

**A BALANCED SCORE CARD PERSPECTIVE OF THE SAFETY  
MANAGEMENT OF TWO EXEMPLARY CONSTRUCTION COMPANIES IN  
THE WESTERN CAPE**

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## **ABSTRACT**

### **A Balanced Score Card Perspective of the Safety Management of Two Exemplary Construction Companies in the Western Cape**

Occupational Health and Safety is largely determined by the creation of a Safety Culture that minimises risk. In South Africa the construction sector is the second most hazardous industry after mining. This study focuses on the cases of two exemplary construction firms in the Western Cape. The main research question is “How do the companies ensure coherent safety management practices that create a safety culture?”

Based on a modification of a Balanced Health and Safety Scorecard for the Construction sector five sub-questions address safety management practices from a Management Perspective, an Operational Perspective, a Learning Perspective and a Client and Compliance Perspective. Data has been gathered from company documents, semi-structured interviews, together with on-site observation.

In conclusion the study reveals that management commitment, active communication and employee acknowledgement contribute positively to creating an effective safety culture on-site. Further studies are recommended to compare these findings with the practices of small and medium companies in the construction sector.

**KEYWORDS:** Occupational Health and Safety, Occupational injuries and fatalities, Construction Safety, Safety Culture, Organisational Culture, Balanced Scorecard

**DECLARATION**

I declare that *A Balanced Score Card Perspective of the Safety Management of Two Exemplary Construction Companies in the Western Cape* is my own work, that it has not been submitted before for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged as complete references.

James Hannie

November 2015

**Signed:**.....

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## **1. CHAPTER ONE: INTRODUCTION**

Business has always been driven by cost and the subsequent potential profits. Deadlines seem to be ever present in all spheres of our economy and companies seem to reach these deadlines at all costs and sometimes at the expense of human life. When business plans are developed most of the attention goes into the final product and the subsequent markets where this product/s will be eventually traded. However Occupational Health and Safety (OHS) is the one facet of business which is in many cases considered last or even administered as an afterthought.

This Research Project focuses on the strategies which contribute to the creation of a safety culture on construction sites. Sherif Mohamed's (2003) health and safety balanced scorecard framework has been used to develop the analytical framework. These are presented in the literature review in Chapter 2. A brief overview and background of Occupational Health and Safety is presented in the next section below.

### **1.1 Overview of Occupational Health and Safety**

Tadesse (2006) defines the OHS domain as an adaptation of the working environment to workers for the promotion and maintenance of the highest degree of physical, mental and social wellbeing of workers in all occupations. Furthermore Tadesse (2006) identifies that globally rapid industrial growth has given rise to this new intense look at worker health and safety. Fatalities, serious injuries and occupational diseases have been a constant problem in the workplace and this is a global problem. This undesirable situation has been acknowledged by the International Labour Organisation (ILO). The ILO's plan of action (2010-2016),

estimated that in 2003, 358 000 fatalities and 337 million non-fatal occupational accidents occurred worldwide. Judging by the figures, this seems to be a global concern.

In South Africa, the same trend of accidents is evident where OHS is not properly managed and implemented (Federated Employee Mutual Assurance Company Limited, 2012). This can be seen in the recent statistics (see Table 1) on employee injuries and fatalities published by the Federated Employers' Mutual Assurance Company Limited (FEM), for the years 2008-2012.

<b>WESTERN CAPE REGION (CONSTRUCTION SECTOR)</b>						
<b>Year</b>	<b>Number of Accidents</b>	<b>Fatal Accidents</b>	<b>Permanent disabilities not resulting in pensions</b>	<b>Permanent Disabilities resulting in pensions</b>	<b>Lost Days</b>	<b>Average Cost per Accident (R)</b>
<b><u>2012</u></b>	2673	17	155	6	21434	15018
<b><u>2011</u></b>	2581	10	180	7	26617	16828
<b><u>2010</u></b>	2997	15	148	13	33505	15661
<b><u>2009</u></b>	3257	26	108	19	31761	12847
<b><u>2008</u></b>	3697	11	122	13	37857	9729

***Table 1: Employee injuries and fatalities statistics***

With reference to Table 1 the most fatal injuries occurred in 2009, incidentally the year preceding the soccer World Cup, where construction project managers were chasing a completion deadline. The Department of Labour has identified mining, construction, iron & steel and chemical sectors as the four high risk sectors. Outside

of mining, the worst sector is the Construction Sector where serious incidents and fatalities in South Africa occur, even though the OHSA has been promulgated.

The Occupational Health and Safety Act (OHSA) no.85 of 1993 promotes the establishment of a workplace that minimises active risks and hazards, and emphasises the implementation of mitigating factors to either reduce or eliminate these risks and hazards. Research done by Smallwood (2000) indicates that the indirect cost of construction accidents is calculated at 14.2 times that of direct costs. Hinze (1994) explains direct costs as those that are associated with treatment of the injury, compensation offered or any insurance premiums that needs to be honoured in the process. Indirect costs on the other hand relate to reduced productivity, clean-up costs, and wages paid whilst injured individuals are off-duty. Smallwood (1996) also identified that productivity and quality, which are vital elements of the value chain on a construction site, are negatively affected by poor health and safety performance.

According to Behm (2005), the construction industry should implement the concept of designing buildings for construction safety as a standard practice to reduce overall project risks. This will place project managers in a position to appreciate the risks and hazards long before the establishment of the construction site. Furthermore Behm touches on the benefits of having a safe working environment, which includes a safe construction site, reduced risks during building, and reduced insurance premiums. This all translates into lower project costs. An article by Fortunato et al., (2012) explains that the traditional safety risks include falls, overexertion, caught-in and struck-by or against and that this has a definitive effect on the safety culture on the sustainability of the organisation.

Choudhry, Fang and Mohamed (2007) examined how employees' attitudes and behaviour influence the organisation's health and safety performance. They define Safety Culture as something an organisation practices rather than something an organisation has implemented. Despite safety legislation in place, and risk assessments developed on paper, this research is concerned about: why so many workplace accidents and fatalities occur on South African construction sites. What could be the fundamental causes? What do stakeholders, management, employees and sub contractors contribute towards creating a particular safety culture on site?

## **1.2 Research goals and study objectives**

The primary focus of this study is based on the safety culture on two construction sites in the Western Cape, South Africa. I hope that this study will provide a better understanding about how a safety culture can be created on construction sites. Mohamed's (2003) health and safety balanced scorecard model provides a framework to analyse the complementary perspectives from the client, employer and employee on a single construction site. This study introduces the perspective of the regulator to his balanced scorecard model.

## **1.3 The South African Construction Industry stakeholders**

Health and Safety in South Africa is a legislative issue and construction safety is impacted by several stakeholders. Stakeholders include employer associations, registration councils and employee associations, all of whom have contributed to health and safety in the construction industry.

### 1.3.1 Employer Associations

The employer associations operational in the South African construction industry include:

- Master Builders South Africa (MBSA)
- Master Builders Associations (MBA), and
- The South African Federation of Civil engineering Contractors (SAFCEC).

The Construction Industry Development Board (CIDB, 2009) notes that the MBSA, MBA and SAFCEC strive to promote a positive OHS culture which leads to the elimination of occupational injury and disease. Actions include informing members of new OHS legislation, providing OHS advice and guidance, assisting contractors to improve their OHS programmes and procedures, conducting site OHS surveys and audits, assisting members with incident investigations and reports and coordinating OHS training courses.

### 1.3.2 Registration Councils

The Engineering Council of South Africa (ECSA) has assisted with investigations of accidents on projects involving design engineers. Design engineers have the responsibility to ensure that safety measures is built in or considered at the design phase already (CIDB, 2009).

### 1.3.3 Employee Associations

The OHS Act (1993) requires the development of an agreement between employers and registered trade unions, which includes the democratic appointment of health

and safety representatives. In the construction industry the National Union of Metalworkers (NUMSA), has contributed effectively to the health and safety of employees but often only on high profile projects such as the Soccer World Cup stadiums.

#### 1.3.4 International Organisations

The International Labour Organisation (ILO) promotes individual and collective rights of workers in terms of OHS and the South African Department of Labour has subscribed to decent and safe work program adopted in 2010.

In addition to the above the Department of Labour is responsible for Occupational Health and Safety legislation and employs an inspectorate to ensure compliance in all industries including the construction industry. My interest in this topic relates to my employment as a manager in the Western Cape office of Department of Labour, who is concerned about OHS in the construction industry.

## **1.4 Structure of chapters**

Chapter 1 presented the overview of occupational health and safety in the construction industry particularly in the Western Cape as well as the research project objectives. Chapter 2 covers the literature review which includes international research as well as South African research in the construction sector focussing on occupational health and safety. In Chapter 3 I provide a rationale for using the case study research method, describe the data collection process, and explain the data analysis process used to compare the two cases. The case studies that describe large construction sites of Murray & Roberts and NMC are reported in Chapter 4. In Chapter 5 and 6 the analysis and recommendations are covered extensively to conclude the write-up.

The literature review and theoretical framework for the study is explained next in Chapter 2.

## **2. CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

In 2008 the ILO published statistics that indicated that occupational incidents, fatalities and diseases were at a record high worldwide and the ILO Convention No. 155 recognised that mechanisms had to be put in place to ensure sustainably safe workplaces. Ultimately a set of strategic objectives were developed to address the problem. The objectives included:

- I. Creating a global environment increasingly aware of the importance of OHS standards;
- II. Placing concern for OHS high on national agendas; and
- III. Improving the OHS situation at the workplace level (ILO Convention 155, 2008).

### **2.2 Organisational Culture, Safety Climate and Safety Culture**

In order to reduce workplace accidents, workplace safety has to be intrinsically linked to organisational culture, which can be defined as the interaction between organisation and individuals where employees' behaviour can change through mutual interaction (Choudhry, 2006).

The safety climate of an organisation is generally taken to comprise a summary of employee perceptions of a range of safety issues. Glendon and Litherland (2001) point out that safety measurement is essential for reporting safety within an organisation. This would include identifying where accident prevention resources are best allocated and evaluating safety program effects. In the past safety

performance was measured in terms of the company's accident or injury data. However Glendon and Litherland (2001) motivate 15 reasons why accident data is a poor measure for safety performance. The types of behaviours that have been observed include personal protective equipment use, machinery use and manual handling, and concurrently trained observers would observe workers to determine whether they are working safely or unsafely.

Neal and Griffin (1997) proposed a model of Safety Climate based on two dimensions safety compliance and safety participation. Safety compliance involves adhering to safety procedures and carrying out work in a safe manner. On the other hand safety participation involves helping co-workers, promoting the safety program within the workplace, demonstrating initiative, and putting effort into improving safety in the workplace.

Measuring the safety climate can indicate the changes in organisational safety behaviour. The potential uses for the safety climate questionnaire include measuring employee perceptions of management commitment to safety, identifying areas for safety improvement, safety trend analysis and benchmarking safety standards.

Research done by Smallwood (2002) defines culture as a collective inclusive of values, vision, goals, mission, assumptions and purpose. He also emphasises the notion of a zero accident culture being a worthwhile goal to strive for in the construction industry where an accident and disease free work environment will result in benefits and more importantly a sustainable organisation.

In another study by Smallwood and Haupt (2000), the importance of having a Quality Management System in place in relation to health and safety brings about consistency and employee confidence.

Clarke (1999) insightfully defines safety culture as a subset of organisational culture where the beliefs and values refer specifically to matters of health and safety. Pidgeon and O'Leary (2000) suggest that safety culture is a set of assumptions, and their associated practices. These practices enable beliefs about danger and safety. Furthermore they suggests that such a culture is self-created and recreated as management and employees repeatedly behave and communicate in ways which seem to them to be natural, obvious and unquestionable. Good safety culture might also reflect and be promoted by at least four factors namely:

- Senior management commitment to safety;
- Shared care and concern for hazards and a concern over their impacts upon people;
- Realistic and flexible norms and rules about hazards; and
- Continual reflection upon practice through monitoring, analysis and feedback systems (Choudhry, 2006).

Glendon and Litherland (2001) found that more safety staff, safety committees, and safety training were associated with lower accident rates within companies therefore improving the safety culture. Together with that management commitment is paramount to the success of the safety systems in companies. They suggested that measuring employee attitudes towards safety could be a useful form of safety measurement. This argument arises from the idea that if safety attitudes of

employees are more mature, they would more likely search for safer environments, and hence unsafe acts would be reduced.

### **2.3 Construction Safety**

Smallwood and Venter (2012) positively indicate that project managers are uniquely positioned to integrate health and safety into all aspects of design and construction processes. The supervisory interventions amongst others include reference to health and safety during site visits and inspections, site meetings and in reports by contractors. A telling revelation is the mention of the marginalised effect competitive tendering has on health and safety in the South African construction industry. In the South African context consideration of health and safety at tendering stage has only become a reality in recent years.

According to Behm (2005), the construction sector in the United States remains the country's most hazardous sector in terms of the number of fatalities occurring every year. In South Africa the construction sector is the second most hazardous sector. In the period 2008 to 2012 more than 12000 disabling accidents has occurred and more 90 fatalities has occurred on construction sites in the Western Cape alone (FEM, 2012). Furthermore these accidents and fatalities has caused substantial revenue loses per incident.

One significant breakthrough idea to reduce the incidence of fatalities in the sector was to involve architects and design engineers in considering construction safety during the design process. In this process the safety features of any operation would be determined prior to people, procedures and equipment reaching the actual construction site. Behm (2005) emphasises that this design for construction safety

concept is defined as the consideration of construction site safety in the design of a project. Very specifically this would include:

- Modifications to the features to allow for construction site safety
- Safety attention during the plans period for safety
- The use of specific designs to ensure construction safety
- The communication of risks regarding the design in relation to the site and the work to be performed (Behm, 2005).

Behm (2005) established a link between the design for construction safety concept and construction fatalities and further determining the magnitude of that link. A model was created to link the design for construction safety concept to construction fatalities. Each incident was evaluated to determine if i) the permanent features of the construction project were a causal factor in the incident; ii) the design or the design process could have been modified to prevent the incident.

A study by Okorie, Emuze, Smallwood and Van Wyk (2014), in a true South African context, emphasises client Health and Safety leadership as a crucial part of ensuring safety on-site. Their focus is also driven by the South African Construction legislation where a client is required to appoint competent professional teams to oversee the ethical delivery of construction projects. The study insightfully draws out the fact that clients have a legal duty to draw up Health and Safety specifications for the project managers to work within.

Agumba and Haupt (2009), identifies leadership skills in health and safety on-site to cultivate positive results. The importance of culture is further explained by Geminiani, Smallwood and van Week (2008), as the relationship between

management commitment, education and training and the subsequent effect on the occurrence of accidents on-site.

In most recent studies, Okorie et al (2014), identifies the following as the key factors why health and safety programs fail or succeed on-site:

- ✓ Management commitment and leadership
- ✓ Manager leadership and behaviours
- ✓ Influence of health and safety training on workers' behaviours
- ✓ Worker involvement and participation in health and safety decisions
- ✓ Feedback systems inclusive of sub-contractors.

Smallwood (2002) makes an interesting observation in commenting on the importance of skilled designers in relation to health and safety. This entails training in health and safety, considering the health and safety of workers into the design and planning process. He also states that clients invariably appoint designers or projects managers as the principal agent. In the same study the influence of the South African Construction Regulations are mentioned to point out the responsibilities of clients and designers to ensure health and safety on construction sites. In its findings Smallwood (2002) puts pressure on the tertiary institutions to address construction health and safety, suggesting that a low awareness exists at architectural schools and departments in South Africa.

