The Impact of the Construction Health and Safety Regulatory Framework on Construction Costs

by

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PREFACE

The research contained in this dissertation was completed by the candidate while based in the Discipline of Construction Studies, School of Engineering of the College of Agriculture, Engineering and Science, University of KwaZulu-Natal, Howard College Campus, South Africa.

The contents of this work have not been submitted in any form to another university and, except where the work of others is acknowledged in the text, the results reported are due to investigations by the candidate.

Signed: Prof TC Haupt

Date: December 20, 2016

DECLARATION 1: PLAGIARISM

I, Elke Helene Hefer, declare that:

(i) the research reported in this dissertation, except where otherwise indicated or acknowledged, is my original work;

(ii) this dissertation has not been submitted in full or in part for any degree or examination to any other university;

(iii) this dissertation does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons;

(iv) this dissertation does not contain other persons' writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:

a) their words have been re-written but the general information attributed to them has been referenced;

b) where their exact words have been used, their writing has been placed inside quotation marks, and referenced;

(v) where I have used material for which publications followed, I have indicated in detail my role in the work;

(vi) this dissertation is primarily a collection of material, prepared by myself, published as journal articles or presented as a poster and oral presentations at conferences. In some cases, additional material has been included;

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DECLARATION 2: PUBLICATIONS

My role in each paper and presentation is indicated. The * indicates corresponding author.

Chapter 1

1. Haupt TC, Hefer EH* 2015. How much is enough? A pilot study of the cost of construction health and safety. Paper presentation to ASOCSA Ninth Built Environment Conference, 2nd to 4th August, 2015, Durban, South Africa. Presented by EH Hefer.
2. Haupt TC, Pillay R and Hefer EH* 2015. Accident Cost Estimating: The Relationship between Direct and Indirect Costs. Paper presentation to ASOCSA Ninth Built Environment Conference, 2nd to 4th August, 2015, Durban, South Africa. Presented by EH Hefer.

Signed: Elke Helene Hefer

Date: 30 December 2016

ABSTRACT

Historically, the construction industry has a poor health and safety (H&S) performance track record, and governments and industry bodies globally acknowledged that construction has an undesirable accident record and that persistently poor H&S records continue to hinder performance improvement. In response, H&S regulations have been introduced and subjected to major revisions during the last four decades as H&S regulations have been seen to be crucial to reducing construction accidents and improving H&S performance overall. Arguably, there has been resistance from the industry to fully implement the provisions of the legislation because of the perception particularly of contractors that the associated costs may result in non-competitive bidding resulting in lost work opportunities and that there was still non-facilitation of equitable pricing of H&S within the construction industry. Since the introduction of very specific H&S regulations in the South African construction industry, there are, as far as the researcher is aware, very few, if any, studies which have quantified the cost of the implementation of the provisions of this legislation. The research was done to investigate the magnitude of the additional construction costs as a result of the implementation of the provisions of the current H&S regulatory framework in South Africa resulting in all construction project participants not being aware of how much would be adequate for the H&S provisions required. The purpose of the research was to determine whether the H&S framework had requirements that involve cost, whether contractors implemented the requirements of the H&S framework, whether implementation of the H&S framework increased the cost of construction, and to what extent did the implementation of the H&S framework increase the cost of construction. A blended research approach was adopted which included both quantitative and qualitative methods such as questionnaire surveys and case studies which were then triangulated. A sample of 30 contractors were surveyed and 3 organisations were interviewed to determine the impact of the construction health and safety regulatory framework on construction costs. The research was limited because the findings were based on a sample of contractors in the KwaZulu-Natal Province, South Africa, the study was conducted over a period of twelve months and the study focused on the impact of the H&S regulatory framework implementation by the contractor only. The study did not include H&S costs pertaining to sustainable building, impact on indirect costs related to construction H&S, impact of H&S regulations pertaining to design and build projects and impact of standard forms of contract on the costs related to construction H&S. The findings provide an indication of the trend in financial allowance by industry practitioners for construction health and safety on their projects.

The study found that complying with the provisions of the legislative framework namely OHS Act, Construction Regulations and COID, had a moderate impact on the overall cost of construction. The impact had resulted in a reported 10% increase in construction costs. Further, in the absence of specifically accounting for all associated costs related to health and safety it is difficult to accurately determine what the financial provision is and whether the allowances are adequate. The findings indicated that a lack of knowledge of the industry of the necessary financial provision existed for effective management of construction H&S. The study found that many of the construction H&S cost requirements as extrapolated from the legislation were not tracked. The findings of this study have implications for the level of financial provision that is adequate for effective management of construction health and safety. The findings of the study will enable industry stakeholders to have a deeper understanding of the underpinning philosophy of the regulations derived from a combination of prescriptive and performance legislation which will have an impact on the calculation of the cost of compliance. Sustainability of the construction industry will be improved through the understanding and knowledge of the implementation costs of the H&S framework**.** From the findings of the study, it can be concluded that the H&S framework has requirements that involve cost. However, the knowledge and awareness deficiency results in possible inadequate financial provision for H&S in competitive bids or on projects. Further, clients are not in a position to comply with the framework that requires them to ensure that contractors have made adequate financial provision for H&S because of no uniform approach to allowing contractors to price for H&S.

