• Lack of management control and monitoring of workers’ exposure to hazardous chemical substances on sites.

These observations are consistent with findings in similar studies carried out in the UK, USA, Australia and Canada. The consensus among researchers is that leadership plays a vital role for effective H&S management (Krause, 2003: 1; Flin and Yule, 2003: 45; Geller, 2008: 26; Madlock, 2008: 61; Yukl, 2010: 12; Lu and Yang, 2010: 123; Lutchman et al. 2012: 64). Therefore, it is undisputable that leadership is a key determinant of workers’ health, safety and well-being, and also fundamental to promoting and sustaining a workplace H&S culture.

6.10 PRESENTATION OF INTERVIEWS

For an additional insightful perspective, interviews were conducted with managers and site supervisors in two large and two small construction organisations in Port Elizabeth. This was done to examine their H&S management practices and leadership. A semi-structured interview guide was developed (see attached Appendix C). Interviewees were informed of the voluntary nature of their participation and they were assured of the confidentiality of their comments. The discussions with each interviewee were recorded on an iPhone with the permission of the interviewee before transcription. To enhance the validity of the findings, a summary was sent to each interviewee for validation and correction of any misconceptions. The primary sources for the open-ended interview questions include an exhaustive literature review on construction H&S, behavioural approaches to safety management (Cox et al. 2004: 825) and people-based leadership (Geller, 2008: 29).

The sample for the interviews was chosen from site leaders and managers to facilitate an in-depth discussion and wider study that fulfils the requirements for generalising the research findings. One of the sample criteria was that the interviewees were currently working on a construction site in South Africa and had over five years’ experience. The second criterion was that the interviewees
were leaders (managers and supervisors). In addition, the sample criteria were in line with the research topic, which seeks to examine the relevance of leadership in construction H&S management. The questions were structured to elicit responses from the managers and site supervisors regarding H&S management practices and leadership styles in their organisations. The questions addressed five areas:

- Poor H&S leadership and lack of commitment to workers’ H&S among clients, designers, project managers and quantity surveyors;
- Lack of top management commitment to H&S and poor leadership;
- Frontline managers’ leadership and behaviour;
- Influence of H&S training on workers H&S behaviour;
- Workers involvement and participation in H&S decisions, and
- Obstacles to optimum H&S management.

6.10.1 Poor H&S leadership and lack of commitment to workers’ H&S in the clients’ organisations

The interviewees were asked to give their perceptions regarding poor H&S leadership and the lack of commitment to workers’ H&S by the clients’ organisations. The interviewees gave a range of responses. These include inadequate financial budgeting for H&S, lack of pre-qualification of contractors on H&S and inadequate monitoring to ensure that contractors comply with project H&S plans and inability to ensure that contractors have made adequate financial provision for H&S in their tenders. Also, references were made to bribery, corruption and political interference that exist in clients’ organisations as being poor behaviour and a lack of commitment, which contributes to workers’ unsafe behaviour on sites.
However, bribery, corruption and political interference particularly among the public clients have become endemic in society. These practices are not only limited to public clients but apply to private clients as well. Such social ills are prevalent in developing nations and are becoming increasingly more dominant in South Africa. The resultant effects of this poor leadership and behaviour among the clients often lead to circumventing procurement guidelines and polices. As a consequence, contracts are awarded to contractors with poor H&S records, which result in site fatalities, injuries and diseases.

### 6.10.2 Poor H&S leadership and lack of commitment to workers’ H&S by the designers

The thrust of designing H&S into construction resides with the architects and engineers. Direct relationships exist between poor designs and unsafe behaviour. The interviewees were asked to give their perceptions of poor H&S leadership and lack of commitment to workers’ H&S by designers. With regard to their construction site experiences, the interviewees identified the following as poor H&S leadership related to the behaviour of designers: low involvement in pre-qualifying contractors with good H&S records and poor monitoring of contractors’ H&S plans implementation.

In terms of commitment to workers’ H&S, interviewees mentioned that the following contribute, inter alia, to at-risk work practices or unsafe behaviour of workers on site:

- H&S information not being incorporated into design, and
- Design hazard identification and risk assessment not being conducted.

They also mentioned complex design and specification of hazardous materials. Designing H&S into construction is highly desirable as it has been recognised that design concepts have a great influence on the extent of workers’ H&S behaviour on construction sites (Gambtese et al. 2008: 675).
6.10.3 Poor H&S leadership and lack of commitment to workers’ H&S by the project managers

The interviewees were asked to give their perceptions of project managers’ poor H&S leadership and lack of commitment to workers’ H&S. The interviewees’ responses range from lack of pre-qualifying contractors relative to H&S to inadequate provision of H&S information to the design team, poor choice of procurement method, poor estimation of project duration and inadequate hazard identification and risk assessment. Project managers, as the project leaders, have a duty and responsibility to coordinate and integrate H&S into the project during the planning stage and to adequately monitor contractors’ project H&S plans implementation. However, interviewees’ responses indicate that project managers are lacking in these important duties. The results have been poor H&S on project sites.

Concerning commitment to workers’ H&S, interviewees identified inadequate monitoring to ensure that contractors comply with project H&S plans, inadequate attention to H&S during site inspections, inadequate attention to H&S during project progress meetings, poor H&S training of workers and low involvement of workers on site H&S matters. However, experience indicates that at-risk work practices or unsafe behaviour are reduced on projects where project managers are committed to workers’ H&S by actively conducting site inspections, attending project progress meetings, conducting regular site H&S training and involving workers on sites in H&S matters.

6.10.4 Poor H&S leadership and lack of commitment to workers’ H&S by the quantity surveyors

Lack of financial provision for H&S in the bills of quantities by quantity surveyors leads to a lack of funds for site H&S interventions. Interviewees were asked to give their perceptions of quantity surveyors’ poor leadership roles and lack of commitment contributing to at-risk practices or unsafe
behaviour of workers on sites. With regard to poor leadership, interviewees’ responses range from lack of transparency in carrying out interim monthly valuations to lack of visible leadership in terms of pre-qualifying contractors and the procurement process. These marginalise H&S performance.

In terms of commitment, interviewees noted inadequate H&S information in BoQs, non-inclusion of an H&S section in the BoQs and failure to ensure that contractors have made adequate financial provision for H&S in their tenders. Lack of commitment to project H&S manifesting through inadequate facilitation of financial provision for H&S in the BoQs and the inability to ensure that contractors do the same in their tenders contribute to at-risk work practices or unsafe behaviour of workers on sites.

### 6.10.5 Lack of top management commitment to H&S and poor leadership

The quality of leadership at the top level determines the H&S behaviour of workers on site. It is the responsibility of the top leaders to develop organisational H&S policies, allocate resources for H&S, approve H&S training of workers and assign responsibility to managers and supervisors. In fact, organisational H&S is grown and nurtured by top leaders. Thus, it is top management behaviour and commitment that influence the behaviour of other managers down the line. One of the managers from a large company put it this way:

“Companies’ H&S management is determined by the top management.”

“They set the company’s H&S policy and lead by example.”

“Regardless of the company size, it is the leadership styles of the top management that influences the H&S behaviour of managers and supervisors that translate to at-risk practices.”

Statements of supervisors from small organisations include:

“The big bosses, owners of the companies never attended any site meetings.”
“We lead by example, a good H&S management system must come from the top…”

“H&S culture has to start from the top, we at the frontline nurture it, by just reinforcing every day, by example.”

The traditional approaches to management have given way to leadership skills, which entails construction managers at all levels of management needing to develop interpersonal skills and intelligent and transformational leadership qualities to meet up with contemporary management challenges. Sunindijo and Zou (2012: 1) contend that project personnel play an important role in construction H&S management, which requires them to have relevant capabilities. It has been argued that visible leadership demonstrated at the top level, has both direct and indirect impact on organisational H&S outcomes.

6.10.6 Frontline managers’ leadership styles and behaviour

A strong link exists between managers and site supervisors’ behaviour and at-risk work practices or site workers’ unsafe behaviour. The safe and unsafe behaviour of managers and supervisors is often emulated by the workers. H&S culture within an organisation indicates the workforce attitudes with respect to H&S. Leadership style, particularly at the site management level, helps to foster a supportive organisational H&S culture. For example, on a site where managers and supervisors go about without having their safety hats on, workers see this as normal. Notably, people have beliefs about their leaders and their leaders’ strengths and weaknesses can influence work culture.

Questions were asked about H&S culture relative to H&S behaviour: Do you wear your safety hat and reflective clothing while on site? How do you treat a case of a worker who does not wear his or her safety boot? Are personal protective equipment (PPE) adequately provided to workers? What are the procedures for incident and accident reporting and investigations in your organisation? One of the managers from the large organisations made these comments:
“It is a mandatory rule in my organisation that all personnel on site must wear the safety hat and reflective clothing on site”.

“Site H&S Committee is responsible for investigations of all reported incidents and accidents on site.”

Contradictory comments were recorded in this instance. The interviewee from a small organisation made the following comments:

“Provision of PPE is grossly inadequate.”

“Sometimes workers are asked to buy.”

“We do not have H&S committee in place.”

“One of the managers said that our site H&S Committee is only active when a major accident occurs on site.”

Arguably, these comments indicate that poor site H&S management, resulting from lack of commitment to H&S and poor leadership among managers and site supervisors, impact negatively on optimal H&S performance and organisational H&S culture.

6.10.7 Influence of H&S training on workers’ behaviour

H&S training for personnel is an absolute requirement for an optimum H&S culture. Workers’ H&S training not only increases their technical competencies but also makes them more committed to their work. H&S training is very important for an organisation as it creates awareness of workplace H&S. Questions on how regularly they conduct site H&S training, types of H&S training, induction training and toolbox talks were asked. The comments of a manager from a large organisation include:

“In my organisation, we conduct H&S training to every new employee”.

“The organisation sends every supervisor for H&S training.”

“We conduct toolbox talks on every Monday morning before the week works start.”

Two supervisors from the small organisations have different views. Their comments were:
“Our weekly toolbox talks are dependent on the pressure of work.”

“On such situations our managers focused more on meeting the target.”

“Twenty to thirty minutes induction training may be given to new employees to join the team.”

Lack of workers’ H&S training is a serious challenge in the construction industry, particularly among the small organisations and despite the fact that H&S training helps to create an awareness of workplace hazards among workers. Hinze (2006: 132) asserts that safe work practices not only pay in terms of financial gain, but also in terms of an organisation’s corporate image. It has also been noted by Okorie and Smallwood (2012: 592) that an effective H&S training programme and H&S communication, in a manner that the workers are capable of understanding, can provide numerous benefits such as fewer injuries, illness, better worker morale and lower insurance premiums.

### 6.10.8 Worker involvement and participation in H&S decisions

Involving experienced workers in workplace H&S decisions is critical in the continuous H&S improvement process (Lutchman et al. 2012: 89). Workers feel more valued by organisations when they are involved in decision-making, particularly in H&S matters that concern their H&S and welfare. The site supervisors were asked the following questions relative to worker involvement and participation: Do you attend management meetings where H&S matters are discussed? How many workers attend such meetings? As a site supervisor do you buy-in input from experienced site workers under you? Responses from supervisors in both large and small firms were the same: “I have never attended management meetings for H&S matters.” “One of the supervisors from the large organisation agreed that he has attended such a meeting once, to present his reports on a fatal accident that occurred on site.”

There is a lack of worker involvement and participation in construction site H&S matters in South African construction. This fact was supported by the research conducted by Teo, Haupt and Feng
This study benchmarked H&S practices between Singapore and South Africa in terms of lack of worker involvement and participation in H&S management. The comparative study indicates that South African contractors have poorer H&S management systems relative to worker involvement in H&S matters.

However, workers were not interviewed for this study, as the study is limited to leadership influence on H&S performance in the South African construction industry. The limitation in sample selection is greatly influenced by the scope of this research. Future research can be directed to this area, although it can be argued that leaders’ behaviour determines the workplace H&S culture.

6.10.9 Comments regarding obstacles to optimum H&S management

Construction site activities are unique and the presence of subcontractors and a transient workforce make it more complex. Management of a subcontractors’ workforce on a construction site in terms of H&S has been identified as a serious challenge in the improvement of H&S performance. The following questions were asked: How do you manage a subcontractors’ workforce to ensure that it complies with site H&S rules and regulations? In your position as a manager or site supervisor what are the obstacles to optimum H&S management? Responses from both managers and site supervisors include:

“Subcontractors’ workforce are problematic….they don’t attend weekly toolbox talks.”

The managers and site supervisors agreed that there are obstacles to optimal H&S management. Their comments include:

“Transient workforce is common in construction.”

“Poor H&S training.”

“Illiterate and uneducated workforce.”

“Unplanned work activities.”

“Lack of funds for H&S.”
“Poor H&S culture.”


6.1 SUMMARY OF INFORMAL INTERVIEWS

The general conclusion that can be drawn from the interview section of this study is that leadership and the behaviour of the key project leaders have both a direct and indirect impact on workers’ H&S behaviour. It was also found that the leadership styles of the top management in construction organisations do influence the behaviour and attitudes of the managers and site supervisors. They, in turn, determine the at-risk work practices or unsafe behaviour of site workers. H&S training of workers, which is a pre-requisite in developing technical competencies, is inadequate. In addition, worker involvement and participation in H&S decision-making is grossly lacking. Subcontractors’ workforces, transient workforce, lack of funds for H&S interventions on site and the problem of illiterate site workers were identified by managers and site supervisors as obstacles to effective site H&S management. This supports the arguments that at-risk work practices or unsafe behaviour are not caused by workers but rather by poor leadership and a lack of commitment to workers’ H&S by the key project leaders.

6.12 INTEGRATION OF FINDINGS FROM QUESTIONNAIRE SURVEY, FOCUS DISCUSSIONS AND INTERVIEWS

Causes of poor construction H&S performance in the South African construction industry have been extensively researched. Researchers, among others, identified the following as factors contributing to poor H&S: lack of management commitment and inadequate supervision (Smallwood, 2000: 56), lack of H&S training (Haupt, 2010: 160), ineffective enforcement of H&S rules and regulations by
H&S inspectors (Geminiani, 2008: 67), lack of H&S culture (Okorie and Smallwood, 2010: 380), poor client attitude to H&S (Musonda and Smallwood, 2008: 231) and lack of worker involvement and participation in H&S (Teo et al. 2008: 485).

However, in South Africa, there is a gap between the effective leadership roles of the key project leaders in H&S management and their impact on H&S outcomes. In filling this gap, this research seeks to explore the relevance of the leadership and behaviour of the key project leaders and H&S outcomes in the South African construction industry. The findings of the questionnaire survey, focus group discussions and interviews that emerged from this study are:

- Poor client H&S leadership and behaviour in terms of inadequate provision of financial resources for H&S;
- Lack of pre-qualifying contractors on H&S;
- Inadequate monitoring to ensure that contractors comply with project H&S plans;
- Lack of appointment of a competent design team;
- Poor leadership; and
- Unethical behaviour relative to contract procurement policies and guidelines among clients’ organisations.