Client satisfaction is also looked at where a contractor/client relationship is addressed in terms of trust, respect, integrity, willingness to partner and a few others

(Smallwood, 2000). Professor Smallwood further discuss the effect of poor contractor performance such as rework, late completion, an unacceptable accident rate, insensitivity to environmental issues on reputation and image as enough reason to put mechanisms in place to combat poor health and safety performance.

It is therefore very clear that past research has shown that a clear concern is existing in relation to health and safety and in particular construction safety, not only in South Africa but worldwide.

#### **2.4 Theoretical Framework – Sherif Mohamed’s Safety Management Balanced Scorecards**

According to Mohamed (2003), the Balanced Scorecard (BSC) was first introduced in 1992. This gave managers an opportunity to view their business performance from four perspectives namely financial, Client, internal business process, and the learning and growth perspectives. This model by Kaplan and Norton (1993) was grounded in the organisation’s strategic objectives and competitive demands. Furthermore the BSC can serve as a useful focal point for an organisation’s management and employees.

Organisations can devise site or project specific scorecards to fit their strategy, technology and culture. In recent developments construction firms are more likely to succeed in winning project bids when their safety record is good enough to be used as a competitive edge, taking into account that reputation is still a strong competitive tool to be considered. Mohamed (2003) furthermore argues that a safety balanced scorecard should be developed at operational level, for the main reason that accident statistics can encourage under-reporting of accidents by employers and employees.

This will include the original four perspectives but will show slightly different aspects to relate to the specifics of construction organisations and measure the safety culture. Table 2 below shows the difference in focal points between Kaplan and Norton's initial model of 1992 and Mohamed's (2003) Safety Management BSC.

<b>Original Perspectives by Kaplan and Norton (1992)</b>	<b>Safety Management Balanced Scorecard by Mohamed (2003)</b>
Financial Perspective – Shareholders view	Management Perspective – What must management improve on to achieve zero-accident culture at acceptable cost?
Client Perspective – Client's view	Client Perspective – How do our employees/project partners/clients see us?
Internal Business Perspective – What must business do internally?	Operational Perspective – What must be done to ensure proper implementation of company rules & procedures?
Innovation & Learning Perspective – Improvement and creation of value	Learning Perspective – Continuous learning & improvement on Safety

***Table 2: Difference in Balanced Scorecards***

Mohamed (2003) makes a very interesting reference to benchmarking in construction. He states that measurement should provide feedback on progress toward safety objectives and if gaps are identified, adjustments need to be made to reach those objectives. The understanding of benchmarking is that practical measures must be implemented. These measures must be understandable, attainable, valid, and client-focused. This brings the current study to the incorporation of measures into a performance measurement framework, of which the Balanced Scorecard is a very useful strategic management tool.

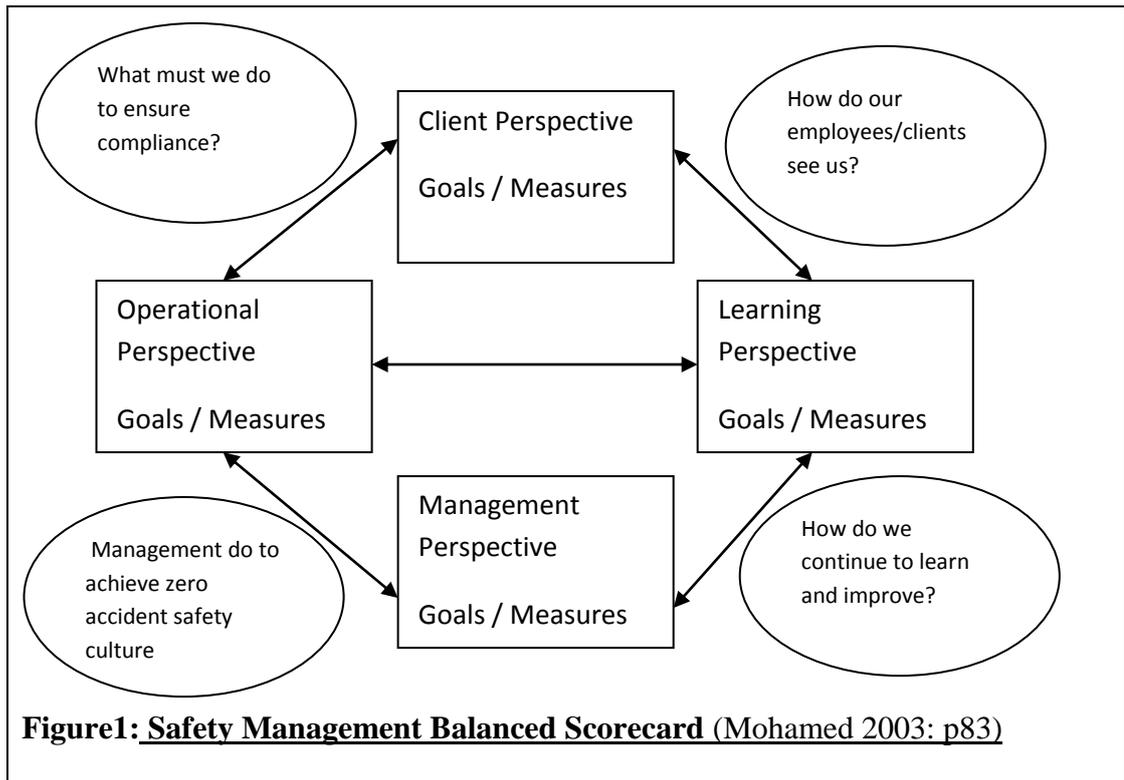
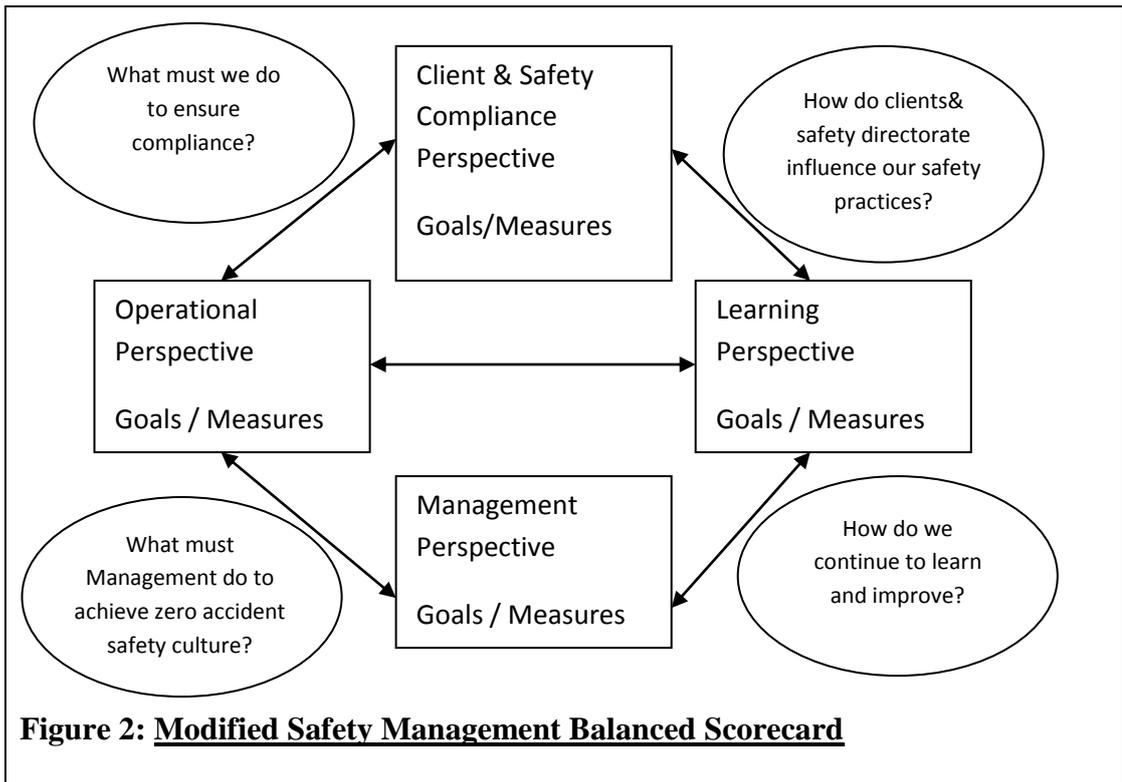


Figure 1 depicts the BSC model developed by Mohamed, for construction organisations to assess and measure their safety culture. This is a fundamental move away from the incident rate measure culture of many companies. The BSC model shows four perspectives namely the management perspective, operational perspective, Client perspective and the learning perspective.

#### **2.4.1 Significance of the study and model modification**

My modified Safety Management BSC model (see Figure 2) introduces the safety compliance perspective in addition to the Client perspective in Mohamed's (2003) model. In the following sections I use the measures and goals in Mohamed's (2003) model as a base and develop additional information required to identify best safety practice.



**2.4.2 Management Perspective –The overall strategic objective is a zero-accident culture.**

The goals contributing to this objective would include accident elimination, reduction of the number of incidents, improved productivity, enhanced business image, accident related cost reduction, highly competent workers and more safety aware sub-contractors.

**2.4.3 Operational Perspective – The primary objective of this perspective concerns the efficient implementation of safety rules and procedures on construction sites.**

Goals in this perspective include degree of compliance, higher level of workforce proactiveness, more efficient site layout planning, efficient communication/feedback systems, safer workplaces and better worker/supervisor relationships.

**2.4.4 Client and Safety Compliance Perspective – This objective provides a platform for the assessment of how site agents representing the client and external parties such as labour inspectors on construction sites perceive safety in relation to compliance.**

Goals associated with this perspective include safety evaluations on construction sites. This is also a good indicator of the extent to which site workers are implementing the safety management system.

**2.4.5 Learning Perspective – This perspective is concerned with the relevant interventions introduced on sites.**

This perspective is one that provides room for innovation. It is entirely based on identifying intervention strategies, learning and improving, evaluating and communicating and finally implementing and monitoring.

Based on the measures introduced, this model should be viewed to have causal relationships with each other. For example if the management (Management Perspective) decides to release more resources to train more employees to identify site hazards (Learning Perspective), it will have an effect on the number of incidents (Operational Perspective) and this will contribute to a more positive compliance rate all round (Client and Safety Compliance Perspective).

## **2.5 The South African Construction Regulations**

The changes to the Construction Regulations (CR) in 2014 have brought about more direct and detailed responsibilities for clients, designers and principal contractors as construction stakeholders to improve the health and safety on their construction sites. Additional changes include the definitions of the competent person and the newly added roles as Construction Manager and Construction Supervisor.

The most relevant changes to the CRs in relation to this study can be summarised as follows:

The Department of Labour has stated in many of their investigations that the root cause of a large percentage of accidents on sites were because of incompetency of site personnel. The new CRs stipulate that a construction manager and a construction supervisor must be registered with the South African Council for the Project and Construction Management Professions before they can on site. The CR details the qualifications as well as the knowledge of the OHS Act and the relevant regulations as prerequisites for the registration of construction managers and construction supervisors. While the agent was deemed the responsible person for the overall construction and processes under the old CR, the new CR passes this responsibility for safety to the construction manager and the construction supervisor.

### **2.5.1 Client**

The client has been given more responsibilities to ensure proper health and safety processes on construction sites. The most important changes pertaining to the client are as follows:

- A Baseline Risk Assessment and a project health and safety plan must be submitted to the Department of Labour (CR 2014, S5, ss1 (a)).
- A construction work permit must be obtained from the Department of Labour whenever:
  - i) Projects values are in excess of R13 million, or
  - ii) 1800 person hours are required for the project or
  - iii) More than 180 people will be assigned to the project (CR 2014, S3, ss1 (a)(b)(c)).
- Health and Safety specifications must be made available during the design stage and these specifications must be part of the tender documents (CR 2014, S5, ss1(c)).
- Clients are also expected to conduct audits once every 30 days and where changes have been made to the design, must be communicated to principal contractor (CR 2014, S5, ss 1(o)).
- Whenever fatalities occur on-site, the client must ensure that the principal contractor provides the Department of Labour with a report and the client is required by the CR to appoint an agent specifically for Health and Safety (CR 2014, S5, ss3)

### 2.5.2 Designer

The designer of a structure has also come under scrutiny and the new CR has instituted the following responsibilities:

- The designer is expected to take into consideration the Health and Safety Specification compiled by the client (CR 2014, S6, ss1(b)).
- Prior to the contract be put out for tender the designer must provide a written report to the client containing all the relevant health and safety information that might affect the pricing of the construction work (CR 2014, S6, ss1(c)).
- A report detailing the geotechnical-science aspects as well as the loading that the structure is designed to withstand (CR 2014, S6, ss1(c)).
- Designers are also required to make known any known or anticipated dangers or hazards relating to construction work to the client (CR 2014, S6, ss1 (c)).
- The designers of temporary structures are required to adequately design these structures to support all loads (CR 2014, S6, ss2(a)).

### 2.5.3 Principal Contractor

The operational changes realm has been looked at in relation to the principal contractor as well. The promulgated changes are as follows:

- Principal contractors are required to ensure that all employees have a valid medical certificate of fitness specific to the construction work to be performed. Certificates must be issued by an occupational health practitioner (CR 2014, S7, ss1(g)).

- A fulltime construction manager for health and safety must be appointed by the principal contractor (CR 2014, S8, ss1).
- If the project size requires it, assistant construction managers must be appointed (CR 2014, S8, ss3).
- Construction managers in turn must appoint construction supervisors responsible for construction activities (CR 2014, S8, ss7).

The CR 2014 has been promulgated under the Occupational Health and Safety Act of 1993, which essentially is a criminal piece of legislation in South Africa. This means that if found guilty in a court of law of negligence or even contributing to an accident or fatality, the guilty party would end up with a criminal record.

## **2.6 Chapter Summary**

In this chapter I have written about the key theoretical aspects relating to safety culture and the related topics such as safety climate and construction safety. I introduced and discussed Mohamed's (2003) safety management Balanced Scorecard Model, in particular his modified model for focal point safety culture measurement and creation. The recent change in the legislation that governs the health and safety domain in a South African context was also introduced.

The next chapter highlights how cases were chosen and the advantages of insights from exemplary companies.

### **3. CHAPTER THREE: METHODOLOGY OF STUDY**

The research project explores what safety management practices exist in two large sites operating in the construction industry that contributes towards the creation of a safety culture. Initially a literature search on the international and South African occupational health and safety domain was conducted to establish the theoretical framework for the study. Empirical data has been generated by means of direct face-to-face semi-structured interviews with participants of two construction firms in the Western Cape. The interview guide was modified from a Balanced Scorecard Safety Management System model, developed by Mohamed (2003). Together with the interviews, on-site observations and document reviews completed the triangulation data collection methodology.

The documents reviewed included company policies in relation to health and safety, and learning, annual reports, incident reports, and statistical reports.

A qualitative, interpretivist approach has been adopted in this study. The research design objective has been to gather the different perspectives of the Balanced Scorecard Safety Management System model as described in the previous chapter on which this study is theoretically based on. The interviews with participants have been instituted to also make sense of experiences on the construction sites. Where there is a lack of research and theory, qualitative research is very useful, especially where exploring and describing is required (Creswell, 1994). Thus the entire approach can be seen as being deductive in nature.

### 3.1 Research Questions

The study attempts to explore what safety management practices exist in the construction industry to create a safety culture. It investigates one large construction site for each of two construction companies in the Western Cape. Based on two construction companies, the research questions are:

How do the companies ensure coherent safety management practices that create a safety culture?