Keywords: Construction Cost, Financial Provision, Health and Safety, Legislation, Regulatory Framework

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CHAPTER 1 : INTRODUCTION

1.1 Introduction

Historically, the construction industry has a poor health and safety (H&S) performance track record (Windapo, 2013). According to Chileshe and Dzisi (2012) governments and industry bodies globally acknowledge that construction has an undesirable accident record and that persistently poor H&S records continue to hinder performance improvement. Further, global estimates by the International Labor Organization (ILO) confirm that H&S problems in the sector are more extensive than previously recorded (Murie, 2007). For many years construction has consistently been among those industries with the highest injury and fatality rates (Khalid, 1996; Hanna et al., 1996 cited in Haupt, 2001). Statistical data show that, worldwide, the highest rates of occupational deaths occur in agriculture, forestry, mining and construction (Alli, 2008). The following statistics, as adapted from the International Labour Organisation, pertain to the global H&S performance of the construction sector:

- 60,000 fatal accidents – one every ten minutes;
- one in every six work-related fatal accidents occurs on a construction site;
- in industrialised countries, more than 25% to 40% of work-related deaths occur on construction sites despite the sector only employing between 6% to 10% of total employment;
- about 30% of construction workers suffer from back pains or other musculoskeletal disorders; and
- there is a 50% higher incidence rate for non-fatal accidents among workers aged 15 to 24 years (CIDB, 2009).

South Africa is no exception when reviewing the H&S statistics obtained from the Compensation Commissioner and Federated Employers' Mutual Assurance Company Limited (FEMA). According to the most recent H&S statistics available from the Compensation Commissioner, the construction industry has the 3rd highest number of fatalities per 100,000 workers and the 9th highest number of permanent disabilities per 100,000 workers. At the time of writing this dissertation, the most recent H&S statistics available from the Compensation Comissioner are those pertaining to 1999 on the Department of Labour web site. FEM's accident statistics (Table 1.1) for 2000 through to 2015 as at September 2015 also show that there has been no significant improvement in overall construction H&S performance.

Table 1.1: FEM's Accident Stats as at September 2015

ALL REGIONS All Classes		Accident Frequency	Number of Employees	Number of Accidents	Fatal Accidents	Permanent Disabilities not resulting in Pensions	Permanent Disabilities resulting in Pensions
	2000	6.67	110 228	7 348	66	235	26
	2001	6.02	108 411	6 524	75	196	26
	2002	5.48	125 734	6 887	72	233	20
	2003	5.16	143 073	7 376	83	282	35
	2004	4.95	164 423	8 145	66	380	33
	2005	4.76	187 862	8 944	76	352	43
	2006	4.14	218 876	9 057	70	314	31
	2007	4.11	255 632	10 501	72	351	46
	2008	3.87	282 743	10 930	66	433	52
	2009	3.60	288 736	10 394	73	445	57
	2010	3.31	277 764	9 195	96	476	44
	2011	2.84	282 285	8 028	51	510	35
	2012	2.69	311 792	8 383	73	615	41
	2013	2.66	323 298	8 601	92	558	24
	2014	2.51	339 712	8 522	63	546	26
	2015	2.00	283 708	5 681	43	312	16

Source: FEMA, 2015

Table 1.1 shows that, even though the accident frequency has decreased since 2000, the percentage range of fatal accidents and permanent disabilities combined has increased since 2000. A more detailed analysis of the FEMA statistics shows that the dominating causes of accidents were, in no particular order, falls onto different levels, motor vehicle accidents, slips or over-exertion, striking against and being struck by. The statistics further show that the dominating causes of fatalities were falls onto different levels, motor vehicle accidents and being struck by, and the dominating causes of permanent disabilities were falls on to different levels and being struck by.

Globally, in response, H&S regulations have been subjected to major revisions during the last four decades. Significantly, H&S regulations have been cited often as crucial to reducing construction accidents and improving H&S performance overall (Kartam, Flood and Koushki, 2000). In many cases, new national legislative and regulatory approaches have entirely replaced existing regulations and legislation. The emphasis of these new pieces of legislation in Europe, the United Kingdom and New Zealand, for example, has been on individuals and their duties. Additionally, they represent a noticeable departure from previous prescriptive approaches (Coble and Haupt, 1999; 2000, cited in Haupt, 2001). They have been based on principles designed specifically to increase awareness of the problems associated with safety and health issues. They demonstrate a new approach and commitment to the management of construction projects. The value of these new efforts lies in the requirements of all participants in the

construction process to make safety and health a mandatory priority in a structured way (Caldwell, 1999; Lorent, 1999, cited in Haupt, 2001). They are performance-based. Rather than prescribing strict compliance with regulations, they focus on satisfying H&S outcomes or performance requirements. Consequently, they permit flexibility in dealing with H&S issues. Additionally, they provide a framework within which all the activities of all participants in the construction process are coordinated and managed, in an effort to ensure the H&S of those involved with construction (Haupt, 2001).