It was also found that designers lack commitment to workers, do not specify hazardous materials or pre-qualify contractors on H&S, and they have a lack of commitment relative to monitoring workers’ H&S on sites. Poor leadership also exists among project managers relative to the coordinating, integrating and monitoring of project H&S plans. In addition, there is a lack of commitment to workers’ H&S by quantity surveyors in terms of:

- Inadequate facilitation of financial provision for H&S in the BoQs;
- Non-inclusion of an H&S section in the BoQs;
• Inability to ensure that contractors have made adequate financial provision for H&S in their
tenders, and

• Lack of pre-qualifying contractors on H&S.

Contracting organisations lack visible leadership and commitment to workers’ H&S. Inadequacies
relative to H&S workplace planning and construction materials-related issues were found among
contractors in South Africa construction. Poor leadership styles and behaviour, lack of commitment,
involvement and low participation in project H&S exist among contracting organisations. This
manifest in the form of poor H&S culture, inadequate H&S training of workers, lack of worker
involvement and participation in H&S decision-making, lack of H&S committee, infrequent H&S
meetings and lack of H&S recognition for exemplary H&S behaviour.

Integrating the findings from the questionnaire survey (quantitative) and the focus group discussions
and interviews (qualitative) enabled the researcher to come to commonality as to the causes of

Although, the causes of at-risk work practices or unsafe behaviour may vary, the root causes of all
workplace accidents and incidents indicate and point to poor leadership and a lack of commitment
to workers’ H&S by the key project leaders. Haslam et al. (2005: 402), Hopkins (2008: 147), Geller
(2008: 35), Krause et al. (2010: 47), Lees and Austin (2011: 45) and Lutchman et al. (2012: 56)
argue that one commonality in all workplace accident and incident is leadership failure. This
underlies any proximate and immediate causes of accidents and incidents. For instance, all major
incidents injuries and investigations such as the Piper Alpha, BP Texas oil and Transco oil spill
were due to management failure (Krause et al. 2010: 48). Hopkins (2008: 584) argues that the
usefulness of behaviour-based H&S is noted, but focuses solely on the unsafe acts of workers as
the only causes of poor H&S. It doesn’t consider the critical H&S related behaviour of clients,
designers, project managers, quantity surveyors and contractors, which may not result in significant
performance over time. Similarly, Wu and Fang (2012: 3) further maintain that behaviour-based H&S observers are likely to have their greatest impact if directed upwards (leaders), since it is the behaviour of leaders that is most critical in creating and sustaining a positive workplace H&S culture. On this note, there is a strong existing link between leaders’ behaviour (upstream discussions) and overall project performance including H&S.

Drawing from the findings of the questionnaire survey, focus discussions and interviews, the researcher can identify areas of overlap and conclude what constitutes effective H&S leadership. Notably, the promotion of a positive H&S culture, transparent leadership, ethical behaviour, trustworthiness, openness, a no-blame culture, listening ears and caring are areas where leaders can impact positively on workers’ H&S behaviour.

Literature reviews indicate that there are relationships between leadership qualities and positive H&S outcomes. In particular, clients’ leadership, commitment and involvement in project H&S has a direct and indirect impact on workers’ H&S behaviour. In a similar manner, the design team (designers and engineers, project managers and quantity surveyors) leadership functions, commitment, involvement, participation and ethical behaviour have direct links with site H&S outcomes. At the operational levels, top leaders, site managers and supervisors’ leadership behaviour, commitment and involvement play a vital role in effective H&S management. Leaders’ behaviour, leadership styles and practices, exhibited by leaders at all levels of management, influence workers’ perceptions of the importance an organisation places on H&S (Hopkins, 2008: 568; Boin and Schulman, 2008: 1050; Kelloway and Barling, 2010: 271).

Analysis of the questionnaire survey provides statistical evidence that absence of leadership commitment, involvement and ethical behaviour among the key project participants contributes to workers’ unsafe behaviour. These are evident as indicated in Tables 6.7- 6.13 were all the identified factors and behaviour had MSs above the midpoint of 3.00. This indicates that the respondents
perceived them to be contributing significantly to poor H&S performance in South African construction. Focus group discussions and informal interviews conducted for this study supported the empirical findings that there is a lack of visible leadership and commitment to workers’ by the key project leaders in South Africa construction. These comments made by one of the participants during the focus group discussions indicate that there is a need for behavioural change among the key project leaders regarding workers’ H&S, particularly in the clients’ organisation as the initiators and financiers of all construction projects.

“Corruption is too much.”

“Contracts are awarded only to top politicians.”

“Top management are not transparent.”

Finally, the questionnaire survey, focus group discussions and informal interviews revealed that the key project leaders need to demonstrate visible leadership, commitment, involvement, active participation, ethical behaviour and due diligence regarding workers’ H&S. Therefore, these findings support the arguments that the root causes of at-risk work practices or unsafe behaviour are not the workers. They are the result of poor leadership and a lack of commitment to projects’ H&S by the key project leaders during the project planning stages and at the operational level.

6.13 TESTING OF THE RESEARCH HYPOTHESES

A hypothesis is an idea or proposition that can be tested for association or causality by deducing logical consequences and testing these against empirical evidence (Agresti and Franklin, 2007: 372). In other words, it is a proposition that is empirically testable or assesses the strength of evidence present in the data.

In carrying out a descriptive analysis in scientific research, it is important to compare the relationships between variables to see whether the observed difference or relationship between variables is statistically significant. This procedure is known as hypothesis testing. Authors such as
Agresti and Franklin (2007: 374) and Samuels et al. (2012: 223) state that hypothesis testing guides a researcher to compare the differences and relationships between variables that provide sufficient evidence in support of the hypothesis. Thus, the hypotheses in this study were postulated to guide the researcher as the road map upon which data were obtained and analysed with a view to providing answers to the research problem and sub-problems and testing the hypotheses.

6.14 ADOPTED PROCEDURES FOR THE RESEARCH HYPOTHESES TESTING

The analysis of data was done by entering it into computer software packages (Excel spread-sheet and Statistica version 10.0) with the help of the NMMU Statistical Support Unit. The packages provided easy analysis of the descriptive and inferential statistics for the study. Testing of proportions was used to evaluate the statistical significance of the field data findings. The choice of this tool was guided by Agresti and Franklin’s (2007: 372) recommendation that testing of proportions can be used for categorical variables.

In this regard, the test of proportions was used to determine whether there is a statistical significance between the respondents’ responses and the hypothetical statements. Agresti and Franklin (2007: 372) maintain that the underlying assumption of significance testing of proportions is that the sample size must be sufficiently large so that the distribution of the sample proportion $p$ is approximately normal. The significance is the result obtained from testing a null hypothesis against an alternative hypothesis with the aim of determining the $p$-value as the output result. Agresti and Franklin (2007: 369) state that null hypothesis is a statement that a parameter takes a particular value, which represents no effect; while an alternative hypothesis states that the parameter falls within some range of values that represents effect. Statistical testing is said to be statistically significant at some pre-determined level of significance, which is usually the 5% level. This suggests that the $p$-value may be assumed to be less than 0.05 as the smaller the $p$-value, the stronger the evidence is against the null hypothesis (Agresti and Franklin, 2007: 369). On the other hand, Samuels et al. (2012: 277) argue that it is not necessary to draw a sharp line in a scientific
research decision between sufficient and insufficient evidence. They further argue that the choice of significance level \( \alpha \) should be chosen by the researcher making the decision. It is further noted that the common choices are \( \alpha = 0.10, 0.05 \) and \( 0.01 \).

The position of Samuels et al. (2012: 227) in the choice of \( p \)-value is that if the \( p \)-value of the data is less than or equal to \( \alpha \), the data are judged to provide statistical evidence in favour of alternative hypothesis (\( H_1 \)) and that null hypothesis (\( H_0 \)) is rejected. On the other hand, if the \( p \)-value of the data is greater than the significance level \( \alpha \), it could be concluded that the data provides insufficient evidence to claim that \( H_1 \) is true, and that, thus, \( H_0 \) is not rejected. This position is adopted in drawing conclusions from the research hypotheses testing for this study.

The following conditions were used for testing the postulated research hypotheses:

- The significance level \( \alpha = 5\% \) (0.05);
- The confidence level at 95%;
- The null hypothesis is \( H_0: p \geq 3 \), and
- The alternative is \( H_1: p \leq 3 \).

**Hypothesis 1**

6.14.1 Clients’ poor H&S leadership and behaviours lead to the award of contracts to contractors with poor H&S records
Table 6.18 Reliability of client leadership and behaviour in the appointment of contractors with poor H&S records

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Valid N.</th>
<th>S.D</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to ensure that contractor has made adequate financial provision for H&amp;S</td>
<td>143</td>
<td>3.54</td>
<td>1.17</td>
<td>1</td>
</tr>
<tr>
<td>Inadequate monitoring project H&amp;S plans</td>
<td>142</td>
<td>3.46</td>
<td>1.19</td>
<td>2</td>
</tr>
<tr>
<td>Non facilitation of financial provision for H&amp;S</td>
<td>143</td>
<td>3.37</td>
<td>1.14</td>
<td>3</td>
</tr>
<tr>
<td>Inadequate addressing of H&amp;S matters during contract negotiation</td>
<td>143</td>
<td>3.36</td>
<td>1.10</td>
<td>4</td>
</tr>
<tr>
<td>Lack of prequalification of contractors on H&amp;S</td>
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<td>3.35</td>
<td>1.11</td>
<td>5</td>
</tr>
<tr>
<td>Inadequate provision of financial resources for H&amp;S</td>
<td>143</td>
<td>3.31</td>
<td>1.19</td>
<td>6</td>
</tr>
<tr>
<td>Inadequate H&amp;S specification provided to the design team</td>
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<td>3.12</td>
<td>1.14</td>
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<tr>
<td>Inadequate project duration</td>
<td>143</td>
<td>3.09</td>
<td>1.27</td>
<td>8</td>
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<tr>
<td>Poor choice of procurement system</td>
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<td>3.08</td>
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<td>1.09</td>
<td>10</td>
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<tr>
<td>Poor project brief provided to the design</td>
<td>143</td>
<td>2.96</td>
<td>1.16</td>
<td>11</td>
</tr>
</tbody>
</table>

Cronbrach’s alpha: 0.89
Average inter-item: 0.45

The null hypothesis states that:

Poor H&S leadership and behaviour by clients does not lead to award of contracts to contractors with poor H&S records.

The alternative hypothesis states that:

Poor H&S leadership and behaviour by clients lead to the award of contracts to contractors with poor H&S records.

If $p$-value < 0.05, then $H_0$ is rejected, but $p$-value = 0.00, $p < 0.05$

Since $p < 0.05$, the alternative hypothesis ($H_1$) which states that poor H&S leadership and behaviour by clients lead to the award of contracts to contractors with poor H&S records is supported. In conclusion, the data provide statistically significant evidence that poor H&S
leadership and behaviour by clients lead to the award of contacts to contractors with poor H&S records.

**Hypothesis 2**

6.14.2 Lack of commitment to workers’ H&S and unethical behaviour by designers lead to H&S not being designed into projects

The null hypothesis states that:

\[ H_0: \text{Lack of commitment and unethical behaviour by designers do not lead to H&S being designed into project.} \]

The alternative hypothesis states that:

\[ H_1: \text{Lack of commitment and unethical behaviour by designers do lead to H&S not designed into project.} \]

If \( p\text{-value} < 0.05 \), then \( H_0 \) is rejected, but \( p\text{-value} = 0.04, p < 0.05 \)

Therefore, \( H_1 \), which states that lack of commitment and unethical behaviour by designers do lead to H&S not designed into project, is accepted. In conclusion, the data provide sufficient evidence that lack of commitment and unethical behaviour by designers contribute to at-risk work practices or unsafe behaviour of workers on site. The three most influencing factors of poor leadership and unethical behaviour found among designers are hazard identification and risk assessment not conducted, complex design and design and construction method statements not provided.
Table 6.19 Reliability of lack of commitment to workers’ H&S and unethical behaviours by designers

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Val. N.</th>
<th>S.D</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design hazard identification and risk assessment not conducted</td>
<td>143</td>
<td>1.15</td>
<td>3.31</td>
<td>1</td>
</tr>
<tr>
<td>Complex design</td>
<td>143</td>
<td>1.13</td>
<td>3.24</td>
<td>2</td>
</tr>
<tr>
<td>Design and construction method statements not provided</td>
<td>143</td>
<td>1.18</td>
<td>3.14</td>
<td>3</td>
</tr>
<tr>
<td>Specification of hazardous materials</td>
<td>143</td>
<td>1.08</td>
<td>3.11</td>
<td>4</td>
</tr>
<tr>
<td>Faulty permanent works design</td>
<td>143</td>
<td>1.24</td>
<td>3.10</td>
<td>5</td>
</tr>
<tr>
<td>H&amp;S information not incorporated into design</td>
<td>143</td>
<td>1.12</td>
<td>3.09</td>
<td>6</td>
</tr>
<tr>
<td>Maintenance realities not incorporated into design</td>
<td>143</td>
<td>1.07</td>
<td>3.09</td>
<td>7</td>
</tr>
<tr>
<td>H&amp;S information not recorded on drawings, schedules and specifications</td>
<td>143</td>
<td>1.15</td>
<td>3.06</td>
<td>8</td>
</tr>
<tr>
<td>Constructability reviews not conducted</td>
<td>143</td>
<td>1.07</td>
<td>3.06</td>
<td>9</td>
</tr>
<tr>
<td>Late generic information</td>
<td>143</td>
<td>1.13</td>
<td>3.00</td>
<td>10</td>
</tr>
</tbody>
</table>

Cronbach’s alpha: 0.90  Average inter-item: .49

Hypothesis 3

6.14.3 Poor monitoring of projects’ H&S plans by project managers leads to inadequate implementation on site

The null hypothesis states that:

Poor monitoring of project H&S plans by project managers do not lead to inadequate implementation on site.

The alternative hypothesis states that:

Poor monitoring of project H&S plans by project managers do lead to inadequate implementation on site.

Decision Rule

If $p$-value < 0.05, then $H_0$ is rejected, but $p$-value = 0.00, $p < 0.05$
Therefore, H₁, which states that poor monitoring of project H&S plans by project managers do lead to inadequate implementation on site, is accepted. In conclusion, the data provide statistically significant evidence in favour of alternative (H₁) that poor monitoring of project H&S plans by project managers contributes to poor construction H&S performance. The most contributing factors are inadequate attention to H&S during site inspections and inadequate monitoring to ensure that contractors comply with the H&S plan.