To address this question five subsidiary questions are explored:

- 1) Management and Operational Perspectives – What safety management practices does management implement operationally to achieve a zero accident culture?
- 2) Operational and Learning Perspectives – What does the principal-contractor do to implement and continuously improve health and safety rules and procedures on their construction sites?
- 3) Learning and Management Perspectives – How do management policies ensure continuous learning and improvement in health and safety on their construction sites?
- 4) Client and Safety Compliance and Operational Perspectives – How do the Client, legislation and regulators influence the operational safety environment on their construction sites?

5) Client and Safety Compliance and Management Perspectives – How do the Client, legislation and regulators influence management’s approach to creating a safe environment on their sites?

### **3.2 Research method**

Yin (2006), defines the case study method as an empirical inquiry about a contemporary phenomenon, set within its real-world context. The case study method allows the in-depth focus on cases and in this study the exploratory nature makes the choice an appropriate one. The method provides an opportunity to collect data on the construction sites allowing observations in its natural setting. Yin (2006) furthermore emphasises the use of multiple case studies providing the bases as either a channel for direct replications or predict contrasting results. The exploratory nature of this research in the construction sector, has connect in the argument that Yin (2009), promotes that the case study method is an empirical inquiry that investigates a phenomenon in depth and within its real-life context.

Hsieh (2004), acknowledge that case study research has its strengths and weaknesses. The most compelling advantage is that the research is performed in its real setting and that data is accumulated from real experiences.

The study will concentrate on two construction sites and will therefore provide benefits in answering the research questions.

### **3.3 Data collection techniques**

Yin (1994), argues that qualitative data collection involves using a diverse data to answer research questions about complex phenomena and human life. In this research study it was no different. Semi-structured interviews were conducted with

11 representatives of the organisations identified in the study. In the beginning of the interviews, participants were asked questions regarding their demographic information such as age, experience and education. In general respondents were asked to answer questions but were also encouraged to explain their answers in context where they felt it was necessary. The interviewing was done face-to-face between March 2015 and April 2015. Other data included organisational documents and site observance. An example of the interviewing protocols that were used is shown in Table 3 and the remaining protocols can be found in Appendix 8.

As Eisenhardt (1989) highlights, case study methodology has the advantage of supplementing interviews with observations and document reviews. The objective is to obtain multiple sources of evidence using triangulation techniques to corroborate facts or phenomena observed, collected and analysed. Secondary data collection involved company documents such as policies, safety audit tools, brochures, reports on incident statistics, and special initiatives companywide to address occupational health and safety on-site.

<b>Management Perspective - Safety Manager (Corporate and Site)</b>		
<b>No</b>	<b>DEMOGRAPHIC INFO</b>	<b>STATUS</b>
Q1	Please introduce yourself including your position, nature of your job, age and experience.	
Q2	Tell me how many years have you been in the construction industry?	
Q3	Please tell me about your education background?	
<b>Goal – Eliminate Accidents</b>		<b>Measures- No of Accidents</b>
Q4	In the last financial year what was the number of accidents that occurred on site (company-wide)?	
Q5	How do you classify or acknowledge accidents on site? Are there Policies, Procedures and Practices (PPP) to guide site workers in making this accident classification?	
<b>Goal- Reduce Incidents</b>		<b>Measures- No of Incidents</b>
Q6	In the last financial year what was the number of Incidents that occurred on site (company-wide)?	
Q7	How do you classify or acknowledge incidents on site? Are there PPP to guide site workers in making this incident classification?	
<b>Goal – Improve Productivity</b>		<b>Measure-Performance Reliability</b>
Q8	As management how do you assess the safety performance on site? What do you use to monitor productivity?	
Q9	Do you have PPP developed to track the performance of safety and productivity?	
<b>Goal- Management Commitment</b>		<b>Measure-Extent of Management</b>
Q10	At which level in the company does the management responsibility for safety reside? How involved is management with safety company-wide?	
Q11	What governance (PPP) measures are in place to ensure management’s commitment to OHS? What is expected of management to ensure deliverance of a sound safety performance?	
<b>Goal- Reduce Accident related cost</b>		<b>Measure-Revenue saved on accidents reduced</b>
Q12	What budgetary PPP are in place to drive safety in the company? Are there certain targets in place to chase revenue savings?	
<b>Goal-Emphasize subcontractors’ safety awareness</b>		<b>Measure- No of safety issues pushed down to subcontractors</b>
Q13	From a management perspective what safety requirements are pushed down to subcontractors on site?	
Q14	Are there agreements driving health and safety practices on site?	

**Table 3- Interview Protocol: Management Perspective - Safety Manager**

The company documentation that was scrutinised in the study is shown in Table 4. In addition, relevant SA legislation and codes formed part of the analysis.

<b>MURRAY &amp; ROBERTS</b>	<b>NMC</b>
Group Health, Safety and Environment Policy	Group Health and Safety Policy
Group Values	ISO standard documents
HSE vision and principles	SUSA booklet
Standards	Incident Identification document
King III Governance Principles	Values
Fatal Risk Control Protocols Booklet Version 1	Accident Statistics
Statement of Business Principles	Accreditation files

***Table 4: List of documents studied***

### **3.4 Participants in the study**

Case study research can involve either single or multiple cases and numerous levels of analysis (Yin, 2006). The participants in the study included two construction sites, where Murray & Roberts and Neil Muller Construction (NMC) was the appointed principal contractor, of more or less the same category were included in the study. It is also noted that case study methodology has the advantage of combining interviews, observations and document reviews (Eisenhardt, 1989). The criteria for selection of construction firms and interviewees included the following:

- Firms must be at least five years old,
- Sites chosen must have a project value of more than R100 million,

- Both sites will be multi-storey construction work with more than 40% of the project completed, and both sites must be in the Western Cape.

The individual site employees were selected based on their understanding of the procedures within the company. However at the lowest operational level site employees with less a year and employees with more than three years' experience were selected. These participants were considered to be “information rich” that is individuals that could provide the greatest insight into the research questions. Specifically within the construction companies, employees at different levels were selected to be part of the study. The Department of Labour agreed to allow their Principal Inspector which is responsible for the civil and construction industry in the Western Cape to be part of the study. The list of participating organisations and positions of the respondents are displayed in Table 5 below.

<b>ORGANISATION</b>	<b>POSITION</b>
Department of Labour	Principal Inspector: Civil and Construction
Murray & Roberts	Health, Safety & Environment Manager
Murray & Roberts	HSE Co-ordinator
Murray & Roberts	Site Employee, less than 1 year experience
Murray & Roberts	Site Employee, more than 3 years experience
Client Agent of Murray & Roberts	Safety Consultant
NMC	Health, Safety & Environment Manager
NMC	Site Safety Manager
NMC	Site Employee, less than 1 year experience
NMC	Site Employee, more than 3 years experience
Client Agent of NMC	Safety Consultant

*Table 5: List of participating organisations and interviewees*

Secondary data collection involved company documents such as policies, safety audit tools, brochures, reports on incident statistics and special initiatives companywide to address occupational health and safety on-site. Documentary analysis of relevant SA legislation and codes formed part of the analysis. A very important part of the research process was the on-site observations which was performed twice whilst one of the days were unannounced. This was done to observe employee behaviour and response from site management. The objective was to obtain multiple sources of evidence using triangulation techniques to corroborate facts or phenomena observed, collected and analysed.

### **3.5 Data Analysis**

Miles and Huberman (1994) suggested a three phase procedure involving data reduction, data display and conclusion drawing. All the interviews were transcribed and printed to allow the comprehensive reading of it in full. I started to analyze the interviews with a reading phase, identifying all the aspects that the interviewees had emphasized. The interview data were given more weight in the analysis process, followed by document reviews and observations. A journal was also kept to allow post reflection of the events during the data collected.

This was followed by summarising the interviews based on the aspects identified. The analysis of every interview was developed around particular concepts and themes from the modified BSC Construction Safety model. This included the management perspective, operational perspective, learning perspective, client perspective and the compliance perspective which were divided into sub-themes as shown in Table 6.

The interview questions were structured to ensure a connection between the concepts and themes.

<b>CONCEPT</b>	<b>MAIN THEME</b>	<b>SUB-THEME</b>
Management Perspective	Reduce Accidents/Incidents	Eliminate accidents and incidents
	Productivity	Improve Productivity
	Management Commitment	Lead by example
	Safety Awareness	Sub-contractor compliance
Operational Perspective	Establish and maintain safe workplace	Level of compliance
	Communication	On-site engagements
	On-Site Risk Control	Integration
	Productive and Focussed Workforce	Reduced on-site incidents
Learning Perspective	Improved safety performance	Number of safety initiatives
	Improved competency of workforce	Transfer of knowledge
	Empowerment	Employee involvement
	Practical learning	Number of training initiatives
Client & Compliance Perspective	Improved safety compliance	Number of reportable incidents
	Enhanced reputation	Project delivery ability

*Table 6: List of Themes and sub-themes*

### **3.6 Ethical Considerations**

Orb, Eisenhauer and Wynaden (2000) argue that ethical principles should be implemented and used to direct the research in order to meet the research goals and

objectives as well as to establish and maintain the rights of the research participants. This study was conducted on the principle of informed consent with participants. I provided each participant with an information sheet which detailed all the information about the research process, and in addition a personal explanation was offered. A consent form was included to ensure that participants have the right to self-determination and autonomy. Therefore the participants' involvement in the entire process was negotiated. This meant that they had the right to withdraw from the study at any time. This study did not disclose any identities of interviewees. Participants were informed that their interviews would be recorded, and that transcripts be made available to them. Finally each participant was treated equally and without judgement or prejudice.

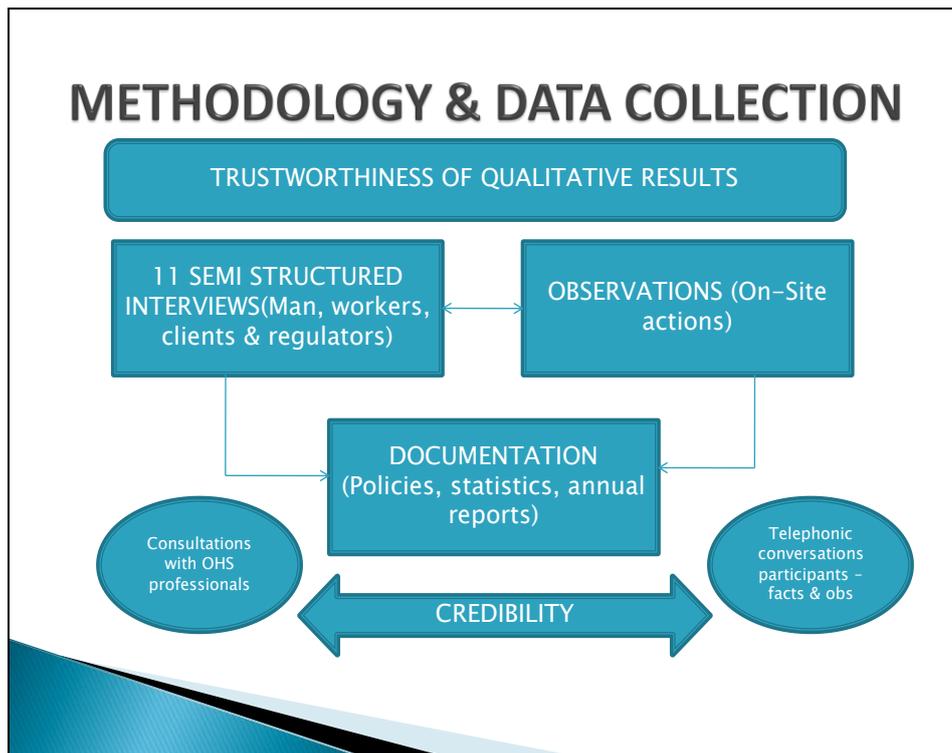
### **3.7 Trustworthiness of Results**

According to Miles and Huberman (1994) qualitative research results can be verified by subjecting it to three basic questions namely:

- 1) Do the conclusions make sense?
- 2) Do the conclusions adequately describe the research participants' perspective?
- 3) Do conclusions represent the phenomena under study?

Bowen (2005) explains triangulation as a means of corroboration, which allows more confidence in research findings. In this study I relied on triangulation to enhance validity and credibility (Maxwell, 2004). I also relied on additional consultations with other OHS professionals in the region and country-wide. This gave me an

opportunity to get comments from other sources as the research process unfolded. Figure 3 illustrates the different strategies I used to enhance research credibility and trustworthiness (Bowen, 2005). This process included telephonic conversations with respondents to check accuracy of the facts and observations.



*Figure 3: Diagram illustrating the elements of credibility and trustworthiness (Bowen, 2005)*

### **3.8 Research Protocol**

As a novice researcher I decided to follow a strict research protocol which entailed having a range a detailed research steps. The protocol for this study was as follows:

- 1) The two companies were visited well in advance to establish the terms of reference in relation to the research participation.

- 2) Semi-structured interviews were held with employees at the management level as well as the on-site employee level in the organisation following the interview protocols that were developed (see Appendix 1).
- 3) Interviews were audio-recorded and transcribed within 5 days of the interviews.
- 4) Informal follow up contact was initiated especially where I was unsure of what was actually meant by interviewees.
- 5) After collection, data analyses commenced.

### **3.9 Report Writing**

The study's target audience includes members of the academic community with an interest in health and safety management and in particular the construction industry. More importantly other stakeholders such as construction companies, trade unions, and health and safety consultants are also targeted.

### **3.10 Study Limitations**

Replication of Mohamed's (2003) perspective, goals and performance measures instrument were used as the primary semi-structured interview tool. Resource constraints such as time, accessibility and costs were partially addressed by restricting the research to the Cape Town Metro. Initially all the inspectors specialising in doing construction investigations and inspections were included as intended participants, but only one inspector was interviewed to compile the compliance perspective because he is regarded as the expert in the field of construction health and safety in the Western Cape. In total 11 interviews were

recorded covering the management perspective, operational perspective, client and compliance perspective and finally the learning perspective as depicted in Mohamed's (2003) Safety Management BSC model.

Client agents were very difficult to track down for an interview. Information from literature has been used to supplement the data where possible. Literature included legislation promulgated in the Occupational Health and Safety Act, General Safety Regulations, Administrative Regulations, Facilities Regulations, Environmental Regulations, Electrical Installation Regulations, Electrical Machinery Regulations, Pressure Equipment Regulations and the Construction Regulations.

The next chapter (Chapter 4) presents the data which was collected via the semi-structured interviews conducted with the participants.

## **4. CHAPTER FOUR: CONSTRUCTION COMPANY CASE STUDIES**

This chapter compares the cases of Neil Muller Construction and Murray & Roberts, based on the data obtained from interviews, on-site observations and company documents. These two companies were specifically chosen because their track record in relation to accidents and incidents were relatively low in the construction industry in the last five years. After an overview each company and the construction sites that were studied, the comparison of the cases follows the modified version of Mohamed's (2003) Construction Safety Balanced Scorecard discussed in Chapter Two.

### **4.1 Presentation of the companies**

#### **4.1.1 Murray & Roberts**

Murray & Roberts is a well-established engineering and construction services company operating in South Africa as well as internationally. The company's international footprint is evident in the fact that offices have been established in Australia, Canada, Chile, United Arab Emirates and the United States of America (Murray & Roberts Annual report, 2012). The company offers general building, construction, maintenance services and civil and electrical services internationally, operating as wide as the Middle East, Southeast Asia, North and South America. The company was instrumental in completing a number of 2010 Soccer World Cup stadiums in South Africa. The company's head office is in Johannesburg, South Africa where it is listed on the Johannesburg Stock Exchange Limited.