South Africa, following international trends, attempted to improve the industry's H&S performance, by promulgating the Construction Regulations in July 2003 under the OH&S Act of 1993 with amendments made in February 2014 to the Construction Regulations. Since the introduction of very specific H&S regulations in the South African construction industry, there are, as far as the researcher is aware, very few, if any, studies which have quantified the cost of the implementation of the provisions of this legislation.

Arguably, there has been resistance from the industry to fully implement the provisions of the legislation because of the perception particularly of contractors that the associated costs may result in non-competitive bidding resulting in lost work opportunities. In a recent exploratory qualitative study conducted by Malan and Smallwood (2015) it was found that contractors felt that on projects where the H&S requirements exceeded the standard legislative requirements, it could affect the tender prices submitted by contractors. They further argued that there was still non-facilitation of equitable pricing of H&S within the construction industry. A study conducted in Jordan, confirmed the perception that contractors, and in particular small enterprises, were driven by profit maximization motives and did not provide, for example, basic personal protective equipment (PPE) for their workers regarding PPE as an unnecessary added expense (Alkilani, Jupp and Sawhney, 2013). Implementing H&S procedures were viewed as increasing the cost of construction. Resultantly, the costs of H&S procedures were not disclosed in tenders and only the costs of insurance were considered (Ibid). Therefore, this study is an attempt to address this perception by establishing the magnitude of the costs involved in satisfying as a minimum the requirements of the prevailing legislative and regulatory framework.

Construction and maintenance are by their nature dangerous (Dadzie, 2013), and increased emphasis needs to be placed on occupational health and safety (OH&S) in order to reduce the

cost [of accidents] to the industry (Lin and Mills, 2001). These costs arise as a consequence of other undesirable outcomes due to non-compliance with the H&S regulations. Research in South Africa estimated the total cost of accidents to be about 5% of the value of completed construction (Smallwood, 2004). In addition to the cost of accidents, there is also a cost of implementing H&S systems within a company which is estimated to be between 0.5% and 3% of total project costs (ibid.). This finding confirms that the total cost of accidents is greater than the cost of H&S (Malan and Smallwood, 2015). The issue of cost and its impact plays a role in the effort and commitment to reduce accidents and improve efficiency. According to Tang (2004) there is a general consensus that construction contractors should increase their H&S investment on their construction projects. Arguably, the higher the investment in H&S, the better the H&S performance. However, determining the extent or how much is enough is the challenge. Further, time and economic constraints influence the way individuals perceive risks and consequently risks should be identified prior to construction. H&S must preferably be seen as an enabler. Hinze (2006) argued that construction managers should consider H&S from a purely economic perspective. The total cost of accidents exceeds the cost of H&S and therefore, H&S is in essence a profit centre (CIDB, 2009). A synergy exists between H&S and other project parameters. In a study conducted among construction project managers it was identified that project parameters, productivity and quality, ranked first and second respectively, were most negatively affected by inadequate or the lack of H&S, both project parameters also having a cost implication, and the project parameter, cost, being ranked third as most negatively affected. The business case for H&S is enhanced by the fact that H&S is the catalyst for enhanced performance relative to cost, the environment, productivity, quality, and schedule (ibid).

It is common practice for contractors to discount their bids just to win the tender with the allowance for H&S often suffering. In an expanded study undertaken by Haupt and Hefer (2016) one of the respondents stated that given the opportunity to price items included in H&S specifications on an equitable basis will ensure that tenderers don't gain a financial advantage during the tender process by reducing the cost allocated to H&S. H&S is more often than not the first item to face cost cutting because contractors believe that implementing H&S management systems will cost more, a cost which the contractors are concerned they may not be able to recover from the client/employer. This concern is alluded to in the responses received from industry in a recently published study conducted to establish the perceptions of practitioners of the cost provision for construction H&S (Haupt and Hefer, 2015). In addition,

managerial focus tends to concentrate on production "at cost." Since H&S is incorrectly perceived not to improve production, the investment is reduced when a project runs over budget. There is research that demonstrates that a safe worker is a productive worker (Hinze, 2006). The research further demonstrates that the true success of the company's safety efforts is dictated, to a large degree, by how the workers are treated (ibid). According to Hinze (2006) and Levitt and Samelson (1993) safe workplaces and workers improve productivity accompanied by reduced costs and increased profitability. Safety performance can be compromised if the job pressures are unduly harsh on the workers (Hinze, 2006) which has a direct and indirect effect on the financial success of a project. Contractors prioritise production criteria and aims, considering resources dedicated to occupational safety as expenditures that have nothing to do with the production aims of the organization - costs rather than an investment (Fernández-Muñiz, Montes-Peón and Vázquez-Ordás, 2009). They ignore that there are other project parameters that also need to be achieved, other than just the outdated cost, time and quality parameters, for a project to be successful, such as H&S.