Table 6.20 Reliability of poor monitoring of project H&S plans by project managers

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Val. N.</th>
<th>S,D</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate attention to H&amp;S during site inspections</td>
<td>143</td>
<td>1.10</td>
<td>3.60</td>
<td>1</td>
</tr>
<tr>
<td>Inadequate monitoring to ensure that contractors comply with H&amp;S plan</td>
<td>143</td>
<td>1.16</td>
<td>3.57</td>
<td>2</td>
</tr>
<tr>
<td>Inadequate hazard identification and risk assessment</td>
<td>143</td>
<td>1.21</td>
<td>3.50</td>
<td>3</td>
</tr>
<tr>
<td>Failure to ensure that contractor has made adequate financial provision for H&amp;S</td>
<td>143</td>
<td>1.14</td>
<td>3.45</td>
<td>4</td>
</tr>
<tr>
<td>Lack of prequalification of contractors on H&amp;S</td>
<td>143</td>
<td>1.10</td>
<td>3.44</td>
<td>5</td>
</tr>
<tr>
<td>Inadequate attention to H&amp;S during project progress meetings</td>
<td>143</td>
<td>1.07</td>
<td>3.43</td>
<td>6</td>
</tr>
<tr>
<td>Inadequate project duration</td>
<td>143</td>
<td>1.10</td>
<td>3.28</td>
<td>7</td>
</tr>
<tr>
<td>Inadequate attention during design coordination meetings</td>
<td>143</td>
<td>1.10</td>
<td>3.28</td>
<td>8</td>
</tr>
<tr>
<td>Inadequate provision of H&amp;S information to the design team</td>
<td>143</td>
<td>1.13</td>
<td>3.20</td>
<td>9</td>
</tr>
<tr>
<td>Poor choice of procurement system</td>
<td>143</td>
<td>1.07</td>
<td>3.18</td>
<td>10</td>
</tr>
<tr>
<td>Constructability reviews not conducted</td>
<td>143</td>
<td>1.14</td>
<td>3.17</td>
<td>11</td>
</tr>
<tr>
<td>Poor coordination of design delivery</td>
<td>143</td>
<td>1.14</td>
<td>3.07</td>
<td>12</td>
</tr>
<tr>
<td>Poor coordination of design team</td>
<td>143</td>
<td>1.18</td>
<td>3.03</td>
<td>13</td>
</tr>
<tr>
<td>Poor coordination of design</td>
<td>143</td>
<td>1.13</td>
<td>3.02</td>
<td>14</td>
</tr>
</tbody>
</table>

Cronbach’s alpha: 0.93
Average inter-item:0.50

Hypothesis 4

6.14.4 Inadequate financial provision for H&S by quantity surveyors at the tender stage results in a lack of funds for H&S implementation on construction sites

The null hypothesis states that:
Inadequate financial provision for H&S by quantity surveyors at the tender stage does not result in a lack of funds for H&S implementation on construction sites.

The alternative hypothesis states that:

Inadequate financial provision for H&S by quantity surveyors at the tender stage results in a lack of funds for H&S implementation on construction sites.

Decision Rule:

If $p$-value < 0.05, then $H_0$ is rejected, but $p$-value = 0.00, $p < 0.05$

Therefore, $H_1$, which states that inadequate financial provision for H&S by quantity surveyors at the tender stage results in a lack of funds for site H&S interventions, is accepted. In conclusion, the data provide statistically significant evidence in favour of the alternative hypothesis that inadequate financial provision for H&S at the tender stage by quantity surveyors contributes to contractors’ lack of funds for implementing H&S on site.
Table 6.21 Reliability of inadequate financial provision for project H&S by QS

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Val. N.</th>
<th>S.D</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to ensure that contractor has made adequate financial provision for H&amp;S</td>
<td>143</td>
<td>1.16</td>
<td>3.51</td>
<td>1</td>
</tr>
<tr>
<td>Inadequate facilitation of financial provision for H&amp;S in the BoQ</td>
<td>143</td>
<td>1.07</td>
<td>3.49</td>
<td>2</td>
</tr>
<tr>
<td>Non-inclusion of an H&amp;S section in the BoQ</td>
<td>143</td>
<td>1.14</td>
<td>3.43</td>
<td>3</td>
</tr>
<tr>
<td>Inadequate hazard identification and risk assessment</td>
<td>143</td>
<td>1.09</td>
<td>3.34</td>
<td>4</td>
</tr>
<tr>
<td>Lack of prequalification of contractors on H&amp;S</td>
<td>143</td>
<td>1.03</td>
<td>3.27</td>
<td>5</td>
</tr>
<tr>
<td>Inadequate H&amp;S information in BoQ</td>
<td>143</td>
<td>1.10</td>
<td>3.24</td>
<td>6</td>
</tr>
<tr>
<td>Inadequate project duration</td>
<td>142</td>
<td>1.18</td>
<td>3.19</td>
<td>7</td>
</tr>
<tr>
<td>Poor choice of procurement system</td>
<td>143</td>
<td>1.03</td>
<td>3.13</td>
<td>8</td>
</tr>
<tr>
<td>Cronbach’s alpha:0.90</td>
<td>Average inter-item:.54</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 5

6.14.5 Contracting organisations lack visible leadership and commitment to workers’ H&S and thus, an H&S problem exists within them

The null hypothesis states that:

Contracting organisations do not lack visible leadership and commitment to workers’ H&S.

The alternative hypothesis states that:

Contracting organisations lack visible leadership and commitment to workers’ H&S.

If $p$-value $< 0.05$, then $H_0$ is rejected, but $p$-value $= 0.00$, $p < 0.05$

Therefore, $H_I$: which states that contracting organisations lack visible leadership and commitment to workers’ H&S, is accepted. In conclusion, the data provide statistically significant evidence that inadequate management commitment to workers’ H&S contributes significantly to unsafe behaviour of workers on site.
Table 6.22 Reliability of contracting organisations lack of visible leadership and commitment to workers’ H&S

<table>
<thead>
<tr>
<th>Factor</th>
<th>Val. N.</th>
<th>S.D</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate site management commitment to H&amp;S</td>
<td>143</td>
<td>1.05</td>
<td>3.71</td>
<td>1</td>
</tr>
<tr>
<td>Non-conformance to H&amp;S plans</td>
<td>143</td>
<td>1.02</td>
<td>3.69</td>
<td>2</td>
</tr>
<tr>
<td>Inadequate enforcement of H&amp;S rules and regulations</td>
<td>143</td>
<td>1.11</td>
<td>3.64</td>
<td>3</td>
</tr>
<tr>
<td>Inadequate provision of financial resources for H&amp;S</td>
<td>143</td>
<td>0.99</td>
<td>3.62</td>
<td>4</td>
</tr>
<tr>
<td>Inadequate H&amp;S training</td>
<td>143</td>
<td>0.99</td>
<td>3.61</td>
<td>5</td>
</tr>
<tr>
<td>Inadequate hazard identification and risk assessment</td>
<td>143</td>
<td>.97</td>
<td>3.60</td>
<td>6</td>
</tr>
<tr>
<td>Poor H&amp;S culture</td>
<td>143</td>
<td>1.10</td>
<td>3.59</td>
<td>7</td>
</tr>
<tr>
<td>Inadequate top management commitment to H&amp;S</td>
<td>143</td>
<td>1.01</td>
<td>3.57</td>
<td>8</td>
</tr>
<tr>
<td>Lack of worker participation and involvement in H&amp;S</td>
<td>143</td>
<td>1.02</td>
<td>3.57</td>
<td>9</td>
</tr>
<tr>
<td>Inadequate middle management commitment to H&amp;S</td>
<td>143</td>
<td>1.05</td>
<td>3.53</td>
<td>10</td>
</tr>
<tr>
<td>Poor H&amp;S planning</td>
<td>143</td>
<td>1.03</td>
<td>3.50</td>
<td>11</td>
</tr>
<tr>
<td>Inadequate H&amp;S inspections</td>
<td>143</td>
<td>0.09</td>
<td>3.45</td>
<td>12</td>
</tr>
<tr>
<td>Inadequate H&amp;S plans</td>
<td>143</td>
<td>1.03</td>
<td>3.38</td>
<td>13</td>
</tr>
<tr>
<td>Poor work organisation</td>
<td>143</td>
<td>0.99</td>
<td>3.35</td>
<td>14</td>
</tr>
<tr>
<td>Inadequate H&amp;S induction</td>
<td>143</td>
<td>1.11</td>
<td>3.32</td>
<td>15</td>
</tr>
<tr>
<td>Poor general project planning</td>
<td>143</td>
<td>1.03</td>
<td>3.28</td>
<td>16</td>
</tr>
<tr>
<td>Infrequent H&amp;S meetings</td>
<td>143</td>
<td>1.02</td>
<td>3.20</td>
<td>17</td>
</tr>
<tr>
<td>Lack of an alcohol and substance abuse programme</td>
<td>143</td>
<td>1.08</td>
<td>3.20</td>
<td>18</td>
</tr>
<tr>
<td>Lack of H&amp;S recognition and award</td>
<td>143</td>
<td>1.11</td>
<td>3.09</td>
<td>19</td>
</tr>
</tbody>
</table>

Cronbach’s alpha: 0.95
Average inter-item: 0.49

6.14.6 H&S workplace planning results in undue exposure of construction workers to hazards on sites

The null hypothesis states that:

H&S workplace planning does not result in undue exposure of construction workers to hazards on sites. The alternative hypothesis states that:
H&S workplace planning does result in undue exposure of construction workers to hazards on sites.

Decision Rule:

If $p$-value < 0.05, then $H_0$ is rejected, but $p$-value = 0.00, $p$ < 0.05

Therefore, $H_1$: H&S workplace planning does result in undue exposure of construction workers to hazards on sites is accepted. In conclusion, the data provide statistically significant evidence in favour of the alternative in that inadequate workplace planning exposes workers to hazards on sites.

Major factors contributing to poor H&S workplace planning are untidy work environment (poor housekeeping), poor working platforms and poor site conditions.

**Table 6.23 Reliability of H&S workplace planning**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Val. N.</th>
<th>S.D</th>
<th>MS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untidy work environment (poor housekeeping)</td>
<td>143</td>
<td>0.96</td>
<td>3.70</td>
<td>1</td>
</tr>
<tr>
<td>Poor working platforms</td>
<td>143</td>
<td>1.09</td>
<td>3.68</td>
<td>2</td>
</tr>
<tr>
<td>Poor site conditions</td>
<td>143</td>
<td>1.05</td>
<td>3.64</td>
<td>3</td>
</tr>
<tr>
<td>Work pressure</td>
<td>143</td>
<td>1.00</td>
<td>3.62</td>
<td>4</td>
</tr>
<tr>
<td>Lifting and handling of heavy materials</td>
<td>143</td>
<td>1.05</td>
<td>3.62</td>
<td>5</td>
</tr>
<tr>
<td>Inadequate vertical access</td>
<td>143</td>
<td>1.03</td>
<td>3.59</td>
<td>6</td>
</tr>
<tr>
<td>Poor work organisation</td>
<td>143</td>
<td>1.11</td>
<td>3.47</td>
<td>7</td>
</tr>
<tr>
<td>Poor illumination</td>
<td>143</td>
<td>1.12</td>
<td>3.41</td>
<td>8</td>
</tr>
<tr>
<td>Poor site layout</td>
<td>143</td>
<td>1.13</td>
<td>3.31</td>
<td>9</td>
</tr>
<tr>
<td>Extreme temperatures</td>
<td>143</td>
<td>1.01</td>
<td>3.29</td>
<td>10</td>
</tr>
<tr>
<td>Poor ventilation</td>
<td>143</td>
<td>1.18</td>
<td>3.28</td>
<td>11</td>
</tr>
<tr>
<td>Lack of mechanisation</td>
<td>143</td>
<td>1.05</td>
<td>3.27</td>
<td>12</td>
</tr>
<tr>
<td>Inadequate provision of site welfare facilities</td>
<td>143</td>
<td>0.96</td>
<td>3.26</td>
<td>13</td>
</tr>
<tr>
<td>Excessive noise</td>
<td>143</td>
<td>1.04</td>
<td>3.18</td>
<td>14</td>
</tr>
</tbody>
</table>

Cronbach’s alpha: 0.93  
Average inter-item: 0.50

**6.14.7 Materials-related issues lead to ill health among construction workers**

The null hypothesis states that:
Materials related issues do not lead to ill health among construction workers.

The alternative hypothesis states that:

Materials-related issues do lead to ill health among construction workers.

Decision Rule:

If $p$-value < 0.05, then $H_0$ is rejected, but $p$-value = 0.00, $p < 0.05$

Therefore, $H_1$: Material-related issues do lead to ill health among construction workers is accepted.

In conclusion, the data provide statistically significant evidence in favour of the alternative hypothesis.

<table>
<thead>
<tr>
<th>Table 6.24 Reliability of materials-related issues</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor</strong></td>
</tr>
<tr>
<td>Sharp edges</td>
</tr>
<tr>
<td>Hazardous chemical substances</td>
</tr>
<tr>
<td>Poor packaging</td>
</tr>
<tr>
<td>Lack of information of material safety data sheet (MSDS)</td>
</tr>
<tr>
<td>Rough edges</td>
</tr>
<tr>
<td>Surface areas</td>
</tr>
<tr>
<td>Inadequate information on material safety data sheet (MSDS)</td>
</tr>
<tr>
<td>Mass and density</td>
</tr>
<tr>
<td>Cronbrach’s alph: .0.90</td>
</tr>
<tr>
<td>Average inter-item: 0.49</td>
</tr>
</tbody>
</table>

6.15 SUMMARY

There is a general consensus among industry leaders and researchers that leadership is a key component of safe organisations. The quality of leadership at all levels of management in any organisation has direct and indirect relationships with H&S outcomes. Leadership and commitment to workers’ H&S entail acting as role models, being inspiring and motivating, building trust,
allocating adequate financial resources for H&S, providing H&S training to workers and promoting H&S citizenship in terms of worker involvement and participation in workplace H&S decisions.

The nature of construction processes and the complex interplay of different independent construction related firms can be regarded as factors contributing to at-risk work practices or the unsafe behaviour of workers on sites. Despite the above arguments, leadership failures have been identified as a major contributory factor to major incident inquiries and investigations. Effective leadership and active commitment to project H&S by the key project leaders is very important for optimal H&S performance. The quantitative survey conducted for this study to determine the extent the key project leaders’ behaviour contributes to at-risk work practices or unsafe behaviour statistically supported the proposition that leadership commitment is critical to workers’ H&S behaviour (see Table 6.17, 6.18, 6.19 and 6.20). The findings were in agreement with the research works of Filn and Yule (2003: 45), Lees and Austin (2011: 2), Lu and Yang (2010: 123) and Wu and Fang (2012: 2). In addition, the qualitative survey conducted in the form of focus group discussions and interviews also supported the empirical findings that leadership and the behaviour of the key construction participants contribute to at-risk work practices or unsafe behaviour. Notably, the focus group discussions and interviews indicate that the leadership styles and behaviour of clients, designers, project managers, quantity surveyors and contracting organisations H&S management at all levels are critical for promoting and sustaining workplace H&S culture. The findings emanating from this research support the arguments that unsafe behaviour or at-risk work practices are not caused by workers, but rather by poor leadership and lack of commitment to workers’ H&S by the key project leaders.
CHAPTER SEVEN: MODEL DEVELOPMENT AND VALIDATION

7.1 INTRODUCTION

The development of a model for this study is to demonstrate a holistic understanding of the influence of the H&S leadership of the key project leaders on workers unsafe behaviour or at-risk work practices. The model will also demonstrate their strategic H&S leadership roles and the influence of the environmental factors in terms of workers’ H&S behaviour. Given that the study is examining behaviour-based H&S management in construction, the use of system thinking modelling techniques may be a useful tool. In support of the relationship between leadership and system thinking, Western (2008: 18) states that system thinking gives an explanation of the connected nature of the world and its power relationships when practising leadership. In other words, critically examining the interconnectedness of leadership and the behaviour of the key project leaders in relation to workers’ unsafe behaviour is important rather than focusing solely on worker behaviour. In addition, the application of a system thinking model for illustration purposes is essential in a volatile and dynamic environment in which construction H&S exists. The social system involves strategic leadership vision, a complex set of interrelated activities that are characterised with uncertainties and varying human elements and environmental factors (McAleenan, 2010: 39).