The construction site currently under the leadership of Murray & Roberts is the Century City Urban Square complex that has a project value of R630 Million. It

includes the construction of a conference centre, hotel, gymnasium and an underground parking facility.



***Figure 4: Panoramic view of Century City Urban Square project***

The construction site is surrounded by existing businesses and public roads. The proximity of public activity is less than 50 metres away and this makes risk management fundamental and extremely important.

#### 4.1.2 Neil Muller Construction Group

Neil Muller Construction (NMC) was established in 1983 as a one-man business. Over the years the company has grown into a multi-disciplinary construction group operating in the wider SADC region. The company's business model comprises of five business units governed by a group board and an executive committee. The

group's organisational structure comprises of finance, new work, building, civil and commercial work.

NMC is currently appointed as the principal contractor on the Panorama Hospital project that has a value of R83 Million. The execution involves a multi-storey medical facility with underground parking and office space.



***Figure 5: Panorama Hospital Project***

The construction work is in close proximity of public activity. An educational college, shopping centre as well as the existing hospital is less than 30 meters away from the busy construction site.

## 4.2 Management Perspective Findings

From the management perspective the goals and measures of the two companies seem to be very similar. In both cases management takes the establishment of a safety culture and the achievement of a zero accident culture within the organisation very seriously. A clear strategic intent is present and this is demonstrated by the way in which resources strategies are managed to achieve the overall goals of the Safety Management System. The main distinguishing characteristics of the companies' Management approaches are summarised in Table 7, followed by a detailed description.

	<b>MURRAY &amp; ROBERTS</b>	<b>NMC</b>
Accidents and Incidents	Incident classification	ISO certification
Productivity	Employee involvement programs	Continuous Improvement Board audit result approach
Management Commitment	CEO spearheads investigations	Incorporation of Safety responsibilities in Performance agreements
Safety Awareness	Service Level Agreement System with sub contractors	Susa and Jika communication programmes on site

***Table7: Management Perspective***

### 4.2.1 Accidents and Incidents

Traditionally, construction sites are generally very complex and hugely unsafe work environments. The extensive use of dangerous plant and machinery, work at hazardous heights and areas of confinement increases the possibilities for accidents and incidents to occur. For both companies it is important to ensure proper policies and process mechanisms are implemented to combat the occurrence of incidents and accidents because this will not only ensure an ethical and safe environment but will

also have a financial benefit in reducing costs, time loss and sustaining the company's reputation. In both firms, management takes full responsibility of the accident review process when it happens and this in itself epitomizes commitment. The following section compares the approach of Murray & Roberts and NMC to accidents and incidents.

Murray & Roberts

Murray & Roberts has a strict corporate strategy which entails reporting statistics at a group as well as a site level. This is inclusive of all sub-contractors as early as the tendering process. Incidents and accidents are classified at different levels throughout the organisation. In case of a level 4 incident, for example, no person would have been injured but a problem diagnosis (tap route) report is completed. The tap route classification and reporting system at Murray & Roberts is shown in Table 8.

<b>INCIDENT CLASSIFICATION</b>	
<b>LEVEL</b>	<b>CLASSIFICATION</b>
1	Fatal
2	Serious Injury
3	On-Site First Aid Injury
4	Damage To Property; No Injury

***Table8: Incident classification table***

For every incident the regional manager is required to present reports to management meetings at group level and this puts enormous pressure on site managers to ensure that good safety records are maintained. This procedure is followed to ensure that lessons are learned to prevent future recurrence.

## NMC

NMC has developed strategies to reduce the amount of on-site accidents and incidents at the group level. All the accidents and incidents are based on the lost time frequency rate which enables the company to compare performance with the industry. The annual target is set to ensure that the accident and incident rate is reduced progressively. This year a target was set at 0.5 lost time frequency rate and currently the company is running at 0.49. The policy on OHS was upgraded in 2006 and the goal has since been to aim for a 0 % rate.

The good results are a direct result of the introduction of certification systems OHSAS 18000, ISO 9000 and ISO 14001. All of these schemes emphasise best practice management principles such as uniformity and consistency in relation to health and safety. NMC has a clear classification system where fatalities are the most serious followed by lost time accidents, medical treatment accidents, first-aid accidents, property damage and environmental cases. All employees are trained on the reporting and investigation procedures. Monthly statistics are also reported to include issues such as environmental impact activities, such as water usage and waste generated, in order to provide a holistic view of the company's performance. A Workman's Compensation Act poster is exhibited on-site to explain the procedure for Injury-on-duty cases and enhance understanding amongst all employees.

### 4.2.2 Productivity

In essence on-site injuries translate into lost man-hours and ultimate means loss of production time and possible loss of revenue. Consequently, health and safety is closely related to productivity levels and ensuring that the desired work-rate is

achieved. Monitoring systems are in place at both companies to ensure safe project execution and completion.

#### Murray & Roberts

The compilation of weekly and monthly reports by supervisors and monitoring of on-site supervisors is essential to maintain productivity and project progression. The first port of call is to ensure that on-site management is aware of their own safety performance and the entire site. For larger sites, each area is assigned to a safety officer. At the end of each week there is a performance review where project reviews are checked to ensure that 100% of the week's objectives have been reached. The total man-hours are recorded to report progression towards the total completion of the project to the client. Sub-contractors are informed or evaluated at tender stage regarding budgeting for safety performance and related initiatives.

#### NMC

The on-site safety culture is objectively summarised on the Continuous Improvement Board (CIP board) which is posted at the gate of every site and at the induction control point. This ensures visibility to all people entering the construction site. All issues are discussed at an early morning meeting, at 7:45am where employees and management engage to review the day's activities and check the Key Performance Areas of the sub-contractors. All sites have a scoring system and in the event a site scores less than 95% on a safety audit, company directors will start to ask questions. Productivity is based on the percentage of the progress that is made per targets and the frequency of loss time is fundamental in the calculation of the actual productivity.

#### 4.2.3 Management Commitment

In both firms it is evident that positive leadership in relation to OHS has proven to be a solid grounding to direct the establishment of a safety culture in both firms.

##### Murray & Roberts

The responsibility for health and safety lies at corporate level as the policy is signed by the Chairperson of the board and the Chief Executive Officer. When fatalities occur, top management, including the CEO, convene to investigate and discuss the incident and ensure that systems are upgraded and similar incidents avoided. The CEO introduced an annual safety conference where all the positives and the negatives are raised. The Visible Felt Leadership Programme where top management is required to do at least sixteen on-site audits per month has been introduced to ensure that management are visible on-site. All managers are required to perform audits on site. This must be done sixteen times a month.

##### NMC

Top management takes full responsibility for the health and safety status within NMC. The corporate policy on health and safety has been signed by all the directors and this signed policy is displayed to showcase their commitment. The company has released additional funds to employ more staff to ensure that the health and safety policy is properly implemented as directed. When interviewed on the 7 May 2015 the group health and safety manager from NMC noted:

*“It starts with the policy. We moved away from the traditional approach, you see all the directors signs the policy; so when we say we do not compromise*

*safety, that is what all these guys believe in and we actually challenge them on that”*

The company has adopted a ‘no-compromise’ attitude towards safety. Health and safety is now a standard agenda item at all director meetings. Thus, health and safety is not viewed as an event, but rather as a second nature. All safety initiatives are now accountable directly to the highest level in the company.

#### 4.2.4 Safety Awareness

The logistics on a construction site become increasingly complex and difficult to manage when sub-contractors enter the premises. In terms of South African legislation all individuals entering a construction site become the responsibility of the principal contractor. A comprehensive system that includes all personnel on-site is thus a crucial part of the operations of both firms.

#### Murray & Roberts

Sub-contractors are required to conclude Service Level Agreements that include the requirement that they uphold and obey all OHS policies, procedures and rules on-site. A set of rules and procedures are clarified at tender stage for sub-contractors to comply with. In some cases the client has specific rules that must be passed down to sub-contractors. At tender stage competence must be proven to the principal contractor. The competencies of sub-contractors are thus adjudicated well before construction work commences. Sub-contractors are also subjected to monthly audits to check whether the safety initiatives are adhered to. Like the employees of the

principal contractor, sub-contractors are subjected to a rigorous induction programme.

### NMC

The ultimate goal is to establish procedures for all safety matters. Employment levels have grown tremendously in the last five years so significantly more effort is needed because of the increase in new employees joining the organisation. The quality policy aims to ensure that every manager and every employee performs tasks in the same way ensuring consistency. A 28-point guide specifies safety principles and procedures for site managers and sub-contractors. This is regarded as non-negotiable issue. The group health and safety manager of NMC respondents excitingly stated:

*“We have two initiatives currently running at the moment, one is Susa conversations and the other Jika. Susa stands for safe and unsafe acts .It started as a behaviour intervention tool; the key here is safety is a negative tool, so we want to turn it into a positive tool”*

All company-wide programs such as the “Jika meetings” and the “susa conversations” are designed to bring about uniformity and standardised work ethic.

### **4.3 Learning Perspective Findings**

This perspective addresses the all-important aspect of continuous learning and improvement in the construction sector. As client expectations are increasingly

demanding, employees need to be up skilled and training mechanisms need to be geared to achieve both improved safety behaviour and worker empowerment. Case data on the learning perspective are reported under four categories – safety initiatives, worker competencies, employee empowerment and training.

	<b>MURRAY &amp; ROBERTS</b>	<b>NMC</b>
Safety Initiatives	Acknowledgement programs for safety performance	On-site positive initiatives such as SUSA and Jika
Workforce Competencies	Task Specific training on-site	Specialised groups of workers
Employee empowerment	Authority handed to safety officers	Top-down & Bottom up communication
Training	Project Specific risk training before commencement	Performance Appraisal alignment with skills gaps

***Table 9: Learning Perspective***

#### 4.3.1 Safety Initiatives

Given the history of South Africa, the construction industry was in the past considered to be a highly labour intensive domain with minimal interest in focussing or transferring knowledge on site especially in relation to health and safety. In the cases under study, efforts are made by the firms to focus employees on their health and safety in their working environment.

#### Murray & Roberts

At group corporate level the company aims to build a positive spin-off for safety by recognising the safety person of the year and safety leader of the year. The managing director of each business unit completes the nominations every year in August. Nominations originate on-site for an individual or a team of workers. In the Western Cape the winner of the safety person of the year receives a trophy in

addition to vouchers and certificates. The core idea is to create a sense of consistency amongst employees to want to do their best in relation to safety on-site because the adjudication is based on a series of safe acts or behaviours.

### NMC

NMC acknowledges that the educational background of their employees ranges from the barely literate to highly educated individuals. JIKA meetings and the SUSAs conversations have been implemented to emphasise the importance of safety. JIKA is a Xhosa word which means ‘dance together’ and aims to ensure that all workers feel that they are considered, included, and free to speak and participate. Jika gatherings are held before the day starts at 7:45 every morning to discuss the particular tasks for the day. These talks also include toolbox talks where risk assessments and other issues such as risk communication take place. This puts focus and concentration where the risks are. Site workers as well as management attend the Jika meetings and everyone is encouraged to speak freely on operational issues.

SUSA conversations are used as a behaviour intervention tool. Because safety commonly has a negative connotation in construction management, SUSA aims to turn safety management into a positive tool to manage workers’ behaviour. Under normal circumstances, when a worker has done something wrong or something unsafe the individual would get a reprimand or tongue-lashing that could lead to demoralisation. The goal of SUSA is to catch workers performing work safely and thanking them for it. SUSA stands for “Safe and Unsafe Acts”. The company hopes

that this will motivate people to do more work safely. All supervisors and managers have targets to perform SUSA conversations.

#### 4.3.2 Workforce Competencies

Highly skilled workers are required to execute tasks safely on-site and without unnecessary risks of potential injury or death. Workforce competency forms part of the elements that ensures on-site knowledge of risks and how workers respond to potentially dangerous situations. In the next section both companies are presented in terms of workforce competency.

##### Murray & Roberts

At group level a Skills and Development department responsible for continuously up-skilling workers' general skills is uniquely functional at Murray & Roberts. When young, inexperienced new recruits join the company, basic safety skills are taught in a formal classroom environment before they are allowed on-site. Murray & Roberts assist sub-contractors with safety training, especially in specialised tasks like working at heights. The transfer of skills occurs practically by requiring that all risk assessments are recorded and 'unpacked' to ensure that workers fully understand on-the-job dangers when they are on-site. Training sessions on different risks must be recorded and specific attention is given to risks such as fall protection, fire and handling of dangerous equipment such as power tools. Workers are not allowed to go on-site if there is no signature their personal record that they have received the required training on each of the hazards.

The company has also established a toolbox talk culture where (a) each standard and procedure is discussed in detail, and (b) employees and managers have the

opportunity to engage and discuss dangers and hazards as well as mitigating factors. Even more important is the employee medical certificate of fitness which is required before the induction program starts.

Each sub-contractor is also screened to ensure they have completed the same medical fitness and induction programmes as applies to Murray & Roberts employees. An enormous amount of responsibility is placed on sub-contractor supervisors and leaders to discuss risk assessments before they are allowed to go on-site.

### NMC

Most of the training happens on-site to ensure that workers have a practical understanding of the facet to be learned. Risk specific training is provided by inviting specialists to teach and showcase the correct way of performing certain tasks. A skill school has been established to address skills shortages on an on-going basis. This fundamentally means that constant gap analysis is done in relation to the relevant skills needed in the firm to perform its most critical duties on-site. Competent workers are the fundamental objective the company is built on. Skills audits are continuously done to assess the position of the company in relation to the skills gaps.

#### 4.3.3 Employee empowerment

On-site authority and a sense of control contributes to implementing safety measures on construction sites and both the firms have developed procedures and rules to make this a reality.

## Murray & Roberts

On-site empowerment of workers forms an integral part of the safety culture at Murray & Roberts. Safety officers are expected to be fully respected by all employees including site managers and supervisors. When there have been five incidents of any rating on a particular day the Safety Officer has the authority to call a stand down, where the entire site is stopped. In support of this the Safety manger interviewed on the 24 April 2015 stated the following:

*“So all my safety officers have authority and nobody will question them, so the only decent thing is do just inform the site managers and advise the managers of any improper activity but there have the right to stop the site” (Safety Manager).*

During this stoppage all risks are re-discussed and re-evaluated. The employees are also encouraged to make use of the company anonymous line to achieve corrective action and this is directly connected to the company’s bill of rights which is displayed on each and every site.

## NMC

Apart from the legislated health and safety forums and meetings the workers are encouraged to speak through the JIKA meetings and what is called the unity meetings. Workers are rotated to ensure that all workers get the opportunity to get involved in the entire safety management system. The idea is also to create a system where communication is top down and bottom up.

### 4.3.4 Training

Practical tuition and complimentary disciplinary action on-site reinforces the importance of personal development and growth. Continuous performance programmes are fundamental to workers' direction in achieving growth and organisational goals.

### Murray & Roberts

Training is considered the most fundamental facet of on-site safety. All new recruits are placed in an induction program that is designed to make employees understand the on-site dangers and the behaviours that are expected to establish and maintain a safe work environment.

In addition a disciplinary committee addresses problems of insubordination. The firm acknowledge that certain tasks require much more intense training and skills. The skills are obtained by resourcing specialist in industry to present specialist training courses to employees on-site.