Studies have shown that the true costs of construction injuries can have a substantial impact on the financial success of a construction organization and may increase overall construction costs by as much as 15% (Everett and Frank, 1996). The calculated costs of construction accidents to a large extent represent the losses incurred by a construction organization (Tang, Ying, Chan, and Chan, 2004). Construction accidents cost the construction organization, the sector and national economy a great deal annually (Pillay, 2014). Such is the magnitude of the problem that a definitive cost has to date never been determined (Griffith and Howarth, 2000). Therefore, it makes business sense to invest in accident/injury prevention not only for H&S management but also for decreasing the overall costs of construction projects. Economists have usually argued for the assessment of the benefits of investments in H&S on the basis of a cost-benefit analysis (Hjalte, Noriner, Perrson and Maraste, 2003). Tang (2004) found in a study in Hong Kong in response to the question: 'What is the optimal level of H&S investment?' that the minimum H&S investment should be about 0.80% of the contract sum and that a greater percentage would produce intangible benefits. While very few definitive studies have been done to determine what the level of investment should be, a range between 1% and 10% of project cost has been suggested (Hinze, 2006). Arguably, this variance may be as a result of different interpretations of which costs should be included as investments in H&S.

The cost of health and safety (COHS) model illustrated in Figure 1.1 was developed by Chalos (1992) to conceptually describe the cost–benefit analysis of accident/injury prevention. According to the COHS model, there is a theoretical equilibrium point at which the total costs of prevention and detection are equal to the total costs of injuries, and this point reflects the optimum investment. The model also supports the presumption that some level of H&S risk must be considered as acceptable to maintain an organization's financial stability. There exists some level of inherent risk in most of construction work processes and that the costs of mitigating this risk can be overwhelming (Manuele and Main, 2002). Subsequently, in practice, beyond the optimum equilibrium point the cost of prevention will exponentially exceed the costs of injuries to the organization.

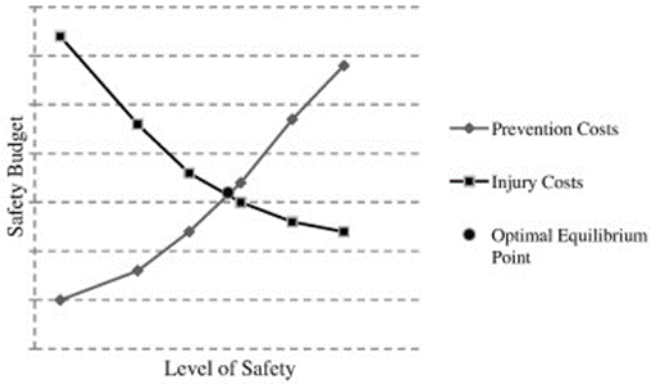
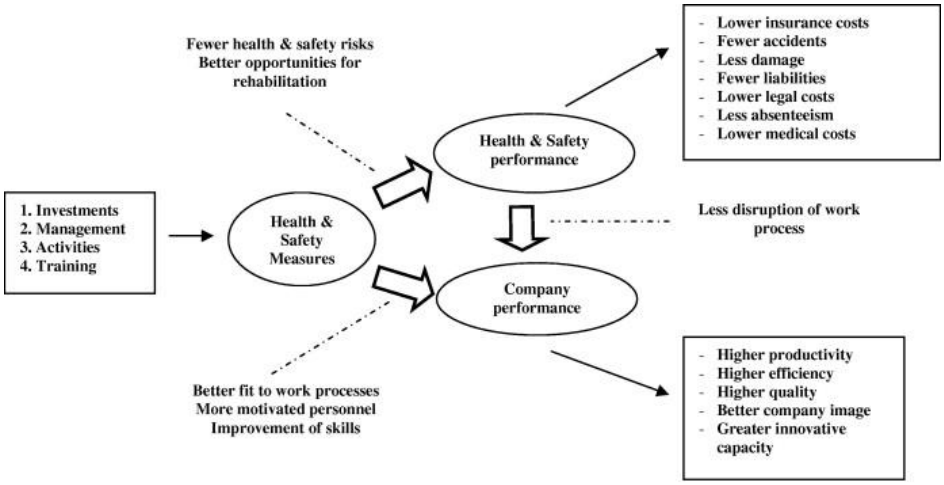


Figure 1.1 : COHS model (Chalos, 1992)

Investment in construction H&S has several positive effects, such as, for example,

- Improved H&S performance, since it reduces the accident rate, and consequently personal injuries and material damage, and simultaneously improves working conditions, which raise employee motivation and reduce their absenteeism;
- Improved organization competitiveness, due to its positive influence on the image, reputation, productivity and innovation of the organization; and
- Improved economic-financial performance, due to its positive influence on the profits and profitability of the organization (Fernández-Muñiz, Montes-Peón and Vázquez-Ordás, 2009).