Forthwith, this chapter covers the following topics:

- Concept of system thinking;
- System structure;
- System thinking and leadership;
- Holistic view of leadership influence on worker H&S behaviour;
- Key project participants’ H&S leadership influence on workers’ H&S behaviour;
- Behaviour-based H&S management systems;
- Elements constituting a leadership model of worker H&S behaviour, and
- Validation of the model.
7.2 CONCEPT OF SYSTEM THINKING

Senge (2006: 35) describes a system as a perceived whole, whose elements belong together because they affect each other over time and operate toward a common purpose. Thus, system approach entails: identifying a system, examining the properties of the whole system and examining the role(s) or behaviour of the system in terms of function(s) within the whole system. However, some systems are simple and predictable, whereas others are complex and dynamic (for example, construction and H&S). Senge (2006: 34) maintains that system thinking is a general principle for seeing interrelationships instead of linear cause-effect chain relationships. System thinking is a discipline for seeing wholes. Reed (2009: 78) argues that system thinking is a framework that should be understood and applied by strategic leaders at all levels of leadership for organisational effectiveness.

System thinking is a set of specific tools and techniques that can help senior leaders to adjust important aspects of organisation behaviour (Reed, 2009: 92). Thus, there are some concepts and approaches embedded in systems thinking that are useful when considering why a situation seems to be immune to intervention or why a problem thought to have been solved suddenly returns. For example, the volumes of rules and regulations designed at local and national levels to improve construction H&S performance have failed to achieve their purpose to a certain extent, especially in South Africa (cidb, 2009: i). Lees and Austin (2011: 3) contend that no number of H&S rules and regulations can drive behaviour. Reed (2009: 93) opines that the system thinking model gives leaders a deeper understanding of the roles or behaviour of the parts that make up a system. It has been noted that a system in general influences the behaviour of people in an organisation. Therefore, in dealing with a complex and dynamic social system such as construction H&S. System thinking becomes crucial to synthesise a problem by seeing things in terms of patterns and relationships. This is aided by constant assessment and feedback of what is happening rather than
flow charts and reliance on what should be happening (Reed, 2009: 82). Leadership in terms of H&S management demands that leaders at all level should employ system thinking tools and techniques that equip them with a better understanding of the interrelationships between the key components of the system.

7.3 SYSTEM STRUCTURE
System structure describes the make-up of an entire system. It presents the subtle interconnectedness that gives a living system its unique characteristics. System structure helps organisational leaders to make a mind shift from seeing an organisation as separate from the world to being connected to the world (Senge, 2006: 45). Furthermore, it helps the leaders to see problems as not being caused by someone, but to see how their roles and behaviour create the problems. In supporting this assertion, Reed (2009: 92) argues that system thinking epitomises the fact that many factors interact over time and contribute to management failure. This is evident where poor construction H&S performance or a cause of worker unsafe behaviour and the interrelated roles of the key project leaders and environmental factors directly or indirectly contribute to worker unsafe behaviour on site.

According to Reed (2009: 91), system structure enables leaders to:

- Build shared visions and foster commitment to long term goals;
- Have mental models that focus on an openness needed to synthesis problems as a whole rather than parts;
- Build team learning that develops people skills to see things beyond the individual perspective, and
- Master how the environment affects their organisations as a system.

7.4 SYSTEM THINKING AND LEADERSHIP
Reed (2009: 81) contends that the concept of system thinking lies on leaders seeing both the parts and the holistic picture. An illustration of this is the human body as a system because each part
affects the performance of the whole. All the parts are interdependent. The liver affects the brain, heart, kidneys and vice versa. Each part can be studied alone, but a comprehensive understanding of how the human body functions cannot be gained by studying one part only because of the interactions between the various parts. This is evident in construction H&S management that involves the input of clients, designers, project managers, quantity surveyors, contractors, environmental factors and social factors (national and state H&S legislation). According to Reed (2009: 92), a system thinker is concerned with looking at a part of something of interest, understanding the behaviour of its parts and then assembling the parts into a whole. For instance, unsafe behaviour or at-risk practices of construction site workers are influenced by many factors. To understand the root causes of at-risk practices or unsafe behaviour of workers on site, it is appropriate to examine the interrelatedness of construction processes and the people that provide input into the system. On this note, Reed (2009: 92) argues that leaders use system thinking to solve many management problems by critically evaluating the interrelationships between the various structures and people and then providing feedback to the system. It becomes obvious that to understand the root causes of at-risk work practices or unsafe behaviour of workers it is necessary to understand the contributions or roles of the key project leaders in terms of their leadership styles and behaviour. Thus, a higher level of thinking is required to deal with the complexities of dynamic social system such as poor construction H&S performance.

Reed (2009: 34) argues that people think in terms of feedback as a substitute for a simple cause and effect relationship. An example is given of a farmer who thinks that the conventional approach of getting rid of insects on his farm is by applying a pesticide. When additional insects appear the farmer applies more of the pesticide because he believes or assumes that what worked in the past will work in this instance. In this regard, it can be argued that there is a need to shift from the old traditional H&S management to the new concept ‘H&S leadership’. Reed (2009: 85) argues that this approach by the farmer to get rid of insects on his farm depicts the lowest level of thinking.
Thus, recognising the pattern of a system over time is a higher-order level of thinking. Therefore, system thinking requires identification of root causes rather than dealing with parts (Reed, 2009: 92). It has been noted that the root causes of workplace accidents are manifestations of upstream decisions by the key construction participants and their critical H&S behaviour that creates the culture of H&S in any organisation. In this regard, it is necessary to employ a system thinking methodology that aims at a holistic understanding of the interrelatedness of the construction process and worker H&S behaviour. This is better than focusing attention on the separate parts of the problem. Therefore, with a system thinking methodology and approach, workers’ unsafe behaviour or at-risk work practices in relation to key project leaders’ H&S behaviour and practices can be better understood.

7.5 HOLISTIC VIEW OF LEADERSHIP INFLUENCE ON WORKER H&S BEHAVIOUR

Construction and its operations can be seen as a large and complex social system that has many interrelated parts. The industry, as a dynamic social system, is affected by environmental factors such as the South African economic policy, societal cultural influences, national and provincial H&S legislation, regulations and labour laws, technological and political influence. These factors influence the H&S leadership and behaviour of the key project leaders that directly and indirectly impact on construction H&S management at varying degrees. This, in turn, influences or determines workers’ H&S behaviour. As noted earlier, system thinking is a discipline for seeing wholes; therefore, developing a leadership model that can bring about H&S performance improvement in the industry requires a holistic understanding of the interrelatedness of construction processes and how they impact on each other. Illustration 7.1 presents a graphical overview of the interrelatedness of leadership influence on worker H&S behaviour and how the interrelated parts interact to influence workers H&S behaviour. The environmental factors that lie in the outer circle exert influence on the key project leaders’ (clients, designers, project managers, quantity surveyors and contractors) H&S behaviour and leadership, which are located in the inner circles as presented in Figure 7.1.
This conceptual framework helps to understand the interrelated parts of leadership influence on worker H&S behaviour. The interconnectedness between the project leaders and the environment have both direct and indirect relationships with the construction H&S management that impact positively or negatively on worker H&S behaviour. For instance, poor leadership in the Department of Labour (DoL) that manifests through the recruitment of incompetent H&S inspectors and lack of empowerment leading to irregular site visit often results in accidents and incidents (Geminiani, 2008: 45). Similarly, political interference has been noted as a major factor contributing to awarding contracts to incompetent contractors who are not capable of carrying out the necessary work (cidb, 2011: ii). Notably, the key project leaders need to understand the dynamics of environmental factors that interplay with their H&S leadership role for effective project H&S management. The relationships between the key project leaders (upstream factors) and the environmental factors need to be understood in the context of construction H&S management, as their interactions influence worker H&S behaviour.

McAleenan (2010: 119) argues that effective H&S leadership requires a holistic understanding of the dynamic and volatile environment in which construction takes place. This argument can be seen in light of construction as a complex set of operations with interrelated activities and varying human elements. Western (2008: 19) simply states that system thinking gives leaders an explanation of the connected nature of the world and its power relationship when practicing leadership. Thus, key project leaders require a holistic understanding of the parts that make up construction and H&S as a social system for effective H&S management.
7.5.1 The key project participants’ leadership influences on workers’ H&S behaviour

The aim of this study is to examine the relevance of the leadership and behaviour of the key project leaders and participants on workers’ H&S behaviour in South African construction. The key project leaders or participants for this study are:

- Clients (public and private);
- Designers (architects and engineers);
- Project managers;
- Quantity surveyors, and
- Contractors.

The H&S leadership influence of the key project leaders on workers’ H&S behaviour have been extensively discussed in Chapters Two, Three and Four of this thesis. Figure 7.2 illustrates the conceptual model of the key project participants’ leadership influence on worker H&S behaviour.

Figure 7.2 Illustration of the key leadership influence on worker H&S behaviour

The clients are initiators and financiers of all construction projects. They have responsibilities and duties under the law to exercise all due diligence and care in the appointment of a competent design team (designers, project managers and quantity surveyors) that will lead to the appointment of competent contractors with good H&S records. The above illustration shows the relationships that exist between the client, design team and the contractors. The arrows from the client to the design team indicate the contractual relationships between them. The other arrows from the design team to the contractor indicate the relationships between the design team and the contractor relative to construction H&S management. The third set of arrows from the design team and contractor pointing to construction H&S management indicate their leadership roles on construction H&S
management. The arrow from clients pointing to construction H&S management indicates the clients’ H&S responsibilities in monitoring project H&S plans implementation by contractors and attending site H&S meetings.

The H&S leadership and commitment of the clients, design team and contractors’ H&S management and leadership styles influence or determine workers’ H&S behaviour. Therefore, improvement of workers’ H&S behaviour on sites is largely dependent upon transparent leadership, commitment to project H&S by the clients’ organisations, their appointed consultants and contractors H&S management and leadership at all level of management. However, instances have shown that poor leadership and a lack of commitment to workers’ H&S exist among some clients’ organisations’, consultants and contractors.

The findings from the questionnaire survey, focus group discussions and informal interviews conducted among managers and site supervisors indicate that poor leadership and lack of commitment to worker’s H&S exist among the key project participants. Findings emanating from this study support other research findings that leadership is the key component for effective H&S management. The cidb (2011: ii) notes that clients’ poor H&S leadership in terms of unethical behaviour and a lack of commitment to projects’ H&S has both a direct and indirect impact on workers’ H&S behaviour. Gambatese et al. (2008: 675) state that there is a relationship between a lack of commitment by the designers and worker H&S behaviour. Research conducted in South Africa by Smallwood and Venter (2002: 2) to investigate the leadership roles of project managers in H&S performance indicates that lack of visible leadership and commitment by project managers is linked to workers unsafe behaviour. Lack of commitment and unethical behaviour by quantity surveyors relative to inadequate financial provision for projects H&S in the BoQs often lead to a lack of funds for site H&S intervention (Olatunji et al. 2011: 112). Inadequacies in H&S management systems, poor H&S behaviour and leadership styles existing in some contracting organisations have
been noted as major factors contributing to workers unsafe behaviour on site (Hinze, 2006: 20; Oloke, 2010: 39; Lutchman et al. 2012: 67).

The developed conceptual model of the key project participants’ leadership influence on worker H&S behaviour for this study indicates that with visible leadership and commitment to worker H&S by the key project leaders, unsafe behaviour or at-risk work practice will be improved. The improved worker H&S behaviour as presented in Figure 7.2 entails that:

- Workers are most aware of the necessity of H&S behaviour;
- Workers are more alert and respond better to unsafe conditions and practices;
- Workers maintain a better workplace H&S culture and ethic;
- Workers respond more positively to H&S guidance and instruction;
- Workers aim for H&S achievements and awards;
- Workers absenteeism will be reduced, and
- Workers will be more productive.

Findings emanating from this research show that clients H&S leadership roles, designers’ critical H&S decisions, project managers’ H&S and quantity surveyors’ leadership roles and contractors’ H&S management, leadership styles and behaviour are critical for optimal H&S performance. Thus, the findings support the widely held views that leadership is a key component for effective H&S management.

7.6 KEY PROJECT PARTICIPANTS’ LEADERSHIP

Figures 7.3 to 7.8 are based on the principles of system thinking and provide graphical presentation and explanation of the key project participants’ leadership roles. The graphical presentations of the key project participants’ leadership emanate from the findings of the study.
7.6.1 Client H&S leadership

Figure 7.3 illustrates the client H&S leadership model.

**Figure 7.3 Client H&S leadership**

The left-hand ellipse indicates that transparent client leadership, commitment and active involvement in project H&S will improve unsafe behaviour and result in reduced site accidents and incidents. Transparent client leadership, commitment and active involvement in project H&S manifest through the appointment of a competent design team and provision of adequate financial resources for H&S. They also manifest through provision of H&S information to the design team, pre-qualifying contractors on H&S and the appointment of competent contractors with good H&S records. Poor H&S performance that is situated between the client H&S commitment and safe behaviour breaks the circle.

The right-hand ellipse indicates that poor client H&S leadership and lack of commitment to project H&S will lead to unsafe worker behaviour and result in site accidents and incidents. It is only visible leadership and commitment, and active involvement and participation in project H&S by the clients’ organisations that can eliminate the break in the circle.

7.6.2 Designers’ H&S leadership

Figure 7.4 illustrates the designer’s H&S leadership model.

**Figure 7.4 Designer H&S leadership**

The right-hand ellipse indicates that poor leadership and lack of commitment to workers’ H&S by designers result in unsafe behaviour that leads to site accidents and incidents.
The left-hand ellipse indicates the extent to which the designers’ H&S leadership and commitment to workers’ H&S can improve worker H&S behaviour on construction sites. These are achievable by incorporating H&S into design decisions, conducting hazard and risk assessments and not specifying hazardous materials. The break in the circle is poor H&S performance, which is located between reduced site accidents and incidents and designers’ H&S leadership and commitment to workers’ H&S. Therefore, it is only a change of behaviour and attitude by designers toward workers’ H&S that can eliminate the break.