### NMC

NMC preference is to recruit employees who already demonstrate the required competencies. The on-going training of workers starts with the Performance Appraisal system which includes the completion of a development questionnaire to evaluate each individual's performance on a quarterly basis. At the end of the questionnaire the individual is given the opportunity to identify their development needs and the company then assesses the possibilities for assistance. Companywide, all the needs are fed into a database to aid a training budget.

A large percentage of training time is prioritised to risk assessment training on-site. On-site competency is very important because they believe that this translates into a good safety culture. The training of workers also translates to detailed job descriptions that specify the required qualifications, knowledge and skills, as well as what is expected on the job. Performance, development needs and training schedules are reviewed to assess personal growth and progress.

#### 4.4 Operational Perspective Findings

On-site safety ultimately depends on the successful implementation of operational rules and procedures. Both companies realise that a successful safety management system is dependent on top management involvement, buy-in from line supervisors, and employee co-operation.

	<b>MURRAY &amp; ROBERTS</b>	<b>NMC</b>
Workplace Safety	Zero Harm campaign	On-site Jika meetings
Feedback System	Monthly audits; Status meetings	Standing Tuesday and Thursday risk meetings
Site Risk Control	Site layout approach	Site divisionalised to manageable portions
Productive and Focused Workforce	Employee Assistance wellness programme for workers 7 family	Annual medical examinations

***Table 10: Operational Perspective***

##### 4.4.1 Workplace Safety

Specific programmes where workers can express themselves on-site bring about inclusivity amongst workers. In both firms the development of specific workplace safety programmes has worked well to establish a safe workplace.

## Murray & Roberts

Employees are all made aware from the start that the company has a “Zero Harm” motto which they attempt to live by at all costs. Employees are informed that safety is a priority, before production. A safe workplace and clean environment is vitally important to workers. It is expected of employees to respect this initiative to ensure that work is being done ethically and above all safely.

*But what makes Murray and Robert a bit different is that we have a motto that says zero harm, by zero harm we mean that person that individual must ensure and know that safety is first not talking about the money or production nothing else, safety first then from there we end up making money, as well as subcontractors as well, if you work safe and on a clean environment that's money (Murray & Roberts on-site worker).*

Employees acknowledge the importance of the induction programme and the company has introduced alternative media such as videos to assist employees to grasp the concepts and presentations. The relatively low level of education in the construction sector has forced the company to come up with this initiative.

Authorisation must be obtained from the safety office before a power tool can be used on site, and a video was developed to show how to use power tools safely. These practices ensure that a well maintained tool is booked out for use and at the same time the competency of the person is verified. As an employee from Murray & Roberts noted:

*The safety workers go on site and if they see someone not following the rules or procedures, meaning that person is unsafe, they first give a yellow card [a*

*warning] and maybe they go again on site and find the same person not following the rules on site regarding safety they give him/her a yellow card again and thirdly they will give you a red card. If you get a red card you stay three months out of the site and after that you go again to the induction training [repeating the whole process] and you can come back on site.*

## NMC

Toolbox talks and the early morning Jika meetings are taken very seriously to ensure that workers understand the risks and tasks to be done on that particular day. When work is to be done in rainy weather, supervisors ensure that on-site alertness is further concentrated by continuously reminding employees of hazards and dangers. Where cranes are used on site, overhead safety is as important as on-the-ground safety, and care is taken to ensure that overhead safety is properly managed. As previously indicated, induction is mandatory when workers come on site the first time. To ensure further responsibility in a safe workplace stickers are affixed to point out drinking water, toilets and emergency assembly points and emergency exits. Safety officers are responsible for safety audits and they are well respected by management and site workers including sub-contractors. Workers are made aware of the existence of the safety records and risk assessments are performed frequently to promote appreciation of the risks on-site.

*The senior site manager will usually be the driver of safety in terms of chair of the safety meetings and we also do tool box talk every week..., it is just*

*fifteen minutes talk on safety, it can be on tools, accidents, safety and safety statistics (NMC Safety Manager).*

#### 4.4.2 Feedback System

It is well understood in both firms that communication is a two way phenomenon. Different media are available for workers and management to share information and ideas to improve health and safety.

#### Murray & Roberts

Employees are well aware that monthly audits are conducted to establish the status of compliance on-site. Monthly safety meetings, which include safety representatives of the sub-contractors, are held to ensure objective feedback. A notification box is available to notify the principal contractor of safety concerns and potential hazards on-site. Workers have the opportunity to write ideas or concerns on paper and deposit it in the notification box. Management will collect after each day and analyse the hand –ins.

#### NMC

Feedback happens mostly in the 15-minute Jika meetings held before work starts. Jika meetings on Tuesdays and Thursdays are specifically set out for Health and Safety where ample time is spent on specific concerns. Progress reports are also given at the meetings. Here talking is from both management and workers.

The wearing of Personal Protective Equipment is discussed at almost in every meeting.

#### 4.4.3 Site Risk Control

Close similarities exist between the firms where responsibilities are given to supervisors and competent workers to manage dedicated portions of the sites.

##### Murray & Roberts

On the larger construction sites, where the project value is over R100 million, site layout planning is fundamental to ensure that safety and health monitoring occurs for every section. The Century City Urban Square site has a value of R630 million and requires such attention to detail and extensive planning. The entire site is divided into work areas, each with a dedicated supervisor and safety officer responsible for control and reporting.

All risk-based assessments are developed and signed off by those individuals who are operational in those areas. This brings about a huge sense of responsibility and sense of positive contribution to the success of the project. The company acknowledges the need for more extensive resources and detailed planning when such large projects are executed. The challenges faced when constructing buildings with underground parking and multi-storey levels requires the involvement of specialised individuals and a competent workforce. Architects are thus consistently involved to ensure compliance with the quality and safe implementation of designed plans.

##### NMC

The site is broken up into sections where specific competent workers are placed to perform certain tasks in line with their competencies. Each section on site is subjected to evaluation of risk assessments. All risk assessments are integrated to ensure proper mitigation of hazards is implemented.

#### 4.4.4 Productive and Focused Workforce

Ensuring a focussed and productive workforce is very important in the construction industry. This is demonstrated by Murray & Roberts especially and the results have proven to be positive.

#### Murray & Roberts

The company acknowledges the effect the social realm can have on the performance of workers and has initiated a service to assist workers and their family members with personal problems that might be interfering with performance at work. Apart from the on-site physical safety of workers, for the past three years Murray & Roberts have gone a step further to support workers to maintain a positive psychological healthy mind-set. The programme has had positive results at work as suggested by this quote from an employee:

*“So if you have a personal problem you can go there for free as well, it includes people who work for Murray & Roberts including their family for example I can take my wife there for free. So like I said about zero harm it’s all about safety”.*

General health of employees is equally important to the companies to ensure sustainability and retention of critical skills. On-site medical surveillance in both cases suggests that safety alone is not enough to better the work environment. The data in Table 11 reflects a clear and decisive reduction in the drug related incidents since the on-site program was introduced in 2012. This programme allows workers to concentrate on issues at work and less about their social problems.

<b>ON-SITE DRUG RANDOM TEST STATISTICS</b>			
<b>Year</b>	2010	2011	2012
<b>No of cases</b>	7012	9958	5220

*Table11: Drug Random test statistics (Murray & Roberts, Annual Report, 2012)*

The company also has measures in place to discipline employees of the company as well as sub-contractors who disobey safety rules and policies. A colour-card system is operational on-site. Similar to the card system in football, a yellow card is issued to workers as a warning for an unsafe act. After three yellow cards, a red card is issued, resulting in a three month suspension without pay.

#### NMC

During the induction process all employees undergo a medical examination to ensure that they are medically fit for construction work, especially the work done at heights. Tests include blood pressure, lung function, hearing and eye sight examination. Random intoxication tests are administered at the gate to ensure workers are fit for work. This is done mostly on Mondays and on occasion if Saturday work is performed.

#### **4.5 Client Perspective Findings**

This perspective is very important in building a reputable brand in the construction industry. Clients are often concerned with the level of standing of construction firms in industry. The end users were Rabie Properties and Panorama Hospital respectively.

#### Murray & Roberts

For the Century City project extensive negotiations took place to appoint a contractor but the decision is primarily based on cost, previous experience and track record on the completion of similar projects. Murray & Roberts are viewed to have an excellent safety culture. However, adequacy of resources, ability to deliver the project on time, required quality standard, ease of working with their senior personnel are strongly considered. Safety is seldom if ever a consideration in the decision to appoint a contractor. It is assumed that they will comply with the statutory H&S requirements. The client also appoints a safety consultant to draw up a safety specification, and the safety consultant is entrusted to respond to all non-compliances.

#### NMC

The choice of contractor largely depends on the tender price pitch. Management recognises that H&S requirements grow with every new contract, that experience leads to improved tendering documentation, and that consequential allowance by contractor is more comprehensive. The critical assessment of the tender is price, thereafter we look at resources, previous contracts performance, costs, claim settlements, programme and management personnel.

The lowest tenderer stands a good chance of being appointed. Past performance and contractor reputation plays a vital role in further deciding on a contractor. The

company has a vigorous H&S policy. NMC constructed a R150 million shopping centre with no serious incidents. H&S actions by NMC were proactive, requiring very little input from the consultants. During contracts the H&S requirements as tendered are applied. The client has a health and safety document in the tender stipulating the requirements.

#### **4.6 Compliance Perspective Findings– A Collective View**

According to the Principal Inspector of the Department of Labour their mandate is to ensure that construction companies comply with the Occupational Health and Safety Act No 85 of 1993. Through years of investigations and inspections by the inspectorate it had become common knowledge that profits were considered as more important than the health and safety of workers in the construction sector. As a result the Construction Regulations (2014) were designed to ensure the professionalization of the construction industry and improve safety management on-site.

Sections 8 and 13 of the Occupational Health and Safety Act No 85(1993) also place unprecedented responsibility on the employer to ensure that a safe work environment is provided for workers. Where risks and hazards exist, the responsibility is also the employer's to communicate those risks in the form of training and formal induction. Section 14 though also directs employees to adhere to all safety rules and requirements set out by employers on-site.

A range of legal appointments are required under the Construction regulations of 2014, including a Safety Manager, a Competent Agent and a Health and Safety Officer. These professionals must be registered with the South African Council for the Project and Construction Management Professions (SACPCMP). The aim is to

ensure that competent personnel are hired to implement practical safety measures, moving towards a proper safety culture in the industry.

The critical role of design clarified in the Construction Regulations that specify the need for safety features to be considered when the building is being designed. The Inspectorate can with confidence engage designers when questions arise around the safety features of buildings and structures. The Principal Inspector from the Department of Labour interviewed on the 20 April 2015 responded as follows:

*Health and safety was always a last resort thing, people would always look at the production but now with this [statutory] board that has been appointed ... to look into health and safety specifically before architects would be appointed by the client to oversee of the whole structure. Because he is a designer the client would trust him because of knowing specifically what needs to be done. Even the agent now has to be registered. We have a database that monitors the compliance and that monitor the personnel that are looking specifically to the health and safety.*

Professionals are now required to act objectively in line with their code of conduct, similarly to the medical field. The appointment of competent risk assessors is now required and the wearing of Personal Protective Equipment should be second nature on a construction site. Active implementation of mitigating measures is much more important than compiling a thick file spelling out plans. Many incidents in the industry occur from falling from heights and this is where supervisors must develop task specific risk assessments.

#### **4.7 Management approach to legislation**

The changes in the Construction Regulations have forced both construction companies to adapt and implement new strategies on-site. It is evident that both firms also acknowledge that the legislation is fundamental in ensuring a focussed health and safety management system from an ethical perspective. It is to be believed that safety is put before the benefits of profits and production. In the next section the response to the changes in the legislation is presented.

#### NMC

Panorama Hospital appointed BFH de Jager Project Managers as the overall lead project manager. In turn NMC was appointed as the principal contractor to perform the construction work. NMC has taken the compliance with the OHS Act and the construction regulation very seriously, even prior to the changes in the construction legislation in 2014. All the stakeholders in the project, client, both end-user and project manager, designer and principal contractors implemented the 2014 changes prior to promulgation.

The lead project manager, BFH de Jager registered with the SACPCMP as a project manager. NMC has instituted that all of their site workers are medically tested and fit for construction work.

*We have a medical surveillance program that declares if everyone is fit for duty or not, so your training officer will justify your competency whether you are a crane operator etc. to make sure you know how to use your skill and also through tool box talk, the suppliers will come and train the guys that work for them (NMC site manager).*

All the health and safety specifications and operational plans for the project are compiled and made available during the design, tender and construction stage. The company has a strong audit culture and this has had a very positive spin-off in relation to a more focussed approach to establish a safety culture. The group health and safety manager responded positively:

*So at site level we have the audit system, so all the people appointed with legal responsibilities, the roles and responsibilities matches what I was talking about then ties that to the question at the back that says are they competent in order to they verify, safety managers then verify if a person is competent or not, if he is not either he will be replaced or training is given.*

Fulltime competent construction managers and construction supervisors have been appointed on the site to comply with construction regulations.

#### Murray & Roberts

On the Century City urban Square site, the end-user, Rabie Properties appointed JBCC project managers as the lead project managers. In addition, Rabie Properties appointed an agent specifically for health and safety matters in the project as required by the new construction regulations. The end-user and the appointed architects conduct monthly audits to keep track of the progress and the compliance level of the site. The site manager for safety noted:

*We have CCPOA which is the Century City Property Association and the client Rabie Properties, where there is a list of rules of everybody working in the facility in relation to safety, security and environment aspect, the*

*subcontractors have to comply with that as well, so everything that is pushed from the client to M&R our sub contractors have to abide by that.*

The designer has a permanent office on-site to be readily available if any technical support is required. Operationally the principal contractor has made all the necessary appointments in alignment with the new construction regulations. Regular site audits are performed to ensure that workers are able to perform their duties on site. A site worker has noted:

*We have safety officers on site, we have a monthly audit on the files, it is not my duty to grade but I must ensure that it happens every month ... we discuss the stats as well and if you have a score below of what is required at Murray & Roberts will call in the person and we sort out everything that is in short fall.*

### Challenges

With the introduction of the new construction regulations both companies experienced difficulties with the registration of the safety professionals with the SACPCMP. With a totally new Council and legislation governing it this was to be expected under any circumstances. Both the sites could not obtain construction permits as prescribed by the new construction regulations because the Department of Labour was not ready to issue permits by the time construction was ready to commence at both sites, even though both firms had compiled all the required documents and plans for submission to the Department of Labour. Ultimately the client, regulator and management relationship has grown much closer with the inception of the new construction regulations.

#### **4.8 Conclusion**

In both cases the findings in the different perspectives shows many similarities. It is only in some instances where one firm is applying more intense practices to ensure safety on-site. The notable difference in the management perspective is the manner in which Murray & Roberts involves their top management structure in pure operational activities such as spearheading accident investigations on site. In the operational perspective, NMC's implementation of a positive recognition programme on site, the SUSA initiative brings across an aspect of willingness to comply with safety rules and procedures on site. The extension of the employee wellness programme, to immediate family members, creates a sense of care and helpfulness from the employer's side and in turn the employee reciprocates with a sense of commitment and loyalty towards the company.

The next chapter presents the analysis and discussion.