These assertions are supported in Figure 1.2 which shows the influence of H&S measures on H&S performance and overall organization performance.



Source: Mossink (2002).

Figure 1.2 : Benefits of H&S investment

The investments in management of and training in H&S measures positively affects the H&S performance, as well as the overall performance, of a company. H&S measures can lead to fewer H&S risks and better opportunities for rehabilitation which improves the H&S performance of a company; the H&S performance being measured against outcomes such as lower insurance costs, fewer incidents, less damage, fewer liabilities, lower legal costs, less absenteeism and lower medical costs. Improved H&S performance positively affects company performance due to less disruption of work processes. Similarly, H&S measures such as better fit to work processes and improvement of skills leads to more motivated personnel which has an influence on company performance and results in favourable outcomes such as higher productivity, higher efficiency, higher quality, better company image and greater innovative capacity.

1.2 Problem Statement

The magnitude of the additional construction costs as a result of the implementation of the provisions of the current H&S regulatory framework in South Africa has to date not been investigated or determined resulting in all construction project participants not being aware of how much would be adequate for the H&S provisions required.

1.2.1 Hypotheses

The hypotheses to be tested are:

- Compliance with the current construction H&S legislative framework in South Africa affects the cost of construction;
- Contractors are unaware of the extent of the provision for H&S in their bids / projects;
- Contractors do not account for the cost of compliance with the construction H&S legislative framework.

1.3 Objectives

The objectives of the study are:

- To determine whether the H&S framework has requirements that involve cost;
- To determine whether contractors implement the requirements of the H&S framework;
- To determine whether implementation of the H&S framework increases the cost of construction;
- To determine to what extent the implementation of the H&S framework increases the cost of construction; and

1.4 Methodology

In an attempt to achieve the objectives of the study, a mixed research approach will be adopted which will include both quantitative and qualitative methods such as questionnaires and case studies.

The research methodology will involve the following, namely:

- Extensive literature review: theories; costing models; subject matter expertise;
- Data collection by means of questionnaires and case studies;
- Analysis of data collected;
- Validation of the findings from the analysed data to the literature; and
- Formulation of sustainable and effective recommendations

To achieve the objectives of the study, the research methodical approach as depicted in Figure 1.3 will be followed.

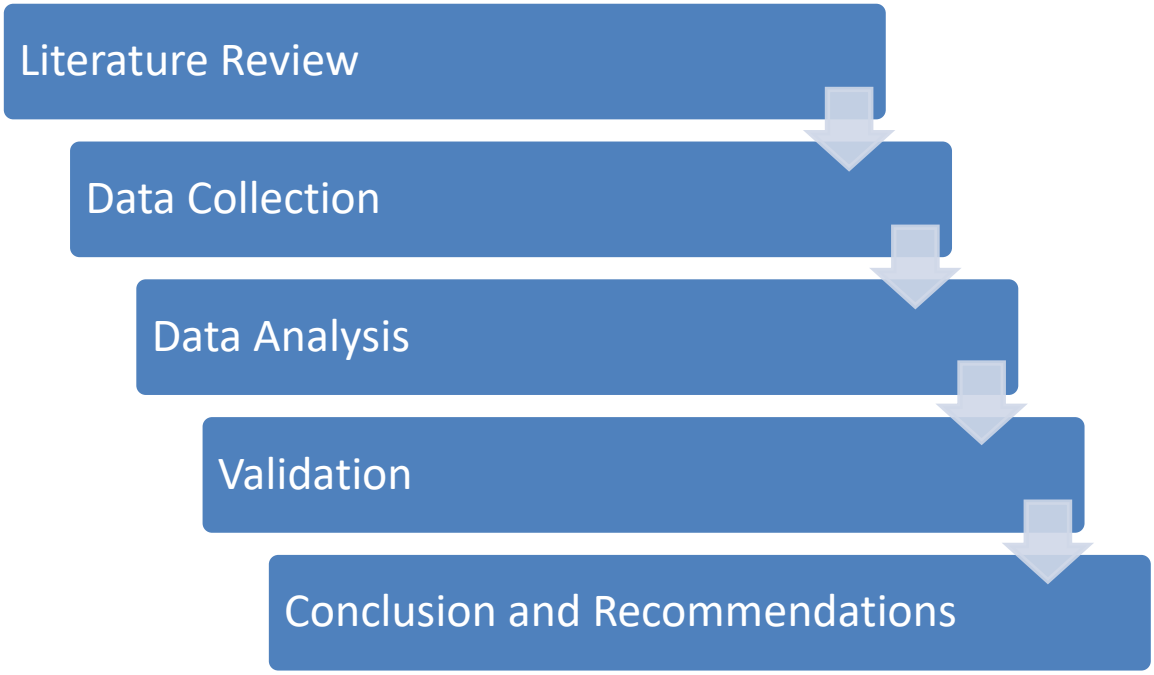


Figure 1.3 : Research methodology

1.5 Limitations and delimitations

The study is subject to the following limitations:

- The study was conducted over a period of twelve months;
- The study is confined to the province of KwaZulu-Natal;
- The sample is limited to contractors and subcontractors operating in Durban and surrounding areas;
- The study focuses on the impact of the H&S regulatory framework implementation by the contractor only

The study is subject to the following delimitations:

- The study does not include H&S costs pertaining to sustainable building;
- The study does not include impact on indirect costs related to construction H&S;
- The cost impact of H&S regulations pertaining to design and build projects are excluded from this study; and
- The study does not include the impact of standard forms of contract on the costs related to construction H&S.

1.6 Assumptions

It is assumed that the people/organisations to be approached to participate in the questionnaire and focus groups have sufficient knowledge and appropriate experience to provide quality data / responses.

It is further assumed that the responses by the participants are honest and can be considered as accurate and reliable information.

1.7 Ethical Considerations

To comply with internationally accepted ethical standards, no reference to actual names of individuals or companies will be recorded. In this way, no individual or company can be linked to a particular statement, thus assuring anonymity. No compensation will be paid to any respondent or participant in the study. Quality assurance will be done with respect to the following aspects, namely:

- Quality of data capturing; and
- Accuracy in calculations.

1.8 Significance of the Study

The study is significant in that the findings will contribute to the existing body of knowledge by providing an understanding of the H&S framework and which aspects of the framework involve costs. A further contribution will be given through the determination of the implementation of the H&S framework requirements and to what extent the implementation has an impact on construction costs. The findings of the study will enable industry stakeholders to understand and know the implementation costs which will further enable industry to make adequate provision for the protection / H&S of the workers. The findings will further enable industry stakeholders to have a deeper understanding of the underpinning philosophy of the regulations derived from a combination of prescriptive and performance legislation which will have an impact on the calculation of the cost of compliance. Sustainability of the construction industry will be improved through the understanding and knowledge of the implementation costs of the H&S framework**.** The findings of this study will result in legislators being made

conscious of the impact of regulation that they promulgate. The findings of this study may affect the forms of procurement going forward resulting in the allowance for H&S correctly being identified and not forming part of the evaluation / adjudication process which may lead to improved and increased competitive tendering market.

1.9 Structure of the Study

Chapter One: Introduction – Chapter one presents the background, problem statement, hypothesis, objectives, methodology, limitations, definitions, ethical statement and chapter outline.

Chapter Two: Legislative and Regulatory Frameworks – This chapter explores the origin, intent and development of regulatory frameworks with particular reference to previous studies pertaining to the introduction and impact of construction H&S regulatory frameworks on construction costs.

Chapter Three: H&S Framework in South Africa - This chapter extracts and discusses all the regulations contained in the construction H&S regulatory framework in South Africa which may have an implication on the construction costs when implemented in order to demonstrate the relationship between legislation and construction environment / cost

Chapter Four: Research Methodology – This chapter discusses the tools and methods used for data gathering. Challenges faced during data collection is also disclosed in this chapter.

Chapter Five: Contractor Survey Analysis - This chapter presents the analysis of data gathered from the surveys. Data analysis focused on testing the hypothesis at the same time responding to the research problem and objectives.

Chapter Six: Case Studies – This chapter presents the analysis of data gathered from the case studies. Data analysis focused on validating the findings of the contractor survey analysis as outlined in chapter 5.

Chapter Seven: Conclusion and Recommendations – Conclusions and recommendations are drawn based upon data analysis, linking them to the problem statement, hypothesis and objectives of the subject under investigation.

CHAPTER 2 : LEGISLATIVE AND REGULATORY FRAMEWORKS

2.1 Introduction

The purpose of this chapter is to provide the theoretical framework to the study by reviewing the existing literature concerning regulatory frameworks. This review will define and highlight the features of regulatory frameworks with focus on the construction H&S legislative frameworks.

Legislation is the framework by which governments achieve their purposes. Legislation is defined by the Webster-Dictionary of the English Language as the process of legislating, a law or a body of laws. A government needs legislation in order to govern. Politicians and administrators see legislation as a means to attain their economic, cultural, political and social policies (Crabbe 1993 cited in Onoge, 2014) and a tool for development and fostering regulatory behaviour in every society. As legislation governs all parts of the lives of humans in any given society, it is of utmost importance that the audience of the legislation understand it to foster compliance and effectiveness of the legislation (Onoge, 2014).