7.6.3 Project managers’ H&S leadership

Figure 7.5 illustrates the project managers’ H&S leadership model.

**Figure 7.5 Project managers H&S leadership**

The right-hand ellipse indicates a lack of commitment to H&S. This includes a lack of monitoring project H&S plans, a lack of pre-qualifying contractors on H&S, constructability reviews not being conducted and inadequate attention to H&S during site meetings. These result in site incidents and accidents leading to unsafe behaviour. However, poor H&S performance, situated between the reduced site accidents and incidents and project managers’ leadership roles and commitment, break the circle.

As illustrated in the left-hand ellipse, elimination of the break is achieved through visible leadership and commitment to H&S. These manifest through integration and coordination of project H&S plans into an overall work programme, adequate attention to project H&S progress meetings, adequate monitoring of project H&S plans and regular site H&S inspections.

7.6.4 Quantity surveyors’ H&S leadership

Figure 7.6 illustrates the quantity surveyors leadership model. The right-hand ellipse indicates a lack of commitment and involvement of quantity surveyors in project H&S.

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Figure 7.6 Quantity Surveyors’ H&S leadership

This manifests through a lack of facilitation of financial provision for H&S in the BoQs, failure to ensure that contractors make adequate financial provision in their tenders, non-inclusion of an H&S section in the BoQs, inadequate project estimation duration and inadequate H&S information in the BoQs. This leads to a lack of funds for contractors’ H&S interventions on site resulting in site incidents and accidents. The break in the circle between reduced site accidents and incidents and quantity surveyors leadership is achievable through commitment to project H&S.

In the left-hand ellipse, commitment and involvement of quantity surveyors enhance workers’ H&S behaviour. This is achieved through facilitation of financial provision in the BoQs and during the project tendering stage, provision of H&S information in the BoQs, project duration estimation and monitoring contractors’ compliance to H&S provision in their tenders. Only commitment to project H&S by the quantity surveyors can restore the circle.

7.6.5 Contractors’ H&S management and leadership

Figure 7.7 illustrates the contractors’ H&S management and leadership model. The right-hand ellipse indicates that the acceptance of poor H&S performance reinforces poor performance.

Figure 7.7 Contractors’ H&S management and leadership

The only way to break the cycle represented by the break in the arrow between reduced site accidents and incidents is for contractors to acknowledge that zero accident is attainable. This acknowledgement invariably results from an awareness and adoption of behaviour-based H&S management systems and a leadership-focused approach.

Thus, the adoption and implementation of behaviour-based H&S management systems are not limited to the following steps:
- Top management commitment and visible leadership;
- Managers and site supervisors commitment and leadership styles;
- Promoting organisational H&S culture;
- Performance management, worker involvement and participation;
- Workers’ H&S training, adequate financial provision for H&S;
- Adequate project planning;
- Adequate provision of PPE;
- Adequate H&S workplace planning, and
- Controlling and monitoring the use of hazardous substances on site.

The implementation of the aforementioned behaviour-based H&S management systems in the South African construction industry will enhance workers’ safe behaviour. Behaviour-based H&S management systems entail understanding the root causes of unsafe acts or conditions rather than focusing on the workers’ unsafe behaviour. This is the key to an effective long-term behaviour change that will ultimately lead to H&S performance improvement in the industry.

7.7 HOLISTIC VIEW OF THE KEY PARTICIPANTS’ LEADERSHIP INFLUENCE ON WORKER H&S BEHAVIOUR

Illustration 7.8 presents the holistic view of the key project participants’ leadership influence on worker H&S behaviour. The left-hand ellipse indicates the H&S leadership of the clients, designers, project managers, quantity surveyors and contractors H&S management and environmental factors. The presented model indicates that visible leadership and commitment to workers’ H&S will lead to improved worker H&S behaviour and enhance the construction industry image.

Clients, as the initiators and financiers of construction projects, should demonstrate visible leadership and commitment in the appointment of a design team. The design team, as experts in
construction matters, should put their expertise into use in advising clients on the best procurement methods and on pre-qualifying contractors on H&S relative to anticipated project risks. The designers have responsibilities and duties under the law to design H&S into projects and to show commitment in monitoring workers’ H&S on sites. The project managers also have leadership functions with regard to the successful completion of projects, including workers’ H&S. The project managers as the project leaders must integrate H&S plans into the overall work programmes and actively monitor their effective implementation on sites by contractors. Finance is the live-wire of any project. Quantity surveyors should demonstrate visible leadership and commitment towards the project success by ensuring that adequate financial provision has been made in the BoQs. They should ensure that contractors do the same in their tenders. Contractors’ site H&S interventions largely depend on their cash-flow. On this note, quantity surveyors need to show commitment to carrying out monthly interim valuations.

Contractors’ H&S management systems and leadership have a direct link with worker H&S behaviour. Top leaders need to demonstrate visible leadership and commitment towards project H&S and be role models when on-site visits. Managers at all levels should demonstrate transformational leadership qualities that motivate workers. Management at all levels should inculcate an H&S culture in all departments and on sites. Workers’ H&S training and involvement in H&S decision-making should be a perquisite of all contracting organisations irrespective of size.

**Figure 7.8 Holistic view of key participants leadership influence on worker H&S behaviour**

The right-hand ellipse indicates a break in the circle, which shows that poor leadership and lack of commitment by the key project leaders will lead to unsafe behaviour of workers that often results in site accidents and incidents. The result of site accidents and incidents is poor project H&S performance. The only way to eliminate the break between poor H&S performance and the key project leaders’ H&S commitment is through a behavioural and attitudinal change towards workers H&S by clients, designers, project managers, quantity surveyors and contractors. This can be
achieved by adapting the principles of behaviour-based H&S management systems. The key principle of behaviour-based H&S is visible leadership and a commitment to worker H&S.

Visible leadership, commitment, involvement and active participation by the key project leaders are prerequisites for effective H&S management. The selection of a design team by clients is the beginning of project H&S management. Thus, the decisions of these selected professional experts during the project planning and design stages have a significant impact on overall project performance including H&S. Notably, their leadership roles include pre-qualifying and appointing competent contractors with good H&S records. Failure to discharge these important duties for their principal agents (clients) is poor leadership, unethical behaviour and professional incompetence that defeat the principle of behaviour-based H&S management.

However, the adoption and application of a behaviour-based H&S management system approach by contracting organisations will enhance organisational H&S culture. It will also, promote workers’ H&S training, site H&S committees, H&S performance management and a motivated workforce and worker involvement and participation in workplace H&S decisions. A motivated and well-trained workforce is likely to work safely and behave well. In addition, the application of behaviour-based H&S management systems in South Africa construction will lead to high productivity and enhance workers’ safe behaviour in the followings areas:

- Workers will be more aware of the necessity of safe behaviour;
- Workers will be more alert and respond better to unsafe conditions and practice;
- Workers maintain better H&S culture workplace ethics;
- Workers will respond more positively to H&S guidance and instruction from managers and supervisors, and
- Workers aim for H&S achievement and awards.
In addition, improved worker H&S behaviour will result in: reduced site accidents, incidents, and fatalities and diseases, as well as an improved industry image, a reduction in medical care by the governments and an overall increase in the economy. Thus, the influences of leadership on workers' H&S behaviour found in this study can help to mitigate unsafe behaviour, which often results in accidents, incidents and fatalities on construction sites in South Africa.

7.8 QUALITATIVE MODEL: BEHAVIOUR-BASED H&S MANAGEMENT SYSTEM

A behaviour-based H&S management system, reflecting a leadership approach, requires clients to appoint competent and technical professional advisers and to provide adequate H&S information to the design team and adequate financial resources for H&S. It also requires clients to ensure that contractors make adequate financial provision for H&S in their tenders and to monitor contractors 'project H&S plans implementation. The competent and technical professional advisers and the clients will, in turn, appoint a competent contractor with good H&S records. Figure 7.9 illustrates the qualitative model of behaviour-based H&S management, a leadership-focused concept.

Figure 7.9 Qualitative model of behaviour-based health and safety management

Designers must design H&S into construction by providing H&S information in drawings, schedules and specifications. They must also carry out hazard identification and project risk assessment and should not specify hazardous materials. In addition, they must be actively involved in monitoring and implementing contractors’ H&S plans on sites.

A behaviour-based H&S management system requires project managers to effectively integrate and monitor the implementation of project H&S plans by contractors. In addition, they need to pay attention to H&S during site inspections and conduct regular project H&S progress meetings. Project managers also need to demonstrate visible leadership and consistent commitment to workers' H&S at all stages of a project.
Quantity surveyors’ involvement in project H&S demands total commitment by ensuring that H&S information and the facilitation of financial provision for H&S is provided in the BoQs and during the project tendering stage. The quantity surveyors also must diligently carry out interim valuations.

Contractors’ H&S management systems and leadership are very important in behaviour-based H&S management. The unsafe behaviour of workers or at-risk work practices on sites is largely influenced by top management commitment to workers’ H&S and the existing organisational H&S culture. The safe and unsafe behaviour of workers are functions of many factors: the organisation’s H&S management systems, workers’ H&S training, H&S workplace planning and the application of modern technology on sites as compared to manual materials-handling. Other factors are: supervisors’ leadership behaviour, motivational factors and most importantly the degree of worker involvement and participation in H&S decision-making in the organisation. Though the application of behaviour-based H&S management is still new in the construction industry its efficacy has been seen in terms of reduction of accidents, incidents and injuries on construction sites (Cox and Jones, 2006: 6; Hopkins, 2006: 583; Paul and Maiti, 2007: 449; Sherratt and Farrell, 2012: 3; Wu and Fang, 2012: 2).

7.9 DEVELOPING A BEHAVIOUR-BASED HEALTH AND SAFETY LEADERSHIP MODEL

One of the objectives of this research is to develop a behaviour-based leadership H&S management model that can enact H&S performance improvement in South African construction. Secondly, the developed model will form an integral part of scholarly work. The model will also play a vital role for decision-makers, clients, designers, project managers, quantity surveyors, and contractors. Notably, the use of models and modelling in the academic discourse is becoming increasingly important, particularly for a doctorate thesis. Cloete and Wissink (2000) cited by van Wyk, 2009: 387) state that a model is a presentation of a complex reality that has been simplified to describe and explain the relationship between its variable components and to sometimes prescribe how something should happen. In a similar manner, van Wyk (2009: 387) argues that models, or images
of systems, could be used to develop knowledge and visualise or realise theory. In a simplifier form, a picture or image speaks more than thousand words. Senge (2006: 34) states that system-thinking models and system archetypes help people to see those structures and thus find leverage, especially amid the pressure and crosscurrents of real-life business situations.

Behaviour-based H&S is a new concept in construction H&S management. To overcome the big challenges of traditional behaviour-based H&S implementation in construction, new ideas and methodologies must come in. There is limited research in South Africa relative to H&S leadership in construction. The model shown in Figure 7.9 for this study was based on a literature review related to causes of poor H&S in South Africa and internationally in the UK, USA, Canada and Australia, where behaviour-based H&S management has been in existence for a decade. In addition to the literature, feedback was obtained from a questionnaire survey, focus group discussions, informal interviews conducted with construction managers and site supervisors and expert reviews. This feedback was used to develop the model of leadership influence on worker H&S behaviour as illustrated in Figure 7.9.

7.10 MODEL OF LEADERSHIP INFLUENCE ON WORKER H&S BEHAVIOUR

All accidents are preventable. Researchers and scholars such as Krause (1997: 12), Hinze (2006: 12), Paul and Maiti (2007: 447), Hopkins (2008: 583), Lees and Austin (2011: 3) and Wu and Fang (2012: 2) argue that if the causes of unsafe behaviour that result in accidents are traced back to clients’ and their consultants’ H&S leadership and behaviour and contractors’ H&S management practices at all levels of management, accidents can be prevented. The literature survey and empirical findings indicate that the root causes of workers’ unsafe behaviour or at-risk work practices on site emanate from the decisions of the upstream factors (project leaders) that created the workplace H&S culture. The research findings support an earlier statement made by Hopkins (2006: 875) that the usefulness of behaviour-based H&S should not be limited to only observing and gathering data on unsafe acts of workers. Attention should also be directed towards the H&S
related behaviour of clients, designers, project managers, quantity surveyors and contractors as
the creators of the work environment. Wu and Fang (2012: 3) further amplify the importance of
H&S leadership and the behaviour of the key project leaders relative to workers’ H&S. They state
that behaviour-based H&S observers are likely to have their greatest impact if directed upwards,
since it is management that is most critical in creating and sustaining a positive H&S culture in an
organisation. Leadership has been found to be an important factor that determines an organisation’s
H&S outcomes and culture. Figure 7.10 is a developed model of leadership influences on worker
H&S behaviour.

Figure 7.10 Model of Leadership influence on worker H&S behaviour

7.11 ELEMENTS CONSTITUTING THE MODEL

The elements that constitute the model of leadership influence on worker H&S behaviour are:
leaders, roles of leaders, leadership influence on construction H&S performance and improved
worker H&S behaviour.

7.11.1 Leaders

Clients are the owners and financiers of construction projects. As the owners and financiers of
construction projects they have a substantial influence on the way projects are being run. It is
important that their decisions relative to project H&S are carefully considered as these will directly
and indirectly impact on worker H&S behaviour.

Designers are persons or organisations that in the course of furtherance of a business prepare or
modify designs. In carrying out their design duties, they are required by law to avoid foreseeable
risks to those involved in construction and maintenance.
Project managers are persons or organisations who undertake project management from inception to successful completion. They assist and advise clients on how best to manage the projects, including workers’ H&S.

Quantity surveyors are construction financial experts. As experts in construction financial matters, it is very important that they make adequate financial provision for H&S in the BoQs and ensure that contractors do the same in their tenders. Thus, inadequate financial provision for project H&S has a direct impact on worker H&S behaviour.

Contractors are persons or organisations who, in the course of furthering a business, carry out or manage construction work in the most effective manner so as to not cause harm to those who carry out the work.

7.11.2 Roles of leaders

Clients H&S leadership roles entail appointment of competent design team, pre-qualifying contractors on H&S, providing adequate H&S information to the design team, adequate provision of financial resources for project H&S, adequate monitoring of contractors’ H&S plans implementation on site and attending site H&S meetings. These client leadership roles will lead to improved worker H&S behaviour.

Designers’ H&S leadership roles and commitment to workers’ H&S involve incorporating H&S into design, providing construction method statements, conducting hazard and risk assessments and not specifying hazardous materials. These leadership roles and commitment by the designers will lead to improved worker H&S behaviour.
Project managers’ H&S leadership roles and commitment entail coordinating and integrating H&S plans into projects, providing H&S information to the design team, prequalifying contractors on H&S, conducting regular site inspections and active monitoring of H&S plans implementation on site. These project manager leadership roles will lead to improved worker H&S behaviour.