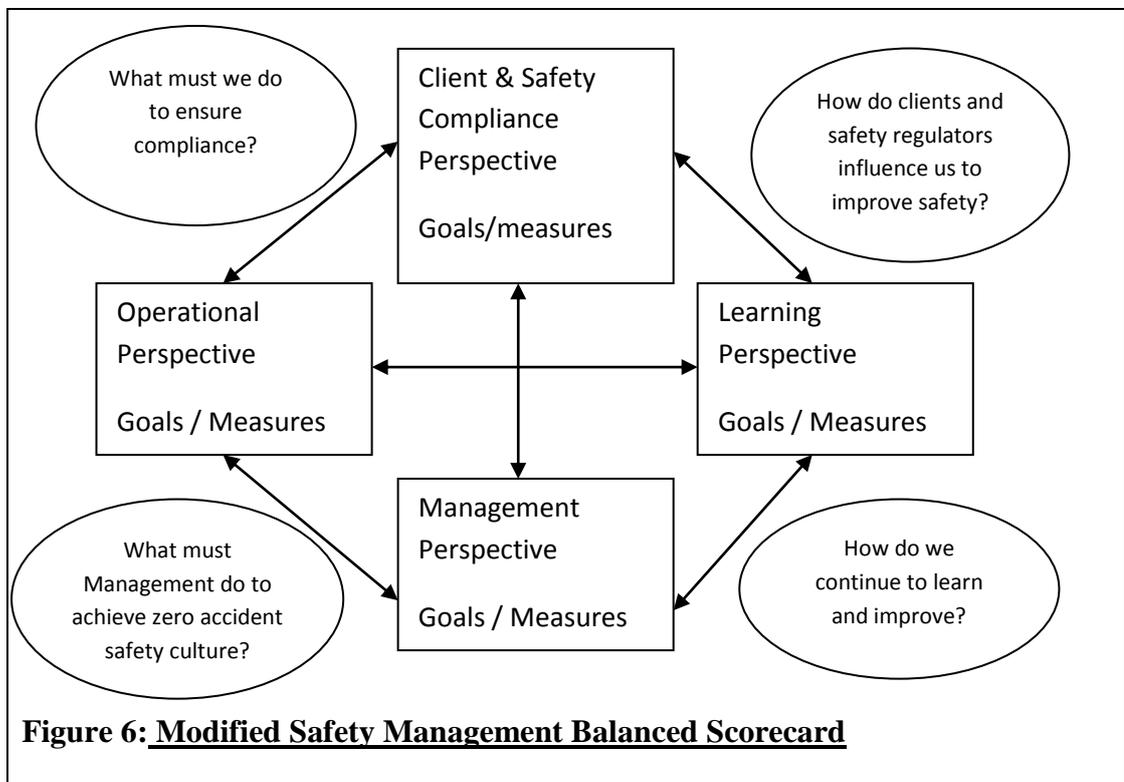
## **5. CHAPTER FIVE: ANALYSIS AND DISCUSSION**

### **Introduction**

Historically, accident statistics were mainly used as a measuring tool in the construction sector. This reactive approach to safety management has its drawbacks because this has encouraged under-reporting of accidents and incidents (Mohamed, 2003). In order to reduce workplace accidents, the entire workplace safety management system must be intrinsically linked to the organisational culture (Choudhry, 2006). It is self-evident that management must initiate and maintain vigilance regarding the behaviour and mutual interaction between employees and management to achieve a positive safety culture.

Kaplan and Norton (1992) introduced the Balanced Scorecard to evaluate business performances from the perspectives of finances, clients, internal business and innovation and learning. Similarly the Safety Management BSC aims to integrate measures for all interested stakeholders in a construction company, including the client, management, employees and regulators. Mohamed's (2003) Safety Management BSC approach promotes a more pro-active approach to occupational health and safety management, especially on construction sites. The four perspectives of the model have certain links to other models such as the research done by Pidgeon and O'Leary (2000). In both models senior management commitment, pro-active monitoring, feedback system, and optimal risk assessments are considered as important to achieve a zero accident culture. As Smallwood (2002) points out, culture has an influence in the management, operational, learning and the client realm in the BSC Model.

The next section presents the analysis and discussion that emerged from this study. The findings are categorised under the following four sub research questions also considering the authors' modified Safety Management BSC model (see Fig 6), which highlights the importance of the inter-relationships between the four perspectives in the model. Note that Mohamed's (2003) Safety Management BSC model did not include the inter-relationship between the Client and Management perspectives.



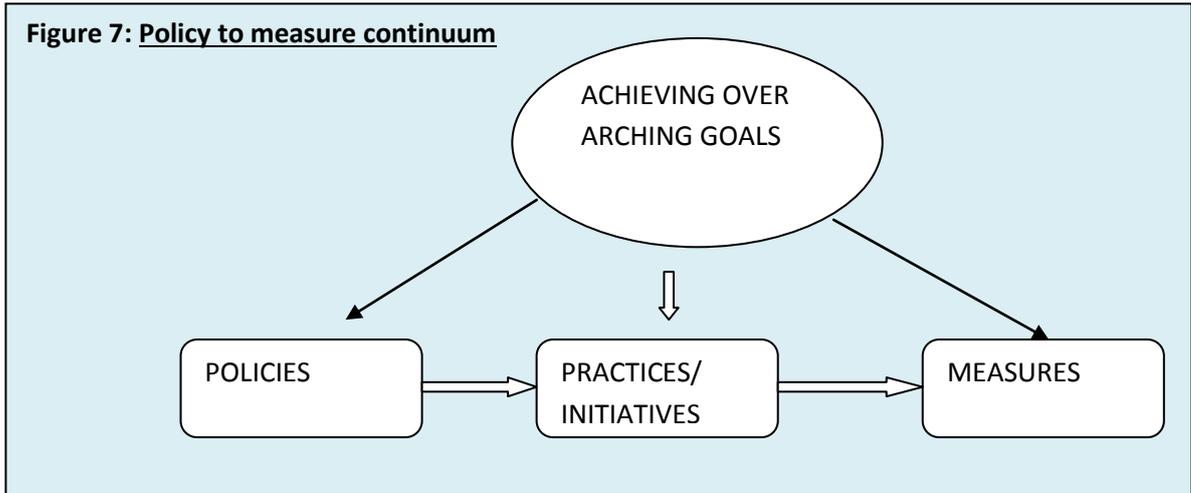
1. Management and Operational Perspectives – What safety management practices does management implement operationally to achieve a zero accident culture?

2. Operational and Learning Perspectives – What does the principal-contractor do to implement and continuously improve health and safety rules and procedures on their construction sites?
3. Learning and Management Perspectives – How do management policies ensure continuous learning and improvement in health and safety on their construction sites?
4. Client and Safety Compliance and Operational Perspectives – How do the Client, legislation and regulators influence the operational safety environment on their construction sites?
5. Client and Safety Compliance and Management Perspectives – How do the Client, legislation and regulators influence the strategic management approach to the safety environment on their construction sites?

In addition I consider how the four perspectives are integrated to achieve a positive safety culture.

The evidence in this research project suggests that Murray & Roberts and NMC have realised the value of a more pro-active approach to safety management and this has proven beneficial to both companies' safety performance and external reputations. The contribution of the client and the Department of Labour is also influential but does not appear to be as significant as the three internal aspects.

In the next section the discussion closely considers the two companies' strategies and approach to health and safety using the modified Safety Management BSC as a framework.



A fundamental commonality between the two companies is the similarities in their main goals in relation to establishing a safe work environment. As illustrated in figure 7 in both companies clear policies are informed by the overarching goals of the organisation. In each instance a goal to achieve a safe environment is supported by a clear policy which is further aligned with practices or initiatives followed by measures to ultimately monitor its effectiveness. Practices and measures are clearly developed to achieve set goals which follow a specific pattern in writing policies, implementing practice on-site and monitoring progress using pre-determined measures. The process is supplemented by a thorough review process by top management and health and safety personnel within the organisation as well as external stakeholders.

The analysis and the discussion below follow the different sub-research questions.

**5.1 Sub-Research Question 1 - What safety management practices does management implement operationally to achieve a zero accident culture?**

Geminiani, Smallwood and van Wyk (2008) identify the important relationship between management commitment and training and the subsequent positive effect it has on reducing the occurrence of on-site accidents. At the heart of all the different perspectives and strategies in relation to health and safety is the all-important role for management to cultivate a safety culture. The ideal situation is to ensure that safety permeates through all levels in the organisation, resulting in a zero accident culture. Mohamed (2003) states that creating a safety culture, is fundamental to managing safety on construction sites. This highlights the importance of a top-down organisational approach. Murray & Roberts and NMC's demonstrated commitment from the top to implement the safety management policy is fundamental to their success in managing the safety domain.

In the case of NMC the signatures of all ten directors of the company are exhibited on the company Safety Policy. This is a true devotion of their commitment to ensuring a safe working environment. Management commitment comes strongly to the fore as a critical success factor in creating the desired safety culture. This is in line with the findings of Choudhry (2006) where ownership and responsibility is emphasised at top management level. Responsibility, participation and accountability all form part of management's commitment to worker health and safety.

As Okorie et al. (2014) found, Murray & Roberts management's participation is strictly monitored by a program called Visible Felt leadership where the Chief Executive Officer performs on-site safety management audits. This ensures that these programmes do not only look good on paper in reports but actually add value to the working environment on-site. As a result, boardroom policies and procedures

translate into operationally safety initiatives. Furthermore this study concurs with Glendon and Litherland's (2001) study around the effective on-site involvement of management in establishing a safe environment.

The investment in additional management schemes such as the ISO programs has given a lot of backbone to the safety management practices at NMC where the company has been certified for ISO 9000 and 14001. Both of these programs include a wider range of safety features which require the commitment of financial resources. This has been extremely beneficial to the company in that the company has reached and exceeded their 0.5% incident frequency rate by 0.1%.

The role of the management systems in construction is well supported by a study by Smallwood (2000) who highlights the importance and organisational benefits of a Quality Management System to ensure consistency and employee confidence.

In light of the successful safety culture at the two companies, management planning, directing, leadership and co-ordination is an important part of implementing an all-encompassing safety domain on-site. In both firms the spending on accidents and incidents has reduced considerably over the last 5 years.

More notably the implementation of safety management systems has seen a reduction of accidents and incidents by more than 5%. This is empirical proof in support of Behm's (2005) claim that reduction in accidents and incidents can be attributed to effective communication of risks on site.

## **5.2 Sub-Research Question 2 - What does the principal-contractor do to implement and continuously improve health and safety rules and procedures on these sites?**

The learning perspective adds a dynamic element to the Balanced Scorecard framework. In both companies the learning facet is taken very seriously in that different learning modes are implemented to facilitate optimal learning, thereby recognising that people, i.e. the workers, are the true drivers of continual learning and improvement to achieve better safety management and performance.

Okorie et al. (2014) identify the influence of health and safety training on workers' behaviours as a critical part in improving working conditions on construction sites. For years the literacy gap was and still remains a worrying challenge in the South African construction sector but Murray & Roberts has developed an induction video to assist illiterate workers to understand the different concepts and risks on-site. This is just one simple example of developing individual skills and innovation on the part of the company. An important part of the learning perspective is the alignment of the company resources to what the market requires. Clients are opting more and more to erect multi-storey buildings as opposed to flat and wide buildings. This itself has posed challenges in the skills gaps to the required capabilities to execute these projects.

NMC has implemented a broader and more comprehensive learning and development model where learning is first captured in a job description, followed by a performance appraisal where a skills request pool is created. In this way the interests of company and the employees are aligned and it creates a win-win

situation. The company's SUSAS Conversation initiative has provided a forum to turn safety into a positive behavioural tool.

The establishment of a skills school has also given NMC an edge in ensuring that a skilled pool of workers is available when required. The importance of innovation and forward thinking and planning is evident in the existence of research and marketing units where analysis of the market is done to establish new developments in terms of market requirements, technology, types of projects and potential clients. For example NMC has grown its civil engineering side of the business considerably and the company has made significant investments in developing the skills of employees to be able to be project ready when it is required.

Tadesse (2006) defines Occupational Health and Safety as the adaptation of the working environment to workers for the promotion and maintenance of a higher degree of physical, mental and social well-being of workers in all occupations. This is well manifested in the sense that an additional wellness program concerning the availability of counsellors and psychologists for employees and their families offers an opportunity to employees to concentrate on their jobs and not be unnecessarily distracted by emotional problems at home or with particular individuals.

Behm (2005) highlighted a link between the design for construction safety concepts and the construction fatalities and determining whether effective learning could have prevented these fatalities. The current study shows that a learning culture has a clear bearing on the final results in relation to safety on-site. Murray & Roberts makes huge contributions on-site to build a competent workforce. Specialists are brought onto site to perform training that is relevant to that particular project. Specialists in

working at heights, and excavation specialists are procured to perform the desired training. The aim is to ensure consistency in the safety performance of the workforce.

Both cases demonstrate that with the training and empowerment of the workforce a clear message is sent to all in the organisation that no compromise is allowed in relation to health and safety. Traditionally, time is deemed as most precious in a construction project. However, this arrangement on-site creates the culture of safety first. This bottom-up empowerment on site has helped to create a positive safety culture. The incentive programmes on offer to employees are an attempt to better worker behaviour in relation to safety on-site, provide further evidence of worker involvement in the safety management system (Okorie et al, 2014).

### **5.3 Sub-Research Question 3 - What does the principal-contractor do to ensure proper implementation of health and safety rules and procedures?**

Neal and Griffin (1997) identified the importance of co-operation between management and site employees to ensure the practical implementation and maintenance of a proper safety management system. Cooperation supports the adoption of specific operational project objectives in relation to safety, the physical environment and the involvement of workers that are closely monitored in both cases.

Ensuring consistent implementation of the safety management system, including rules and procedures poses challenges to on-site employees and management at both sites studied. Efficiency and effectiveness is a priority in this regard. Top management takes responsibility for the formulation of the safety policies, and the

on-site responsibility is dependent upon site management and workers to ensure rules and procedures are properly implemented and followed.

The supervisor-worker relationship on both sites is reinforced by safety discussions before the day starts. This is where risks are discussed and goals are set to achieve a high degree of compliance and workforce pro-activeness. The risks and the hazards that could be encountered during the day are taken very seriously and discussed as a team to ensure that every worker receives the same message at the same time from the same supervisor. Risk assessments have thus become almost second nature as a behavioural attribute amongst both supervisors and workers.

In both cases the involvement of different sub-contractors in this process is unavoidable.

Okorie et al (2014) identify the strategic importance of the establishing proper feedback systems which should be inclusive of all sub-contractors on-site. The achievement and maintenance of a high degree of compliance depends heavily on the feedback system on-site. Apart from the frequent safety meetings and team discussions, the introduction of a notification box on site has improved innovation and the introduction of new ideas from everyone on-site, including the sub-contractors.

Careful site layout planning is fundamental to monitoring daily progress on-site. Because of the project size, Murray & Roberts divides the site into manageable smaller working areas with a supervisor and a dedicated operational team. As a result risk assessments can be done more objectively in a smaller team environment. This also has greater potential for more effective and efficient supervisor worker

relationships. The inclusion and involvement of architects allows more expertise and an outside objective view from a non-site worker. This is consistent with the findings of Smallwood and Venter (2012) who acknowledge the role of designers and project managers to integrating health and safety in all construction processes.

It is also a reality that a minority of workers are constantly looking for shortcuts and unsafe acts are by far the main reason for all serious accidents on-site. A zero tolerance for negligence was found in both cases and is dealt with in the most decisive manner.

This perspective provides a clear indication that optimal safety management on-site requires safe workplaces, effective work relationships, pro-activeness from employees and the skill to detect hazards.