2.2 Regulatory Framework Defined

Policy and Regulatory Framework is defined as "the [development or] existence of the necessary infrastructure which supports the control, direction or implementation of a proposed or adopted course of action, rule, principle or law" (http://www.caricomstats.org/Files/ICT/Justification%20%20Policy%20and%20Reg%20Framework.pdf).

A regulatory framework is a model used for reforming and enacting regulations in an effective and logical way. Policymakers may develop a framework with a specific area of interest in mind such as improving construction H&S performance, or could use an existing model to work on a regulatory project. Many governments rely on these frameworks to handle regulatory matters and develop flexible and useful networks of regulations, laws, and rules (http://www.wisegeek.com/what-is-a-regulatory-framework.htm). A regulatory framework is developed by defining the end goal as a starting point. In this way regulators can have a conversation about what they want to do and what kinds of accomplishments they can use to

measure progress. For example, government regulators might meet to discuss a way to limit consumption of alcohol by minors. Their goal would be to cut down on underage drinking, and they could use measures like self-reported surveys to find out how many minors are able to access alcohol, and how many are drinking (ibid). Strong regulatory principles are the first step towards achieving a sound regulatory system. Implementing them is the second (Simes, Harper and Green, 2008).

2.3 Features of Regulatory Frameworks

Having a clear end goal allows societies to identify ways to reach it. They can develop a list of potential obstacles and discuss methods for circumventing them, and also start to create a time line for achieving goals in the regulatory process. As they create a regulatory framework for achieving a goal, they can explore various ways to assist with achieving the desired outcome. With each regulation, regulators must also consider individual issues, like whether the regulation will be legal, who will enforce it, how they will do so, and how regulators will monitor progress in terms of implementation and enforcement (http://www.wisegeek.com/what-is-a-regulatory-framework.htm). According to Davis (2008), overlap and inconsistencies can occur. The regulatory burden of compliance can build up over time. Poorly designed regulation can be introduced due to inadequate evaluation procedures. Regulatory authorities may implement regulations in ways that reflect their private interests rather than those of society. Appropriate accountability should work against this natural bias towards increased regulation to ensure that only legislation in the public interest is passed (Simes, Harper and Green, 2008).

Similar concerns exist within regulatory agencies, which recognise these problems and whose mission is, in broad terms, to operate in the public good. Regulations, for example, according to Wolski, Dembsey and Meacham (2000) are intended to address and satisfy the public mandate for managing the risks and benefits of technology and designed to improve the performance of individual and organizational behavior in ways that reduce social harms. Being charged with implementing poorly designed or excessive regulation, or being unable to develop better regulation due to lack of information, authority, clear goals, or successful political lobbying by vested interests, are not conducive to job satisfaction. Practical application of cost-benefit analysis is hindered by difficulties in modelling and estimating the potential impacts of policy change – particularly in the area of financial regulation. Understanding the effectiveness

of particular regulations depends upon their interaction with other components of the regulatory structure (Davis, 2008). As argued by Simes, Harper and Green (2008), the implementation process can be improved, advancing the need for increased consultation with industry and improving the accountability of regulators.

The regulatory framework can be large and extremely complex. For something like overhauling financial regulations to address clear shortcomings in an existing system, the work of creating a framework can take months and includes input from a variety of sources. In addition to government, it is common to consult individuals in an industry, as well as agents who will be on the ground enforcing any regulations the government passes. Public comment may also be an important component, allowing people to express wishes and concerns so the government can think about how to meet their needs (http://www.wisegeek.com/what-is-a-regulatory-framework.htm). However, Simes, et al. (2008) contend that achieving effective consultation is difficult.

A good regulatory framework is flexible. As new information arrives, people can integrate it without upsetting the plan or pattern, and also spot and fix holes as they go along. Input at many levels can help maintain flexibility and identify potential problems to avoid them rather than taking a reactive stance and trying to fix issues after the fact (http://www.wisegeek.com/what-is-a-regulatory-framework.htm). The appropriate regulatory tools and framework will depend on many factors, including bureaucratic expertise, resource availability, political constraints, and economic impacts. There is a general need to enhance the capability for evaluating regulation at the local and national levels (Guasch and Hahn, 1999).

In principle, the process of regulation seems simple namely, identify problems arising from market failures, introduce suitable regulation, and achieve compliance by regulatory oversight and enforcement (Davis, 2008). However, this is a reactive approach rather than a pro-active one. According to Serpell (2008) policymakers should first work out whether or not there is a problem before they attempt to fix it. Should a problem be identified, policymakers should first consider whether regulation is a justified response. Regulation should not be introduced unless a case for regulation has been made (Ibid). Regulation can have a significant adverse impact on economic growth especially for developing countries (Guasch and Hahn, 1999). Reasons cited for non-compliance include regulatory authorities imposing regulations that are in practice

prohibitively expensive and the extra precautions considered an unnecessary cost especially when they would apply only in some cases.