Quantity surveyors’ H&S leadership roles and commitment involve facilitation of financial provision for H&S in the BoQs, pre-qualifying contractors on H&S, ensuring that contractors make adequate financial provision for H&S in their tenders and providing an H&S section in the BoQ. These leadership roles will lead to improved worker H&S behaviour.

Contractors H&S management and leadership styles have a direct impact on worker H&S behaviour. Behaviour-based H&S management entails top management’s H&S commitment, managers’ commitment to workers’ H&S and the promotion of an organisational H&S culture. It also entails adequate financial budgeting for project H&S, emphasis on worker H&S training, H&S workplace planning, adequate provision of site welfare facilities, H&S committees, worker involvement in H&S matters and performance management. The adoption and application of behaviour-based H&S management and a leadership approach by contracting organisations will lead to improved worker H&S behaviour.

7.11.3 Leadership influence on construction H&S performance

Leadership is a key component of safe organisation (Geller, 2008: 35). An organisational H&S culture, as earlier noted, is grown and nurtured by leaders. Thus, it is leadership commitment that promotes a positive H&S attitude and behaviour among workers. The project leaders need to demonstrate visible and transparent leadership in managing construction H&S. It is only a strong H&S leadership that can bring about the desired H&S performance improvement in the industry.
Clients, as the owners and financier of construction projects, should demonstrate visible leadership by pre-qualifying and appointing contractors with good H&S records to undertake their projects. Designing H&S into construction is the thrust of the designers. Designers should demonstrate commitment to workers’ H&S in their design decisions. Project managers, as the project leaders, should coordinate and integrate H&S into projects and demonstrate visible leadership in managing workers’ H&S on site. Finance is the live-wire of any project. Quantity surveyors leadership and commitment entail adequate financial provision for project H&S.

Management commitment to project H&S and visible leadership at all levels by contracting organisations is very important for effective H&S management. Contracting organisations, which adopt transformational leadership styles and behaviour, will promote shared values, positive H&S attitudes and commitment among workers, leading to improved H&S behaviour.

7.11.4 Improved worker H&S behaviour

The developed model of leadership influence on worker H&S behaviour presented in Figure 7.10 and the discussions in Sections 7.10.1, 7.10.2 and 7.10.3 indicate that with visible leadership, commitment to workers’ H&S by the key project leaders will lead to improved worker H&S behaviour. The improved worker H&S behaviour, as found in this study, includes:

- Workers are most aware of the necessity of workplace H&S behaviour;
- Workers are more alert and respond better to unsafe conditions and practices;
- Workers maintain a better H&S culture and ethics;
- Workers will respond more positively to H&S guidance and instruction from managers and supervisors, and
- Workers aim for H&S achievement and awards.
7.12 VALIDATION OF THE MODEL

A group interview was convened in order to validate the relationships assumed for the model variables. This was done by sending the model to client organisations (public and private), designers, project managers, quantity surveyors and contracting organisations. Three weeks were given for proper study of the model. In the fourth week, a meeting was held at the Nelson Mandela Bay Local Municipality, Port Elizabeth office with the delegated representatives of the contacted organisations. The meeting was held with the researcher and the organisations’ representatives, who are registered professionals in their various disciplines with several years of experience in construction. After much deliberation and discussion, a number of conclusions were reached concerning the model.

It is notable that the representatives, who have been involved in construction site H&S management in many construction projects in South Africa, perceive that there are relationships between the identified variables and unsafe behaviour of workers on sites. In particular, relative to Figures 7.1 and 7.2, it is their assumption that clients’ poor H&S leadership and lack of commitment to and involvement with project H&S is a serious challenge to H&S improvement. It is also noted that commitment to and involvement with H&S by the consultants, such as the designers, project managers and quantity surveyors as indicated in the Figures 7.3, 7.4, 7.5, 7.6 and 7.7, are highly desirable for effective H&S management in South African construction. Inadequacies of H&S management systems and leadership styles among contracting organisations in South African construction contribute to unsafe behaviour of workers on sites. These manifests through the following factors: lack of top leaders’ commitment to project H&S, inadequate H&S training of personnel, poor H&S workplace planning, inadequate provision of site welfare facilities, absence of H&S committees and lack of worker involvement and participation in H&S matters.

Leadership and the behaviour of the key project leaders were also noted as a critical factor that determines the safe or unsafe behaviour of workers on site. Krause (2003: 1), Flin and Yule (2003: 277)
Flin et al. (2008: 56) and Lutchman et al. (2012: 102) maintain that the quality of leadership is the single most important factor that distinguishes successful from unsuccessful H&S improvement initiatives. For example, a lack of transparent leadership and unethical behaviour common in clients’ organisations has a negative impact on overall project performance. This identified behaviour also has a negative impact on worker H&S behaviour, resulting in site accidents and incidents.

In brief, with respect to Figures 7.1 to 7.9, the interviewees contend that a change of the key project leaders’ behaviour is highly desirable for H&S performance improvement in South African construction. Further, the comments of the focus group participants amplified these facts. “The top management are not transparent”, “H&S is not considered as important as quality”. This argument is supported by empirical findings that there is a positive relationship between the H&S leadership of the key project leaders and the H&S performance within a specific setting. That is, workers’ unsafe behaviour or at-risk work practices and leaders’ commitment, transparent and visible leadership are inseparable (Krause, 2003:1; Flin et al. 2008: 56; Lutchman et al. 2012: 102).

7.13 SUMMARY

Model development for academic research is becoming increasingly important, particularly for a doctoral study. A model helps research to present a complex reality in a pictorial form that can be visualised by all. Like the Chinese adage, a picture or image speaks more than a thousand words. Thus, models describe and explain the relationship between variable components and sometimes prescribe how something should happen in a pictorial format. Leadership in the context of construction H&S is still in its infancy, therefore system-thinking modelling techniques were found useful for developing a model of leadership influence on worker H&S behaviour. The use of a system-thinking model helps the researcher to examine the interconnectedness between the leadership and behaviour of the key project leaders and the environmental factors. Thus, the model demonstrates a holistic understanding of the influence of the H&S leadership of the key project leaders on workers’ unsafe behaviour or at-risk work practices.
CHAPTER EIGHT: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

8.1 INTRODUCTION
This chapter presents the summary of the thesis. It discusses conclusions relative to the problem statement, objectives and hypotheses of the study. The chapter also presents conclusions relative to focus group discussions and leadership influence on the worker H&S behaviour model. It presents recommendations emanating from the research findings and its contributions to knowledge. The chapter finally ends with the research limitation and recommendations for future research.

8.2 SUMMARY
This thesis is presented in chapters that range from one to eight. Chapter One presented the background to the statement of the problem, sub-problems and hypotheses, the scope of the study, the assumptions pertaining to the study, the importance of the study and the objectives of the study. In effect, Chapter One provided a backdrop for articulation of identified H&S related problems in the South African construction industry and the need to offer solutions to the problems.

Chapters Two, Three and Four of the thesis presented the review of related literature. Chapter Two began with an exposition of construction H&S performance and accident theories that amplify the various views of known scholars on construction H&S. Five key project (leaders) participants (clients, designers, project managers, quantity surveyors and contractors) were identified as contributing to poor construction H&S performance, clients’ H&S poor leadership, designers’ H&S critical decisions, project managers’ H&S leadership, quantity surveyors’ H&S leadership and contractors’ H&S management practices and leadership.

Chapter Three addressed literature on a leadership-focused approach to behaviour-based H&S in construction, namely the concept of behaviour-based H&S management, trends in behaviour-based H&S applications and approaches. Three current trends in behaviour-based H&S development
were identified: supervisor-driven applications, employee-driven applications and leadership-focused approaches. To underpin the research topic, attention was focused on the leadership aspect of behaviour-based H&S, including leadership styles and behaviour, leadership theories, leadership versus management, leadership influence on H&S management and transformational leadership styles. Also included were issues concerning challenges to traditional behaviour-based H&S implementation in the construction industry, strategies for implementing behaviour-based H&S management and elements for effective behaviour-based H&S management systems.

Chapter Four presented the theoretical and conceptual framework underpinning the research, including theories of behaviourism that relate to how the H&S behaviour of upstream leaders (actors) influences the unsafe behaviour of workers. It also includes strategic perspectives of a leadership approach to H&S management, clients’ H&S leadership in terms of the appointment of a competent design team, budgeting for H&S and the provision of H&S information and due diligence in the contract award. Designers’ H&S decisions in construction contexts were equally discussed as were the leadership roles of project managers and quantity surveyors. The operational perspective focused on contractors’ H&S management systems and leadership at all levels of management. The impact of workplace planning on workers’ H&S behaviour and materials-related issues were highlighted. The chapter further addressed behaviour-based H&S management systems in construction, the relevance of leadership for effective H&S management and the need to improve construction H&S performance in South African construction.

Chapter Five presented the research strategy by discussing issues pertaining to research methodology, philosophy, population and sampling techniques. Chapter Six presented the results of the:

- Questionnaire survey conducted based on the research objectives;
• Focus group discussion protocol that was conducted with the built environment professionals based on the research hypotheses, and

• Informal interviews that were conducted with managers and supervisors of large and small construction organisations and used to validate the developed model.

Chapter Seven addressed the strategy for the model development and validation. It included the concepts of system thinking, system structure, system thinking and leadership and a graphical overview of leadership influences on worker H&S behaviour and the key project participants’ leadership influence on worker H&S behaviour. The chapter proceeded by presenting the components of the following leadership roles: client H&S leadership, designers’ H&S leadership, project managers’ H&S leadership, quantity surveyors’ H&S leadership and contractors’ H&S management and leadership. The chapter further presented a model showing a holistic view of leadership influence on worker H&S behaviour and a model of the key project participants’ leadership influence on worker H&S behaviour and a validation of the model.

8.3 CONCLUSIONS RELATIVE TO THE RESEARCH PROBLEM STATEMENT

The research problem statement states that the principal H&S performance challenge is mainly the poor leadership and behaviour of the key project leaders (participants) rather than a lack of legislation, regulations, policies and procedures in South African construction.

The poor H&S leadership of the key project leaders results in fatalities, increased costs of accidents, decreased productivity, increased absenteeism, high insurance premiums, high costs of disputes and litigation and a damaged image that leads to the inability to win contracts in the industry.

The research findings and attendant recommendations recognise the issues of poor leadership and a lack of commitment to workers’ H&S by the key project leaders and participants as the root causes of workers’ unsafe behaviour and poor H&S performance. The empirical findings support the
research statements shown in Tables 6.6, 6.7, 6.9, 6.10, 6.11, 6.12 and 6.13. These statements show that the identified behaviour and contributions relate to the H&S leadership and behaviour of clients, designers, project managers, quantity surveyors and contractors and contribute to at-risk work practices or unsafe behaviour of workers. Out of a total of fifty identified related behaviours or factors, forty eight recorded MSs above the midpoint of 3.00. This indicates that the survey respondents can be deemed to perceive that the key project leaders and participants’ poor H&S leadership and lack of commitment to workers’ H&S contribute to worker unsafe behaviour. This leads to accidents and incidents or at-risk work practices on project sites. In addition, statements made by the participants during the focus group discussions and by the interviewees support the empirical findings. In view of these findings, a need exists for H&S performance improvement in South African construction, especially with respect to the identified key project leaders’ related behaviour and leadership. This is important for clients’ H&S leadership in terms of involvement and commitment to H&S, consultants’ (designers, project managers, quantity surveyor and engineers) project H&S decisions and contractors’ H&S management systems and leadership at all levels.

8.4 CONCLUSIONS RELATIVE TO THE RESEARCH OBJECTIVES

The first objective was successfully achieved in that the survey respondents can be deemed to perceive that the identified related behaviour contributes significantly to poor construction H&S performance in South Africa. Notable causes contributing to poor construction H&S performance include poor leadership behaviour among site managers in terms of inadequate site supervision and H&S rules and regulations not enforced. Other causes are: lack of workers’ H&S training relative to irregular site H&S meetings and toolbox talks, lack of commitment in terms of inadequate budgeting for H&S by contractors, lack of worker involvement and use of drugs and alcohol by workers.

As indicated in Tables 6.6 to 6.15, the second research objective was also achieved. The notable related leadership and behaviour contributing to poor construction H&S performance include lack
of management commitment, involvement and participation in H&S. They also include inadequate financial provision for H&S in the BoQs, inadequate construction H&S planning and non-integration of H&S into the project during planning phases. In addition, the comments made by the focus group participants and interviewees confirmed that lack of management commitment to H&S and poor leadership at all levels are sources of poor construction H&S in the South African construction industry. The qualitative findings equally indicate that workers' unsafe behaviour occur as a result of unethical practices by the key project leaders.

The fourth objective of this research was also achieved. Based on the research findings, a range of interventions were affirmed by the respondents as having the potential to bring about a reduction in construction site accidents, injuries and ill health. These interventions include top management leadership, commitment, involvement and participation, adequate financial provision for project H&S and adequate planning of workplaces. They also include ethical behaviour in contract procurement and award, transparent leadership, workers’ H&S training and worker involvement and participation in H&S decisions.

8.5 CONCLUSIONS RELATIVE TO THE RESEARCH HYPOTHESES

Hypothesis 1

8.5.1 Clients’ poor H&S leadership and behaviour lead to the award of contracts to contractors with poor H&S records

Based upon the research results indicated in Table 6.7 and comments from the participants during the focus group discussions, it can be concluded that clients' poor H&S leadership and behaviour lead to the award of contracts to contractors with poor H&S records. The major consequence of poor clients’ H&S leadership, lack of commitment and involvement in project H&S is a lack of funds for contractors' H&S interventions on sites. This results in an increase in site fatalities, injuries, ill health, poor H&S training and inadequate provision of PPE to workers. Therefore, adequate financial provision for project H&S during the planning phases, pre-qualification of contractors on
H&S and adequate monitoring to ensure that contractors comply with the project H&S plans in the clients organisations should be adequately implemented.

Hypothesis 2

8.5.2 Lack of commitment to workers’ H&S and unethical behaviour by designers lead to H&S not being designed into projects

As indicated in Table 6.8, the findings suggest that lack of commitment to workers’ H&S and unethical designer behaviour lead to at-risk work practices and the unsafe behaviour of workers on site. In particular, MSs of practices such as design hazard identification and risk assessment not conducted, complex design and design and construction method statements not provided have negative consequences for worker H&S behaviour. In addition, specification of hazardous materials, faulty permanent work design and H&S information not recorded in drawings, schedules and specifications support the hypothesis and, as a result, this unethical behaviour must be adequately addressed by designers.

Hypothesis 3

8.5.3 Poor monitoring of projects H&S plans by project managers lead to inadequate implementation on construction sites

The findings suggest that poor monitoring of project H&S plans by project managers leads to inadequate implementation on construction sites. Comments by one of the participants during the focus group discussions supported the empirical data. The comments are: “In major projects they have written H&S plans for the project”, “Implementation of H&S plan is the problem”.