#### **5.4 Sub-Research Question 4 - How do the Client, legislation and regulators influence the safety environment on these sites?**

Clients rely extensively on the design engineers and architects to manage large construction projects. In both cases the principal contractors were appointed by an architectural firm. Behm (2005) identifies the need to involve these specialists in considering construction safety as early as the design phase. In a South African context, Smallwood (2002) promotes the development of designers and architects who are aware of health and safety issues and incorporate health and safety measures in their designs and ideas.

In the business realm company reputation is always sound competitive advantage to possess in market advancement and securing projects (Porter, 1998). For construction companies it is fundamentally important to exhibit a positive safety

culture especially when tendering for projects. Client satisfaction is at the heart of securing projects and positioning the firm for future tenders. Past experience gives an indication of construction work in relation to safety records, public relations and the company's ability to deliver safely on time. The clients' responses in relation to safety suggest that they consider worker morale as a major element when awarding tenders to construction companies. With projects highly dependent on time, costs and quality, a workforce prone to accidents can only have a negative impact on the delivery schedule.

In both cases clients cited legislative compliance and a positive organisational atmosphere as a major consideration for concluding agreements with the principal contractors. Clients also indicated that they appoint a safety agent to draw up a safety specification which the principal contractor must comply with by developing a safety file and program. In practice large clients chose not to be directly involved in the projects and rely on the expertise of the safety agent to deal with such issues.

However this practice is in direct contradiction to what the Occupational Health and Safety Act of 1993 requires. This failure is a problem that Smallwood (2000) also identified because the client/contractor relationship is viewed as critical to ensuring proper health and safety on construction sites. Both management respondents in the cases viewed compliance with the Construction Regulations as first priority and as second nature to the company. In light of the fact that this legislation is prosecutable in terms of the Criminals Procedures Act, compliance is important to avoid having a criminal action instituted against companies (OHS Act No 85 of 1993).

The recent attempt to professionalise the safety personnel on-site has opened up the possibility for regulators to engage with safety professionals with much more confidence. Smallwood (2002) promotes the introduction of skilled designers to ensure the consideration of health and safety as early as the design phase of projects. He also encourages tertiary institutions to address health and safety in their curriculum. Although both cases exhibited very good records and safety mechanisms on-site, the inspectorate is adamant that more workers should be trained as risk assessors to be able to control and monitor risks on-site. This is especially the case on the larger projects where large scale site layout planning is required. They believe that less effort should be afforded to safety file compilation and more attention should be invested into on-site practical safety implementation of mitigating measures. This will enhance the move towards the creation of a safety culture in the construction industry.

#### **5.5 Sub-research Question 5 - How do the Client, legislation and regulators influence management's approach to creating a safe environment on their sites?**

The study by Behm (2005) identifies that the designer plays a fundamental role in contributing towards safety whilst construction is underway. He emphasise the consideration of safety aspects and legislative requirements by designers as early as the design phase of projects. To put it simply, this will allow principal contractors to identify risks and hazards long in advance. This could allow principal contractors to suggest changes to minimise or even cancel the risks in its entirety. Smallwood (2002), in a South African context, champions the idea of the importance of having skilled and knowledgeable designer in relation to health and safety. With the recent

responsibilities cascaded down to clients, designers and principal contractors, it is important to have this realised by construction management.

In both companies, management has responded proactively and swiftly to the changes in the construction regulations of 2014. Even though the Department of Labour has given a grace period to implement the changes on all construction sites in South Africa, management in both firms has implemented all of the required changes on their sites. Changes entail client, designer and principal involvement from designer phase up until the actual construction phase.

With reference to a very specific practice of having medical certificates of fitness for all construction employees is in line with a study by Agumba and Haupt (2009), where leadership on-site cultivates positive results. Having said that both companies have implemented medical fitness programmes on-site even before it was a requirement in terms of the Construction Regulations of 2014, which is a sign of forward thinking and concern for the health and safety of site workers. The evidence of the management's approach and willingness to complying with the construction regulations makes positive contributions. The focus of the changes directs more management involvement around the client, designer and ultimately the principal contractor.

The triangle relationship of regulator, client and on-site professional team seems to have come closer together, where the client and its professional team are largely dependent on one another to succeed in complying with the legislation and ultimately establishing a safety management system that produces positive results. The regulator in this instance will have a much more direct yardstick to apply largely

because the respective responsibilities are clearly defined in the new Construction Regulations.

All the management approaches on sites agrees extremely well with studies from Behm (2005), Smallwood (2002) and Agumba and Haupt (2009).

## **5.6 Main Research Question**

**How do the companies ensure coherent safety management practices that create a safety culture?**

Mohamed (2003) argued that a behavioural approach towards a safety performance system is much more beneficial than a reactive system because it does not only focus on non-compliant behaviour but also on safe behaviour. In both case studies a well-defined safety culture is evident and can be identified in the way workers and management speak, act and behave on-site. All employees are preaching the same message. As Choudhry (2006) suggests, safety has to be intrinsically linked to organisational culture, which is defined as interaction between organisation and individuals where employees' behaviour can change through mutual interaction. Okorie et al (2014) also identify that the following are required for health and safety to succeed on construction sites:

- ✓ Top Management commitment and leadership
- ✓ Site Management leadership and behaviours
- ✓ Influence of health and safety training on workers' behaviours
- ✓ Worker involvement and participation in health and safety decisions and

- ✓ Feedback systems inclusive of sub-contractors.

The responses to the sub-research questions revealed that internally management and the lowest ranked site worker share responsibility to create a positive safety culture.

Based on the evidence presented in the two cases studied, this section extracts the most relevant and significant factors contributing to an effective and efficient safety culture:

#### Management Perspective

1) *Management Commitment* tops the list to a positive safety culture. Safety must be driven and managed from a corporate level. All the complementary resources such as budgets, authority and accepting final responsibility reside at a corporate level. This will ensure that proper attention is given to ensure employee wellness and safe and ethical work environments.

2) The establishment of a *Health and Safety Department* with clear key performance areas and indicators will ensure that focussed professionals drive the key health and safety goals of the organisation.

3) *Management Systems implementation* to assist in the ultimate goal of a zero-accident working environment. Management programs such as the ISO 9000 and 14000 systems ensure quality assurance of safety programs and help to enhance company reputation and worker involvement.

## Learning Perspective

4) *Continuous learning* needs the operational level to steer towards a safety culture. Literacy level appraisals amongst all workers need to be performed to assess the company's skills gap. This requires a proactive approach to ensure that workers possess the necessary skills to perform difficult and hazardous tasks on-site. Skills schools or learning centres must be implemented to ensure that learning take place as a norm, not an exception. Literacy appraisals will also assist employers to upgrade skills in the most understandable medium possible.

## Operational Perspective

5) *Standing Induction and Risk Identification* from an on-site perspective is an element that contributes greatly to accident-free days in the construction sector. Early morning talk strategies as well as site stoppages contribute to ensuring a culture of safe work on-site.

6) *Constant communication and Feedback systems* are essential elements responsible for sharing knowledge and warning of potential accidents. These strategies must be in place to ensure that information flows both ways i.e., top-to-bottom and bottom-to-top. There must be a very good sense of synergy between management and workers in this regard. The appreciation of the presence of experienced as well as inexperienced workers makes communication and feedback a necessity to create a safety culture.

7) The availability of *Employee Wellness Programs* that assist with social and other related problems and challenges allows the employee to concentrate on work related

matters. Such programs have a positive impact on worker commitment towards the company and create an enhanced psychological upliftment in the workplace.

8) The implementation of *Employee Recognition Programs* in relation to safety keeps employees focused on the element of consistently striving to act safely and responsibly. These types of programs have the potential to ensure that workers on-site communicate freely and in a goal orientated manner on-site.

#### Client and Compliance Perspective

9) *Client Involvement and Satisfaction* compels construction firms to strive for the ultimate goal of a positive safety culture. No client wants to be associated with an unsafe construction partner. Therefore it is important to involve clients from the start to ensure that the right ethical paths are taken consistently through the entire project lifespan.

10) *Professional on-site appointments* in relation to safety are new requirements in line with the new Construction Regulation of 2014, promulgated in South Africa. These changes in the legislation aim to create a safety culture from an education perspective. The presence of better educated and skilled safety personnel aims to ensure that practical and more direct safety mitigation measures are implemented where needed.

11) *The development of a proactive, cooperative relationship with regulators and officials helps to improve compliance levels and reduce incidents of reportable accidents.* The responsibilities that are cascaded to clients, designers, principal contractors and labour inspectors, aims at improving the health and safety on

construction sites and this reinforcing circle of efforts should have a positive impact on construction safety management systems.

The above safety management practices have made a distinct difference in the operations and reputations of the companies that were examined in this study. There are possibly many other strategies that can be tested and implemented, but the above points us in the correct direction.

In conclusion, it can be noted that the four Safety Balanced Scorecard dimensions- management perspective, learning perspective, operational perspective and the client & compliance perspective are related in a cause and effect pattern. In both construction companies, strategic decisions underpin policy development process and helped to ensure that adequate resources were made available. A critical strategy is to train employees to identify risks and hazardous environments on-site which lead to a reduced incident rate in the organisations studied. The reduced incident rate has had a positive spin-off in relation to client perception and regulatory compliance.

## **6. CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS**

The research study aimed to explore the safety management practices at two firms in the construction industry. Of course, general conclusions cannot be drawn from this research as it reports on a small-scale qualitative project based on the safety management practices of two construction firms in the Western Cape.

All participants in this study were given the opportunity to share their experience and knowledge about the company they work for and the daily culture they are immersed in. The study revealed new initiatives in relation to safety at top management level as well as at site-level. The study has also revealed that a successful or effective safety management system is not dependent on one single element of an organisation but depends on each and every person in the organisation.

The cases suggest that the start of an effective safety culture should reside squarely on the shoulders of top management and this must be strongly supported by an efficient feedback system from the on-site workers. Continuous learning came out very distinctly as ensuring sustainability as a competent workforce is critical to staying abreast with what industry and the marketplace requires.

The study focused on participants ranging from top management, site-workers, clients and compliance regulators. In the study both firms view compliance with the South African legislation as second nature and believe that the institution of additional programs has geared them up for the establishment of a safety culture that effectively involves everybody.

## **6.1 Summary of findings**

In this section the findings of the study will be summarised in relation to the research study's sub-research questions.

### **Sub-Research Question 1 - What safety management practices does management implement operationally to achieve a zero accident culture?**

The successful cultivation of a safety culture starts with management. Mohamed (2003) states that safety culture is concerned with the determinants of the ability to manage safety which is a sure indication of a top-down organisational attribute approach. In both cases the existence of a clear safety management policy is fundamental to their success in managing the safety domain.

Management commitment comes strongly to the fore as a critical success factor in creating the desired safety culture. Responsibility, participation and accountability all are important parts of management's commitment to worker health and safety. The establishment of a Health and Safety Department as a business unit with clear key performance areas and indicators will have focussed professionals driving the primary health and safety goals of the organisation.

Investment in additional management schemes such as the ISO programs provides extensive structure to the safety management practices in support of an effective safety culture. In light of the successful safety culture at the two companies, management planning, directing, leadership and co-ordination is an important part of the all-encompassing safety domain organisationally and in particular on-site.

**Sub-Research Question 2 – How do management policies ensure continuous learning and improvement in health and safety on their construction sites?**

The learning perspective largely involves the alignment of the company resources to what the market requires. In both companies studied the learning facet is taken very seriously as different learning modes are implemented to facilitate optimal learning. This recognises that people, i.e. the workers, are the true drivers of continual learning and improvement to achieve better safety management and performance.

The establishment of a skills school ensures that a skilled pool of workers is available when required. The importance of innovation and forward thinking and planning is evident in the existence of research and marketing units where thorough analysis of the market establishes new developments in terms of market requirements, technology, types of projects and potential clients. On a micro-level specialists are brought on to site to perform training that is relevant to that particular project. Specialists in working at heights, and exaction specialists are procured to perform the desired training. The aim is to ensure consistency in the safety performance of the workforce.

**Sub-Research Question 3 - What does the principal-contractor do to implement and continuously improve health and safety rules and procedures on their construction sites?**

The operational aspect of the construction site poses challenges not only to the on-site employees but to a large extent a great challenge is created in how well management and on-site employees execute the safety management system. At first the management must get buy-in from everybody on-site to make the safety

management system work. In both cases top-management takes responsibility for the formulation of the safety policies, and the on-site responsibility is dependent upon site management and workers to ensure rules and procedures are properly implemented and followed. Efficiency and effectiveness is priority in this regard. This is achieved by early morning safety discussions before the day starts and this is where risks are discussed and a goal is set to achieve a high degree of compliance and workforce pro-activeness. The achievement and maintenance of a high level of compliance is dependent on the feedback system on-site. The recognition of good work, in addition to salaries, inspires workers to conform to prescripts of health and safety requirements on-site.

**Sub-Research Question 4 - How do the Client, legislation and regulators influence the operational safety environment on their construction sites?**

For construction companies it is fundamentally important to exhibit a positive safety culture especially where tendering for new projects. Client satisfaction is at the heart of securing projects and also positioning the firm for future tenders. Past experience gives an indication of construction work in relation to safety records, public relations and the company's ability to deliver safely on time. The clients' response in relation to safety suggests that clients consider worker morale as a major element when awarding tenders to construction companies.

Legislative compliance and a positive organisational atmosphere are also fundamental for consideration for concluding agreements with principal contractors. The recent attempt to professionalise the safety personnel on-site has opened up the possibility for regulators to engage with safety professionals with much more each

and confidence. The inspectorate believes that more workers should be trained as risk assessors to be able to control and monitor risks on-site especially on the larger projects where large scale site layout planning is required. Less effort should be afforded to safety file compilation and more attentive efforts should be invested into on-site practical safety implementation of mitigating measures. This will enhance the move towards the creation of a positive safety culture in the construction industry.

**Sub-Research Question 5 - How do the Client, legislation and regulators influence management's approach to creating a safe environment on their sites?**

The new Construction Regulations of 2014 has prompted management of the construction companies to be much more involved and proactive in ensuring the health and safety of on-site staff. In both companies, management has responded proactively and swiftly to the changes in the construction regulations of 2014. Even though the Department of Labour has given a grace period to implement the changes on all construction sites in South Africa, management in both firms has implemented all of the required changes on their sites.

Both companies have implemented medical fitness programmes on-site even before it was a requirement in terms of the Construction Regulations of 2014, which is a sign of forward thinking and concern for the health and safety of site workers. The evidence of the management's approach and willingness to complying with the construction regulations makes positive contributions. More management involvement around the client, designer and ultimately the principal contractor has brought about a more focussed approach in relation to health and safety.

The three vital role players namely regulator, client and on-site professional team seems to have come closer together, where the client, and its professional team was prompted to work much more closer together to succeed in complying with the legislation and ultimately establishing a safety management system that produces positive results. The regulator, The Department of Labour Inspectorate, in this instance will have a much more direct yardstick to inspect and enforce.

## **6.2 Contributions of this study**

Although the two sites studied are operated by two of the country's largest construction firms, this research was done on a very small-scale and is not considered to be generalizable. Despite exceptional research by Smallwood (1996, 2000, 2002, 2005, and 2012), Okorie (2014), Emuze (2014) and Haupt (2005, 2009) more operational research is can be initiated on health and safety practices in the construction industry in a South African context.

This research is the first South African study of construction site health and safety from a BSC perspective. Prior experience as a Department of Labour inspector and in-depth industry knowledge were valuable in that it enabled the researcher to interpret actions and behaviour patterns as observed on-site whilst data were generated. The study provides new knowledge in relation to strategies to improve safety on-site.

The fundamental lesson is advocated that compliance with construction legislation is not enough to establish an effective safety culture. Additional programs such as emotional well-being are required to keep workers focussed and energised on-site.

The study highlights the importance of synergy between workers and management. One party will never be able to work in silo and expect to be successful in driving a safety management system. This study highlights the important role of top management in this process. The study adds some value to current literature by highlighting the benefits flowing from initiatives to turning the safety concept from a negative issue into a positive. By immediately recognising compliance and safety actions, management can add significant impetus to promote participation in the special initiatives on-site.

### **6.3 Reflections on the methodology**

Prior experience in the construction industry made the researcher aware that the workforce on site-level is apprehensive about conversing with strangers especially in their own working environment. At first interviewing the participants in their own working environment would be beneficial to the study but in retrospect, it would have been better to perform the interviews off-site, maybe at their homes or some other familiar place other than work. The unannounced visits provided an opportunity to observe behaviours and actions as they really occur on-site. This method allowed no or minimal time for site supervisors to warn workers to behave in any prescribed way. No anomalies were observed during these unannounced site visits.

The decision to include both inexperienced and more experienced workers provided useful empirical data. The issue of power imbalance may have become an issue during data collection. Consciously aware of the fact that the researcher was also a Department of Labour inspector, to reduce potential conflicts of interest, the right to

withdraw at any time during the interview was communicated to participants in the beginning of each interview.

The inclusion of the external stakeholders namely clients and the legislative regulators provide a previously under-researched dimension to the study. In this regard both clients and regulators spoke freely and in without inhibitions and I could use this to my advantage to explore this perspective extensively. The length of the interviews also measured up well as the longest interview was 52 minutes long and the shortest engagement was 8.5 minutes long. I am satisfied with the approach that was adopted in this study and further research can only learn from this attempt in the future.

#### **6.4 Recommendations for further study**

More research can be performed on Occupational Health and Safety in a South African context. The topics below can be investigated to strengthen the literature available.

- 1) A longitudinal study involving the perspective and influence of trade unions in the construction sector in relation to occupational health and safety.
- 2) The choice of two large firms, selected because they represent industry best practice, reveals the need to extend the scope of future research to other large firms and Small and Medium Enterprises in the construction industry.
- 3) The current study was done only within the borders of the Western Cape. Each region certainly has its own challenges and barriers in relation to worker and social culture. A study of similar elements can be performed elsewhere in South Africa.

4) The construction industry is known to be amongst the most hazardous sectors in South Africa. Besides the programmes available to workers whilst they are working, there is little knowledge about what happens to them when they retire or are seriously injured and are forced to retire.

## **6.5 Final Comment**

The inclusion of accident related statistics in the introduction of this research project was an attempt to showcase how serious and hazardous construction work is. It is my view that most people never realise how serious this problem is, until the data regarding the issue of deaths and serious accidents in the construction sector is shared.

Business people view problems like health and safety through the lenses of the profit margin whilst families ponder upon the social and psychological impact once a loved one or breadwinner has been lost. Clearly both business and society at large will benefit from the added savings that a positive safety culture can bring. The business case suggests that annual monetary savings of millions can be made when incidents and accidents are reduced. The enhancement of company reputation is also a great part of the package when a safety culture is made a priority.

In the literature the idea of sustainability is advocated, but what is sustainability without a positive and ethical culture, in this instance a safety culture. Intrinsicly, management must come on-board as responsible drivers of ethical business practices not only in the boardroom but as active participants in the playing field by ensuring a safe working environment. The loss of one life on a construction site should be

viewed and calculated as a dismal failure, whilst the observance of one safe act must be applauded and loudly acknowledged.

I conclude with the words from a car manufacturing company: “What you put in is what you going to get out!” Ensuring a safe work environment requires more than a budgetary allocation, it requires strategic effort and action.

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## 8. APPENDICES

### 8.1 APPENDIX 1: Semi-structured interviewing tool

<b>Management Perspective - Safety Manager (Corporate and Site)</b>		
<b>No</b>	<b>DEMOGRAPHIC INFO</b>	<b>STATUS</b>
Q1	Please introduce yourself including your position, nature of your job, age and experience.	
Q2	Tell me how many years have you been in the construction industry?	
Q3	Please tell me about your education background?	
<b>Goal – Eliminate Accidents</b>		<b>Measures- No of Accidents</b>
Q4	In the last financial year what was the number of accidents that occurred on site (company-wide)?	
Q5	How do you classify or acknowledge accidents on site? Are there Policies, Procedures and Practices (PPP) to guide site workers in making this accident classification?	
<b>Goal- Reduce Incidents</b>		<b>Measures- No of Incidents</b>
Q6	In the last financial year what was the number of Incidents that occurred on site (company-wide)?	
Q7	How do you classify or acknowledge incidents on site? Are there PPP to guide site workers in making this incident classification?	
<b>Goal – Improve Productivity</b>		<b>Measure-Performance Reliability</b>
Q8	As management how do you assess the safety performance on site? What do you use to monitor productivity?	
Q9	Do you have PPP developed to track the performance of safety and productivity?	
<b>Goal- Management Commitment</b>		<b>Measure-Extent of Management</b>
Q10	At which level in the company does the management responsibility for safety reside? How involved is management with safety company-wide?	
Q11	What governance (PPP) measures are in place to ensure management’s commitment to OHS? What is expected of management to ensure deliverance of a sound safety performance?	
<b>Goal- Reduce Accident related cost</b>		<b>Measure-Revenue saved on accidents reduced</b>
Q12	What budgetary PPP are in place to drive safety in the company? Are there certain targets in place to chase revenue savings?	
<b>Goal-Emphasize subcontractors’ safety awareness</b>		<b>Measure- No of safety issues pushed down to subcontractors</b>
Q13	From a management perspective what safety requirements are pushed down to subcontractors on site?	
Q14	Are there agreements driving health and safety practices on site?	
<b>Operational Perspective – Site Worker (&lt;1yr)</b>		

<b>No</b>	<b>DEMOGRAPHIC INFO</b>	<b>STATUS</b>
Q1	Please introduce yourself including your position, nature of your job, age and experience.	
Q2	Tell me how many years have you been in the construction industry? And how many years have you been with the current company?	
Q3	Please tell me about your education background?	
<b>Goal – Establish and maintain a safe workplace</b>		<b>Measures- Score of compliance/non-compliance to safety requirements</b>
Q4	As a worker what is expected of you as a worker to ensure a safe working environment? Are there any requirements that you are aware of or have been made aware of on this site specifically?	
Q5	Have you ever been asked to complete a compliance scoring of safety on site? Do you know of any PPP that is operational on site?	
<b>Goal- Establish an operational feedback system</b>		<b>Measures- Score and/or No of safety audits/focus reviews</b>
Q6	Does an on-site feedback system exist between workers and management? What is the channel(s) available for communication on-site?	
Q7	How many safety audits are performed on-site? How frequently?	
<b>Goal – Create a better working environment</b>		<b>Measure- degree of satisfaction with current working relationships, safe behaviours and attitude towards safety</b>
Q8	What is your opinion around the current working relationship between management and workers in relation to safety on-site?	
Q9	What rules, or PPP exist to ensure that workers are working safely on-site?	

<b>Operational Perspective – Site Worker (&gt;3yrs)</b>		
<b>No</b>	<b>DEMOGRAPHIC INFO</b>	<b>STATUS</b>
Q1	Please introduce yourself including your position, nature of your job, age and experience.	
Q2	Tell me how many years have you been in the construction industry? And how many years have you been with the current company?	
Q3	Please tell me about your education background?	
<b>Goal – Establish and maintain a safe workplace</b>		<b>Measures- Score of compliance/non-compliance to safety requirements</b>
Q4	As a worker what is expected of you as a worker to ensure a safe working environment? Are there any requirements that you are aware of or have been made aware of on this site specifically?	
Q5	Have you ever been asked to complete a compliance scoring of safety on site? Do you know of any PPP that is operational on site?	
<b>Goal- Establish an operational feedback system</b>		<b>Measures- Score and/or No of safety audits/focus reviews</b>
Q6	Does an on-site feedback system exist between workers and management? What is the channel(s) available for communication on-site?	
Q7	How many safety audits are performed on-site? How frequently?	
<b>Goal – Create a better working environment</b>		<b>Measure- degree of satisfaction with current working relationships, safe behaviours and attitude towards safety</b>
Q8	What is your opinion around the current working relationship between management and workers in relation to safety on-site?	
Q9	What rules, or PPP exist to ensure that workers are working safely on-site?	

<b>Learning Perspective - Safety Manager</b>		
<b>No</b>	<b>DEMOGRAPHIC INFO</b>	<b>STATUS</b>
Q1	Please introduce yourself including your position, nature of your job, age and experience.	
Q2	Tell me how many years have you been in the construction industry?	
Q3	Please tell me about your education background?	
<b>Goal – Continue to improve safety performance level</b>		<b>Measures- No of safety initiatives</b>
Q4	What safety initiatives are currently implemented and monitored by management on-site?	
Q5	Has these safety initiatives in anyway has an effect on Policies, Procedures and Practices (PPP)?	
<b>Goal- Build highly competent workforce</b>		<b>Measures- Extent of ability to transfer learning into workplace</b>
Q6	How do you as management ensure that workers have the required skills to perform highly dangerous tasks on-site? How do you ensure that skills transfer takes place over time?	
Q7	At which point does the skills transfer occur and how does it happen? Are there PPP's supporting this?	
<b>Goal – Empower workforce</b>		<b>Measure-extent of workforce proactive involvement to improve safety</b>
Q8	Are there programs that encourage workers to be more proactively involved to improve safety?	
Q9	Do workers have a voice to contribute towards improved safety on-site?	
<b>Goal- Provide adequate training to new recruits</b>		<b>Measure-No of hours of competency/Induction training</b>
Q10	What training do you have in place for new recruits?	
Q11	What training initiatives do you have to ensure that workers are aware of the dangers and risks on-site?	
Q12	Are there PPP's that pronounces on competency levels of construction workers on-site?	

<b>Client Perspective – Site Agent</b>		
<b>No</b>	<b>DEMOGRAPHIC INFO</b>	<b>STATUS</b>
Q1	Please introduce yourself including your name, position, nature of your job within the construction industry? ANSWER:	
Q2	Tell me how many years have you been in the construction industry? ANSWER: And how many years have you been with the current company? ANSWER:	
Q3	Please tell me about your education background? ANSWER:	
<b>Goal – Ensure Client satisfaction</b>		<b>Measures- Client satisfaction rating</b>
Q4	Why have you chosen NMC? ANSWER: What have you taken into account for NMC’s appointment to the Panorama project? ANSWER:	
Q5	How do you view NMC safety culture? ANSWER:	
<b>Goal- Enhance worker morale</b>		<b>Measures- Extent of recognising and rewarding workers for excellent safe performance</b>
Q6	What is important to you as a client in relation to awarding contracts to construction companies? How does contractor reputation in relation to safety influence your decision-making? ANSWER:	
Q7	Are there any Policies, Procedures and/or Practices you require the contractor to implement in relation to safety on-site? ANSWER:	

<b>Compliance Perspective – DOL inspector</b>		
<b>No</b>	<b>DEMOGRAPHIC INFO</b>	<b>STATUS</b>
Q1	Please introduce yourself including your position, nature of your job, age and experience.	
Q2	Tell me how many years have you investigated accidents in the construction industry?	
Q3	Please tell me about your education background?	
	<b>Goal – improved safety compliance</b>	<b>Measures- On-site legislative knowledge</b>
Q4	What tools are you as an inspector equipped with to perform compliance inspections on-site? What informs you of the responsibilities of both employers and employees?	
Q5	As a regulator, what does the inspectorate look for to ensure that safety on-site is moving in the right direction?	
Q6	In general, what must construction firms focus on to ensure improved safety compliance?	



## 8.2 APPENDIX 2: Consent Form

### Consent Form for questionnaire for University of the Western Cape learners

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**Title:** A Balanced Score Card perspective of the Safety Management of two exemplary construction companies in the Western Cape

**Researcher: James Hannie 2343799**

**Please initial box**

1. I confirm that I have read and understand the information sheet explaining the above research project and I have had the opportunity to ask questions about the project.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. (If I wish to withdraw I may contact the lead researcher at anytime)
3. I understand my responses and personal data will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the reports or publications that result from the research.
4. I agree for the data collected from me to be used in future research.
5. I agree for to take part in the above research project.

\_\_\_\_\_  
 Name of Participant Date Signature  
*(or legal representative)*

\_\_\_\_\_  
 Name of person taking consent Date Signature  
*(If different from lead researcher)*

\_\_\_\_\_  
 Lead Researcher Date Signature

*(To be signed and dated in presence of the participant)*

*Copies: All participants will receive a copy of the signed and dated version of the consent form and information sheet for themselves. A copy of this will be filed and kept in a secure location for research purposes only.*

<p><b>Researcher: James Hannie</b>          Address: 138 Connaught Rd, Elsies River, 7490          Contact Numbers: 0837468188; 021592 6739          E-mail: 2343799@myuwc.ac.za</p>	<p><b>Supervisor: Prof P Hirschsohn</b>          Address: UWC School of Business &amp; Finance          Contact Numbers: 021 959 3715; 083 229 5951          E-mail: phirschsohn@uwc.ac.za</p>	<p><b>HOD: Prof F Herbst</b>          Address: UWC School of Business &amp; Finance          Contact Numbers: 021 959 2240          E-mail: fherbst@uwc.ac.za</p>
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### 8.3 APPENDIX 3: List of all Interviewees and Respondents

No.	Date	Organisation	Position
1	20/04/2015	Department of Labour	Principal Inspector: Construction
2	28/04/2015	Murray & Roberts	Divisional Manager: Health, Safety and Environment
3	30/04/2015	Murray & Roberts	Senior Safety Co-ordinator
4	30/04/2015	Murray & Roberts	Construction worker- less than a year experience
5	30/04/2015	Murray & Roberts	Construction worker- more than 3 years experience
6	7/05/2015	NMC	Group – HSE Manager
7	7/05/2015	NMC	HSE Manager
8	8/05/2015	NMC	Construction Workers- less than a year experience
9	8/05/2015	NMC	Construction Worker- more than 3 years experience
10	8/06/2015	JBCC	Client
11	4/06/2015	BFH de Jager Project Managers	Director

#### 8.4 APPENDIX 4: List of Tables

<b>Table 1</b>	Employee injuries and fatalities statistics 2008-2012
<b>Table 2</b>	Difference in Balanced Scorecards Models
<b>Table 3</b>	Interview protocol: Management Perspective
<b>Table 4</b>	List of Documents studied
<b>Table 5</b>	List of participating organisations and interviewees
<b>Table 6</b>	List of themes and sub-themes
<b>Table 7</b>	Management Perspective
<b>Table 8</b>	Incident classification
<b>Table 9</b>	Learning Perspective
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<b>Table 11</b>	Table of Drug Random test statistics

#### 8.5 APPENDIX 5: List of Figures

<b>Figure 1</b>	Safety Management Balanced Scorecard
<b>Figure 2</b>	Modified Safety Management Balanced Scorecard
<b>Figure 3</b>	Diagram illustrating the elements of credibility and trustworthiness
<b>Figure 4</b>	Panoramic view of the Century City Urban Square Project
<b>Figure 5</b>	Panorama Hospital Project
<b>Figure 6</b>	Modified Safety Management Balanced Scorecard
<b>Figure 7</b>	Policy to measure continuum