The consequences of project managers’ poor monitoring of project H&S plans to ensure their full implementation by contractors leads to at-risk work practices or unsafe behaviour of workers on
site. Therefore, clients and their appointed project managers should adequately monitor contractors to ensure that they comply with the projects H&S plans and implement them fully on site. Furthermore, the results presented in Table 6.9 suggest that project managers’ related behaviour contributes to poor construction H&S performance. Project managers as the project leaders should as a matter of importance integrate H&S plans into overall project planning and adequately monitor their implementation on construction sites and demonstrate leadership qualities that show concern for workers’ H&S.

Hypothesis 4

8.5.4 Inadequate financial provision for H&S at the tender stage results in a lack of funds for H&S implementation on sites

The results indicated in Table 6.10 suggest that inadequate financial provision for H&S at the tender stage results in a lack of funds for H&S implementation on sites. Quantity surveyors’ failures to ensure that contractors make adequate financial provision for H&S in their tenders contribute largely to poor H&S performance on site. Further, consequences of inadequate financial provision for project H&S result in poor H&S interventions such as poor H&S training for workers and inadequate provision of PPE. Quantity surveyors should demonstrate visible leadership and commitment to project H&S as a matter of professional ethics and should ensure that projects H&S financial matters are diligently addressed during project planning and procurement.

Hypothesis 5

8.5.5 Contracting organisations lack visible leadership and commitment to workers’ H&S and thus, H&S management problems exist within them

The results presented in Table 6.11 and comments by the interviewees support the view that management commitment to, involvement and participation in project H&S in contracting organisations is inadequate. Comments by one of the interviewees from a large construction
company were: “Companies’ H&S management is determined by the top management”. “They set the company’s H&S policy and lead by example”.

Regardless of the organisation size, it is the leadership styles of management that influence the H&S behaviour of workers on site. Thus, top management commitment to project H&S and site management leadership styles and behaviour are very important for effective H&S performance improvement. The consequences of poor H&S management systems and poor leadership styles lead to worker unsafe behaviour. Therefore, management commitment to workers’ H&S entails:

- Adequate implementation of an H&S plan;
- Adequate enforcement of H&S rules and regulations on site;
- Adequate provision of financial resources for H&S;
- Adequate H&S training for workers;
- Worker involvement and participation in H&S decisions, and
- H&S recognition, awards and honours to exemplary workers.

8.5.5.1 Contractors’ H&S management inadequacies relative to H&S workplace planning

As indicated in Table 6.12, the findings suggest that inadequate H&S workplace planning results in undue exposure of construction workers to hazard on sites. In particular, MSs of practices such as an untidy work environment (poor housekeeping), poor work platforms and poor site conditions impact negatively on workers’ H&S behaviour. In addition, lifting and handling heavy materials, work pressure, inadequate vertical access and poor work organisation point to poor leadership that must be adequately addressed by management at all levels as they contribute to a significant number of site incidents, accidents, injuries and construction workers’ ill health.

8.5.5.2 Contractors’ H&S management inadequacies relative to material issues

The results presented in Table 6.13 suggest that material-related issues lead to ill health of construction workers. The empirical findings indicate that sharp edges, hazardous chemical
substances, inadequate information on material safety data sheets, poor packaging, rough edges, surface areas and the mass and density of material result in ill health among construction workers. Therefore, materials-related issues can be mitigated through designers’ H&S critical behaviour, management control and monitoring.

8.6 CONCLUSIONS RELATIVE TO FOCUS GROUP DISCUSSIONS AND INTERVIEWS

As part of the efforts to find out more regarding H&S leadership and practices of the key project leaders (participants) and their influence on poor construction H&S performance in South African construction, focus group discussions and interviews were conducted among built environment professionals. Based on the discussions, comments and personal perspectives of the participants and interviewees, it became apparent that:

- Poor H&S leadership, lack of commitment to and involvement and participation in project H&S exist among the top management in the clients’ organisations in both public and private sectors.
- Unethical behaviour is prevalent among top leaders. There are cases of corruption, fraud, political patronage and collusion among top leaders and contractors. These result in the award of contracts to contractors who are not capable of undertaking the necessary work and consequently lead to poor construction H&S performance.
- A lack of commitment to workers’ H&S and unethical behaviour exist among designers, resulting in H&S not being designing into projects and therefore contributing to at-risk work practices or unsafe behaviour of workers on sites.
- Project H&S plans are too poor to ensure that contractors comply with its implementation on sites.
- H&S is not accorded equal status with quality, time and cost in respect of project success parameters. Consequences of this are: inadequate financial provision for project H&S by
clients in the BoQs and contractors inability to make adequate financial provision for H&S in their tenders.

- The complex and dynamic nature of construction site workplaces further complicates the inadequacies relative to poor H&S workplace planning that contributes to workers unsafe behaviour or at-risk work practices.

- The hazardous chemical substances, poor packaging and manual material handling used on construction sites relative to contractors’ H&S management inadequacies contribute to workers’ ill health.

- Workers involvement and participation in H&S decision-making processes are poor in South African construction and the situation is even worse in small construction companies.

- Workers’ H&S education and training is grossly inadequate, particularly in small companies.

- Site incidents reporting and investigations are virtually absent on most construction sites and in particular in small organisations.

8.7 CONCLUSIONS RELATIVE TO THE MODEL OF A LEADERSHIP INFLUENCE ON WORKER H&S BEHAVIOUR

In an effort to offer solutions for the root causes of poor construction H&S performance in the South African construction industry, a model of leadership influence on worker H&S behaviour was developed. Although the causes of construction site accidents and incidents recorded in South African construction and other countries may be the same, leadership styles and H&S behaviour of the upstream actors (key project leaders and construction participants) that impact on workers’ H&S behaviour differ.

Conclusions based on the model include:

- The model of leadership influence on worker H&S behaviour suggests that there is a significant relationship between workers’ unsafe behaviour and leadership styles and the
behaviour of the upstream leaders (clients, designers, project managers, quantity surveyors and contractors);

- The model suggests that there is a link between clients’ poor H&S leadership and workers’ unsafe behaviour;
- The model also suggests that there is a link between designers’ critical H&S decisions and workers’ unsafe behaviour;
- The model suggests that there is a relationship between poor monitoring of H&S plans implementation on construction sites and workers’ unsafe behaviour;
- The model also suggests that a lack of funds for sites H&S interventions by contractors, contribute to workers’ unsafe behaviour;
- Top management commitment to projects’ H&S is linked to workers’ unsafe behaviour;
- Managers’ lack of commitment and leadership are linked to workers’ unsafe behaviour;
- Workers’ decisions to behave safely or unsafely are influenced by leadership styles and H&S commitment or behaviour of the frontline managers (supervisors);
- Workers’ perceptions of management commitment, transparency, trustworthiness, honesty and consistent behaviour influence their safe or unsafe behaviour;
- Identification, control and monitoring of the consequences of hazardous chemical substances by management can impact on workers’ H&S behaviour;
- Lack of or absence of alcohol and other substance programmes are linked to workers’ unsafe behaviour;
- Lack of worker involvement in workplace H&S matters contribute to their unsafe behaviour, and
- H&S education and training create awareness and understanding of the existence of hazards and risks in the work environment.
8.8 RECOMMENDATIONS

In general, leadership and behaviour have been identified as the critical dimensions for creating well-functioning H&S management systems. If leaders learn to be committed, transparent and compassionate, there will be much improvement in H&S performance in the South African construction industry. Generally, the empirical findings and comments made by the respondents, focus group participants and interviewees indicate the need for behavioural and attitudinal change by clients, designers, project managers, quantity surveyors and contracting organisations. Consequently, to realise a significant performance improvement in South African construction, transparent leadership, ethical behaviour and commitment to H&S at all levels of management and a change of attitude in the (leaders) principal actors towards workers’ H&S are recommended. In addition, more emphasis on courses such as construction H&S, quality and risk management, interpersonal skills, emotional intelligence and leadership in the built environment tertiary education curriculums is highly recommended.

Behavioural H&S applications that identify H&S related behaviour and leadership styles of the upstream actors in the construction process are important to understand the root causes of poor construction H&S performance. Based on these research objectives, it is recommended that:

- All identified causes of worker unsafe behaviour and poor construction H&S performance in South African construction should be adequately addressed so as to bring about improved H&S performance in the industry;
- Causes of worker unsafe behaviour and poor construction H&S relative to clients’ poor H&S leadership and behaviour, such as the appointment of contractors with poor H&S records and inadequate financial allocation for project H&S, should be addressed;
- Designing H&S into construction by providing H&S information in drawings, schedules and specifications should be adequately addressed through designers’ H&S critical decisions;

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• Causes of worker unsafe behaviour and poor construction H&S performance such as lack of integration of project H&S plans into construction work programmes and poor monitoring of H&S plans by project managers should not be allowed;

• Causes of worker unsafe behaviour, such as inadequate facilitation of financial provision for H&S in the BoQs, should be adequately addressed by quantity surveyors;

• Pre-qualification of contractors in H&S by the clients and their appointed consultants should be highly encouraged;

• Causes relative to poor choice of procurement systems should be adequately addressed by the clients and their appointed professionals;

• Quantity surveyors should ensure that contractors have made adequate financial provision for H&S at the project tendering stage or during projects negotiation;

• Clients should, as a matter of importance, provide H&S information to the design team during the projects planning phases;

• Design hazard identification and risk assessment, construction method statements and constructability reviews must be conducted on every project;

• Maintenance realities must be incorporated into design during the planning phase and construction;

• Causes of worker unsafe behaviour such as lack of top management involvement, commitment to and participation in project H&S should be adequately addressed by contracting organisations;

• Inadequate involvement, commitment to and participation of middle management in project H&S should be also addressed;

• Causes related to inadequate involvement, commitment to and participation of the site management on project H&S should be adequately addressed by every contracting organisation;
• Contracting organisations should adequately make financial provision for H&S in their tenders;
• Causes related to a lack of H&S education and training of personnel, regardless of the size of the contracting organisation, should be addressed as a matter of priority;
• H&S management systems such as H&S committees, H&S meetings and weekly toolbox talks should be encouraged;
• Causes relative to poor project H&S planning, poor estimation of project duration and lack of sequencing of site activities should be adequately addressed;
• H&S induction should be regularly conducted for all personnel and particularly for new employees;
• Contractors must prepare H&S plans for every project as each project differs in scope and with peculiar environmental characteristics;
• Causes related to inadequate information on materials safety data sheet, packaging, mass and density, hazardous items such as materials and surface areas should be provided;
• H&S recognition, award, promotions and honours to motivate workers should be encouraged;
• Causes related to alcohol and substance abuse in contracting organisations should be adequately addressed;
• Inadequate H&S site inspections by clients, designers, project managers, H&S inspectors and top management should be adequately addressed;
• Behaviour-based H&S that centres on worker involvement and participation in H&S decision-making in an organisation should be addressed;
• Active worker involvement and participation in H&S matters in the South African construction industry should be of priority to contracting organisations regardless of size;
• Behaviour-based H&S that encourages a culture of information sharing and a no blame culture for workers should be adhered to;

• A behavioural approach to H&S management is recommended in South African construction industry, and

• Mitigation strategies that advocate the use of behaviour-based H&S management systems should be adopted by construction organisations in the South African construction industry.

8.9 CONTRIBUTION TO KNOWLEDGE

The notable contributions that this thesis makes to the body of knowledge include:

• Application of a behavioural H&S management system with emphasis on a leadership-focused approach. This provides an opportunity for examining the critical H&S related behaviour of the upstream leaders that determines the H&S culture of organisations which, in turn, influences the H&S behaviour of the downstream (workers);

• Examination of the critical H&S related behaviour of the key construction participants relative to poor construction H&S performance that excludes workers who do not have the resources to manage and control workplace H&S;

• Application of a leadership-focused approach in the area of H&S management that will be of tremendous importance to the built environment professionals;

• Emphasis on the concept of behaviour-based H&S, a leadership approach that centres on or revolves around active involvement and participation of the key project leaders (upstream actors) in organisations’ H&S management;

• Unsafe behaviour of workers in workplaces that is influenced by many factors such as clients H&S leadership, designers critical H&S decisions, project managers H&S leadership and quantity surveyors H&S leadership;

• Leadership-focused approach to H&S management that entails systematic analysis of all cases of at-risk work practices;
• Though South African H&S legislation and regulations have been perceived to have impacted positively on H&S management in the industry, behaviour-based H&S management is perceived to be a better intervention strategy for H&S performance improvement, and

• It is the contention of this research that the construction industry in the developing countries where autocratic leadership thrives will have to rethink and embrace transformational leadership that is sweeping across developed countries.

8.10 LIMITATIONS OF THE RESEARCH

It is important to note that the empirical data generated in the research process are limited to only four provinces in South Africa. In addition, due to time constraints, funds and logistic bottlenecks, the results failed to capture sufficient in-depth perceptions from respondents. Another limitation is the problem of qualitative findings that do not allow extensive generalisation. Although qualitative research involves studying respondents in their true setting, no research can truly capture the full effect of the setting or the respondents because they are complex entities (Sutrisna, 2009: 56; Zou, Sunindijo and Dainty, 2011: 953). Furthermore, the nature of the research topic and the sensitivity attached to H&S leadership and behaviour of the key construction participants, made it difficult for the interviewees to discuss inadequacies relative to H&S management in their respective organisations. The low turnout of the participants for focus group discussions is connected with construction personnel being busy on sites.

The constructs applied in this study were drawn from the reviewed literature. The study was focused on the critical H&S leadership and behaviour of the key project leaders and participants. It excluded the contributions of workers to the causes of at-risk work practices or unsafe behaviour of workers. This, to a certain degree is a limitation of the study.
8.11 RECOMMENDATIONS FOR FUTURE RESEARCH

The limitations discussed in Section 8.10 of this study could be overcome by conducting future research. This research could include:

- A wider geographical area in South Africa;
- An empirical survey to include infrastructure development projects, suppliers and manufacturers of building materials in South Africa;
- Workers’ contributions to poor construction H&S performance in South Africa;
- Behaviour-based H&S management that focuses on a supervisor-driven approach can be further researched, and
- An exploration of leadership in the context of a wider array in construction H&S management in South African construction.

Notably, a behaviour-based H&S application in construction management is still in its infancy. Future research will develop and perfect the model of leadership influence on worker H&S behaviour as presented in this study.
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6 July 2012
Dear Madam / Sir

RE: BEHAVIOUR-BASED HEALTH AND SAFETY MANAGEMENT IN CONSTRUCTION:
A LEADERSHIP-FOCUSED APPROACH

The survey is a part of a research project aimed at meeting the requirement for a PhD in (Construction Management) at the Nelson Mandela Metropolitan University, carried to:

- Determine the leadership influence of clients, built environment consultants and contractors' health and safety (H&S) management on worker H&S behaviour, and
- Develop a leadership influence model of worker H&S behaviour that will bring about H&S performance improvement in South Africa construction.

Kindly complete the accompanying questionnaire and note your anonymity is assured. Solution to workers unsafe behaviours resulting in poor construction H&S performance will be evolved from your response. We would be grateful if you endeavour to complete the questionnaire and return it by 5 August 2012 to:

Department of Construction Management
Faculty of Engineering, the Built Environment and Information Technology
Nelson Mandela Metropolitan University
PO Box 77000
Port Elizabeth
6031
or per facsimile to (041) 504 2345
Att: VN Okorie
Should you have any queries please do not hesitate to contact Mr. VN Okorie at 073 196 605 or per v.okorie@yahoo.com

Thanking you in anticipation of your response.

Mr. VN Okorie
PhD (Construction Management) Candidate

Dr Fidelis Emuze PhD, GMICE, AMSAICE, ICIOB
Co- Promoter
SECTION A: Demographic information

1. In which sector do you work?
   - [ ] Private sector
   - [ ] Public sector

2. Name of organisation: 

3. Please indicate the actual number of years your organisation has been involved in construction:

4. Please indicate the actual number of years you have been involved in construction:

5. Please indicate your gender: Female [ ] Male [ ]

6. Please record your age: 

7. Please indicate your highest qualification and discipline thereof:

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If ‘Other’, please record adjacent to ‘Other’ in the table above.

8. Indicate the discipline you practice:

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<td>• Electrical</td>
<td></td>
</tr>
<tr>
<td>• Mechanical</td>
<td></td>
</tr>
<tr>
<td>• Structural</td>
<td></td>
</tr>
</tbody>
</table>

If ‘Other’, please record adjacent to ‘Other’ in the table above.

9. Kindly indicate your constituency:

<table>
<thead>
<tr>
<th>Client</th>
<th>Project Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designer</td>
<td>Quantity Surveyor</td>
</tr>
<tr>
<td>General contractor (Building)</td>
<td>Other:</td>
</tr>
<tr>
<td>General contractor (Civil Engineering)</td>
<td></td>
</tr>
</tbody>
</table>

If ‘Other’, please record adjacent to ‘Other’ in the table above.

10. Please indicate your status in the organisation:

<table>
<thead>
<tr>
<th>MD / Managing member / Principal</th>
<th>Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director / Senior executive</td>
<td>Other:</td>
</tr>
<tr>
<td>Manager</td>
<td></td>
</tr>
</tbody>
</table>

If ‘Other’, please record adjacent to ‘Other’ in the table above.
### SECTION B: Main section

11. On a scale of 1 (minor) to 5 (major), to what extent do the following factors contribute to poor construction H&S performance (Please note the 'Unsure' or 'Does not' options).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Unsure</th>
<th>Does not</th>
<th>Minor</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1</td>
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<td>11.2</td>
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<tr>
<td>11.3</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
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<tr>
<td>11.4</td>
<td></td>
<td></td>
<td>4</td>
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<tr>
<td>11.5</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

12. On a scale of 1 (minor) to 5 (major), to what extent do the following client related factors contribute to poor construction H&S performance (Please note the 'Unsure' and 'Does not' options).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Unsure</th>
<th>Does not</th>
<th>Minor</th>
<th>Major</th>
</tr>
</thead>
<tbody>
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<td>12.2</td>
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<td>2</td>
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<tr>
<td>12.3</td>
<td></td>
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<td>3</td>
<td></td>
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<tr>
<td>12.4</td>
<td></td>
<td></td>
<td>4</td>
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<tr>
<td>12.5</td>
<td></td>
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<td>5</td>
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</tr>
</tbody>
</table>
13. On a scale of 1 (minor) to 5 (major), to what extent do the following designer related factors contribute to poor construction H&S performance (Please note the 'Unsure' and 'Does not' options).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Unsure</th>
<th>Does not</th>
<th>Minor</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.1 H&amp;S information not incorporated into design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.2 H&amp;S information not recorded on drawings, schedules and specifications</td>
<td></td>
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<tr>
<td>13.3 Design hazard identification and risk assessment not conducted</td>
<td></td>
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<tr>
<td>13.4 Design and construction method statements not provided</td>
<td></td>
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</tr>
<tr>
<td>13.5 Faulty permanent works design</td>
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<td></td>
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<tr>
<td>13.6 Specification of hazardous materials</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>13.7 Maintenance realities not incorporated into design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.8 Late generic information</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>13.9 Constructability reviews not conducted</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.10 Complex design</td>
<td></td>
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</tbody>
</table>

14. On a scale of 1 (minor) to 5 (major), to what extent do the following project manager related factors contribute to poor construction H&S performance (Please note the 'Unsure and 'Does not' options).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Unsure</th>
<th>Does not</th>
<th>Minor</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.1 Poor coordination of design team</td>
<td></td>
<td></td>
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<tr>
<td>14.2 Poor coordination of design</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>14.3 Poor coordination of design delivery</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>14.4 Inadequate attention to H&amp;S during design coordination meetings</td>
<td></td>
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<tr>
<td>14.5 Inadequate provision of H&amp;S information to the design team</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>14.6 Lack of prequalification of contractors on H&amp;S</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.7 Poor choice of procurement system</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>14.8 Inadequate project duration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.9 Inadequate hazard identification and risk assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.10 Constructability reviews not conducted</td>
<td></td>
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<tr>
<td>14.11 Inadequate monitoring to ensure that contractors comply with H&amp;S plan</td>
<td></td>
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<tr>
<td>14.12 Inadequate attention to H&amp;S during site inspections</td>
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<tr>
<td>14.13 Inadequate attention to H&amp;S during project progress meetings</td>
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</tr>
<tr>
<td>14.14 Failure to ensure that contractor has made adequate financial provision for H&amp;S</td>
<td></td>
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</tbody>
</table>
15. On a scale of 1 (minor) to 5 (major), to what extent do the following quantity surveyor related factors contribute to poor construction H&S performance (Please note the ‘Unsure’ and ‘Does not’ options).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Unsure</th>
<th>Does not</th>
<th>Minor</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.1</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Inadequate facilitation of financial provision for H&amp;S in the BoQ</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15.2</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Inadequate H&amp;S information in BoQ</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15.3</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Non-inclusion of an H&amp;S section in the BoQ</td>
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<td>2</td>
<td>3</td>
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<tr>
<td>15.4</td>
<td></td>
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<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Poor choice of procurement system</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15.5</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Lack of prequalification of contractors on H&amp;S</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15.6</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Inadequate hazard identification and risk assessment</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15.7</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Inadequate project duration</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>15.8</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Failure to ensure that contractor has made adequate financial provision for H&amp;S</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

17. On a scale of 1 (minor) to 5 (major), to what extent do the following management related factors contribute to poor construction H&S performance (Please note the ‘Unsure’ and ‘Does not’ options).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Unsure</th>
<th>Does not</th>
<th>Minor</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.1</td>
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<td></td>
<td>1</td>
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</tr>
<tr>
<td></td>
<td>Inadequate top management commitment to H&amp;S</td>
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<td>3</td>
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<tr>
<td>17.2</td>
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<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Inadequate middle management commitment to H&amp;S</td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>17.3</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Inadequate site management commitment to H&amp;S</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>17.4</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Poor H&amp;S culture</td>
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<td>2</td>
<td>3</td>
</tr>
<tr>
<td>17.5</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Inadequate provision of financial resources for H&amp;S</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>17.6</td>
<td></td>
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<tr>
<td></td>
<td>Inadequate H&amp;S training</td>
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<td>2</td>
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<td>17.7</td>
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<tr>
<td></td>
<td>Poor general project planning</td>
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<td>2</td>
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<tr>
<td>17.8</td>
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<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Poor H&amp;S planning</td>
<td>1</td>
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<td>3</td>
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<tr>
<td>17.9</td>
<td></td>
<td></td>
<td>1</td>
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</tr>
<tr>
<td></td>
<td>Inadequate hazard identification and risk assessment</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>17.10</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Non-conformance to H&amp;S plans</td>
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<td>17.11</td>
<td></td>
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<tr>
<td></td>
<td>Poor work organisation</td>
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<tr>
<td>17.12</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Infrequent H&amp;S meetings</td>
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<td>17.13</td>
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<tr>
<td></td>
<td>Inadequate H&amp;S induction</td>
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<td>17.14</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Lack of H&amp;S recognition and awards</td>
<td>1</td>
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<td>17.15</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Lack of an alcohol and substance abuse programme</td>
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<td>2</td>
<td>3</td>
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<tr>
<td>17.16</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Inadequate enforcement of H&amp;S rules and regulations</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>17.17</td>
<td></td>
<td></td>
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<td>2</td>
</tr>
<tr>
<td></td>
<td>Lack of worker participation and involvement in H&amp;S</td>
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<tr>
<td>17.18</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Inadequate H&amp;S site inspections</td>
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<td>3</td>
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<tr>
<td>17.19</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Inadequate H&amp;S plans</td>
<td>1</td>
<td>2</td>
<td>3</td>
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</tbody>
</table>
16. On a scale of 1 (minor) to 5 (major), to what extent do the following workplace factors contribute to poor construction H&S performance (Please note the 'Unsure' and 'Does not' options).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Unsure</th>
<th>Does not</th>
<th>Minor</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor site conditions</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Extreme temperatures</td>
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<td></td>
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<tr>
<td>Untidy work environment (poor housekeeping)</td>
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<tr>
<td>Lifting and handling of heavy materials</td>
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<tr>
<td>Work pressure</td>
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<td></td>
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<tr>
<td>Inadequate provision of site welfare facilities</td>
<td></td>
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<tr>
<td>Poor illumination</td>
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<td></td>
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</tr>
<tr>
<td>Excessive noise</td>
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<tr>
<td>Poor site layout</td>
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<tr>
<td>Poor working platforms</td>
<td></td>
<td></td>
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<tr>
<td>Poor work organisation</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Inadequate vertical access</td>
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<td></td>
</tr>
<tr>
<td>Lack of mechanisation</td>
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<tr>
<td>Poor ventilation</td>
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</tbody>
</table>

20. On a scale of 1 (minor) to 5 (major), to what extent do the following materials related factors have contribute to poor construction H&S performance (Please note the 'Unsure' and 'Does not options).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Unsure</th>
<th>Does not</th>
<th>Minor</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous chemical substances</td>
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<tr>
<td>Mass and density</td>
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<tr>
<td>Poor packaging</td>
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</tr>
<tr>
<td>Sharp edges</td>
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<tr>
<td>Rough edges</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Surface areas</td>
<td></td>
<td></td>
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<tr>
<td>Inadequate information on material safety data sheet (MSDS)</td>
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<tr>
<td>Lack of information of material safety data sheet (MSDS)</td>
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</tbody>
</table>
21. On a scale of 1 (minor) to 5 (major), to what extent do the following factors contribute to poor construction H&S performance?

<table>
<thead>
<tr>
<th>Factor</th>
<th>Unsure</th>
<th>Minor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor client H&amp;S leadership</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate designing for construction H&amp;S</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>H&amp;S is not integrated into the project during planning phases</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Inadequate financial provision for H&amp;S in the BoQ</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate construction H&amp;S planning</td>
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<td>Lack of management commitment, involvement and participation on H&amp;S</td>
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<td>Worker communication related aspects</td>
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<td>Poor plant management and operating</td>
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<td>Materials issues</td>
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22. Do you have any comments in general regarding ways of improving site H&S performance?

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Please record your details to facilitate contacting you, in the event that a query should arise. Please note that the data provided in this questionnaire will be treated in the strictest confidence.

CONTACT PERSON: .................................................................
ADDRESS: ...........................................................................
PHONE: ................................................................................
FAX: ..................................................................................
E-MAIL: .............................................................................

Thank you for your contribution to efforts directed towards improving construction H&S performance

© March2012 VN Okorie
RE: BEHAVIOUR-BASED HEALTH AND SAFETY MANAGEMENT IN CONSTRUCTION:
A LEADERSHIP-FOCUSED APPROACH

FOCUS GROUP DISCUSSION PROTOCOL

Brief: This focus discussion is aimed at examining practices and behaviour of professionals that can improve construction health and safety (H&S) performance.

Questions
1). Please tell us your, job designation and description.
2). Base on your experience, why do you think contractors without adequate H&S records are awarded contracts?
3). Is it possible that lack of commitment to H&S contribute to the award of contracts to such contractors?
4). Based on your experience, do you think that designers’ H&S critical decisions impact on workers’ H&S behaviour on site?
5). In most construction projects that you were / are involved, have encountered the use of an H&S plan?
6). What effect does inadequate financial provision for H&S at the tendering stage has on the ability of contractors to ensure adequate on-site H&S interventions?
7). To what extent do you perceive that poor leadership and lack of commitment to workers’ H&S by contracting organisations contribute to at-risk practices or unsafe behaviour?
8). To what extent do you perceive that contractors’ inadequacies relative to workplace planning have affected workers’ H&S behaviour on site?
9). Despite the interventions that have been mentioned in the course of this discussion, do you think that leadership abilities/attributes can improve construction H&S performance?
10). In closing the discussion, what other comments can be made concerning behaviour-based H&S management in South Africa?

Many thanks for contributing to efforts directed towards improving construction H&S performance in South Africa.

VN Okorie
Researcher
INTERVIEW PROTOCOL

15 July 2013

Dear Madam / Sir,

RE: BEHAVIOUR-BASED HEALTH AND SAFETY MANAGEMENT IN CONSTRUCTION:
A LEADERSHIP-FOCUSSED APPROACH

The purpose of the interview is to, either support or refute perceptions, pertaining to behaviour-based health and safety management in South Africa construction. The duration of the interview is intended to range between 30 and 45 minutes. Please be assured that the meeting in its entirety will be confidential. To provide you with peace of mind, we are prepared to enter into a confidentially agreement with you and / or your organisation should you opt to exercise this right.

Questions
1). Does poor H&S leadership and lack of commitment of the key project participants such as the clients, designers, project managers and quantity surveyors contribute to workers unsafe behaviour or at-risks work practices on sites?
2). Do you agree that lack of top management commitment to H&S and poor leadership at all levels of management influence workers unsafe behaviour?
3). In your opinion, do you agree that frontline managers’ leadership styles and behaviour can contribute to workers’ unsafe behaviour on site?
4). How regular do you conduct site H&S training including induction training and toolbox talks?
5). Do you attend management meetings where H&S matters are discussed?
6). How many workers attend such meetings?
7). Do you buy-in input from experienced workers under you?
8). In your opinion, do you agree that workers involvement and participation in workplace H&S decision-making can change their at-risk work practices or H&S behaviour.
9). How do you manage subcontractors’ workforce to ensure that they comply with the site H&S rules and regulations? In your position as a manager or site supervisors what are the obstacles to optimum H&S management?
10). What other general comments or suggestions can be made concerning behaviour-based H&S management in South Africa.

Thank you for sparing some time out of your busy schedule to make this interview possible.

VN Okorie
Researcher