2.4 Construction H&S Legislative Frameworks

The introduction of construction regulations due to H&S legislative frameworks globally has one common goal, namely that of reducing construction accidents. The primary objective of any H&S legislation is the prevention of accidents with their associated consequences in terms of injury, disablement and fatality, and ill health within the work environment (CIDB, 2009). The achievement of this objective depends on good legislation supported by effective, sensible and accountable enforcement (ibid). Arguably, designers and contractors view regulations as additional burdens with which they have to comply and involve additional cost. The Construction (Design Management) CDM Regulations 1994 were introduced in the UK in 1995 in response to an EU Directive 92/57/EEC of 24 June 1992 to reduce deaths and injuries on construction sites by changing design and management procedures (Beal, 2007). Subsequently, the 1994 CDM Regulations have been substantially amended and the 2007 CDM Regulations is the latest version. In addition to CDM, there were two other major pieces of legislation, the Construction (Health, Safety and Welfare) Regulations 1996 and the Management of Health and Safety at Work Regulations 1999 (Beal, 2007) implemented in the UK. In the US, the purpose of the Occupational Safety and Health Act of 1970 was to assure safe and healthful working conditions for working men and women (OSHA, 2016) which led to the standard developed and promulgated under the Act referred to as Part 1926 – Safety and Health Regulations for Construction. The countries in the European Union were allowed to incorporate the provisions of Directive 92/57/EEC into their national legislative frameworks. While some incorporated them in their totality, several did so with many changes from Directive 92/57/EEC. However, the essence of the Directive remained entrenched in the new national legislation (Haupt, 2001) In New Zealand, the New Zealand Building Codes (NZBC) originated from building industry requests for reform dating back to 1979 with a Ministry of Works and Development sponsored research project. It was the culmination of 10 years research at Victoria University of Wellington in the School of Architecture Industry Research Group and Centre for Building Performance Research under the direction of Dr. Helen Tippett, and the service of five people for four years to reform the existing national building regulatory system (ibid).

The South African Construction Regulations were promulgated on 18 July 2003 in terms of section 43 of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and amended on 7 February 2014. The South African OH&S legislative framework, particularly the Construction Regulations, compare favourably with the OH&S legislation of UK, Europe and New Zealand (CIDB, 2009) both in terms of intent and implementation.

2.5 Chapter Summary

In summary, regulatory frameworks are mostly developed upon the call from society, arising from market failures, to intervene by introducing suitable regulation in the hope that regulation will address the problems. Regulatory frameworks can be large and extremely complex however, if well formulated, regulatory frameworks can also be flexible. Regulators should evaluate whether regulation is justified and analyse the cost-benefit of such regulation. Poorly and/or excessively designed regulation can be introduced due to inadequate evaluation procedures and could be improved through enhanced evaluation capability, increased effective consultation and appropriate accountability.

CHAPTER 3 : H&S FRAMEWORK IN SOUTH AFRICA

3.1 Introduction

In this chapter literature is reviewed concerning the H&S framework in South Africa. The purpose of this review is to highlight issues pertaining to the implementation of the construction regulations and guide the research study to clarify compliance issues with the South African H&S legislative framework. The review will further determine if contractors are effectively allocating costs to H&S elements contained within the legislative framework.

The government regulations are the outcome of legal efforts, strongly influenced by governmental and social forces, evaluated against the consequences of the process and are often enacted to reduce the probability of negative performance outcomes in terms of quality and H&S issues on construction projects (Windapo, 2013). Regulations come in many forms and can be imposed by government at different levels (Emrath 2011, cited in Windapo, 2013) for the reason that people habitually look to government to take the lead in creating a scheme of prevention, protection and control (Spence 2004, cited in Windapo, 2013). According to the CIDB (2009, cited in Windapo, 2013), the activities in the construction industry due to its poor H&S performance record are the subject of various legislative and institutional frameworks in South Africa, the primary objective of which is the prevention of accidents and their consequences in terms of injury, disablement, fatality and ill health within the work environment. However, the success of such H&S legislation lies in the effective implementation thereof. The most important legislation regarding construction H&S in South Africa are the Construction Regulations 2014, the Occupational Health and Safety Act No. 85 of 1993 (OH&S Act) and the complementary Compensation for Occupational Injuries and Diseases Act No. 130 of 1993 (COID Act) (Malan and Smallwood, 2015).

3.2 The South African H&S Regulatory Framework

South Africa's legislative framework addresses H&S at three hierarchical levels, firstly in terms of the National Constitution, then in terms of Acts of Parliament such as the OH&S Act and the COID Act, followed by regulations such as the Construction Regulations, codes of practice and standards such as those of the South African National Standards (SANS). Clearly South Africa is not lacking in terms of H&S legislation (CIDB, 2009).

The hierarchical levels can be illustrated as follows:

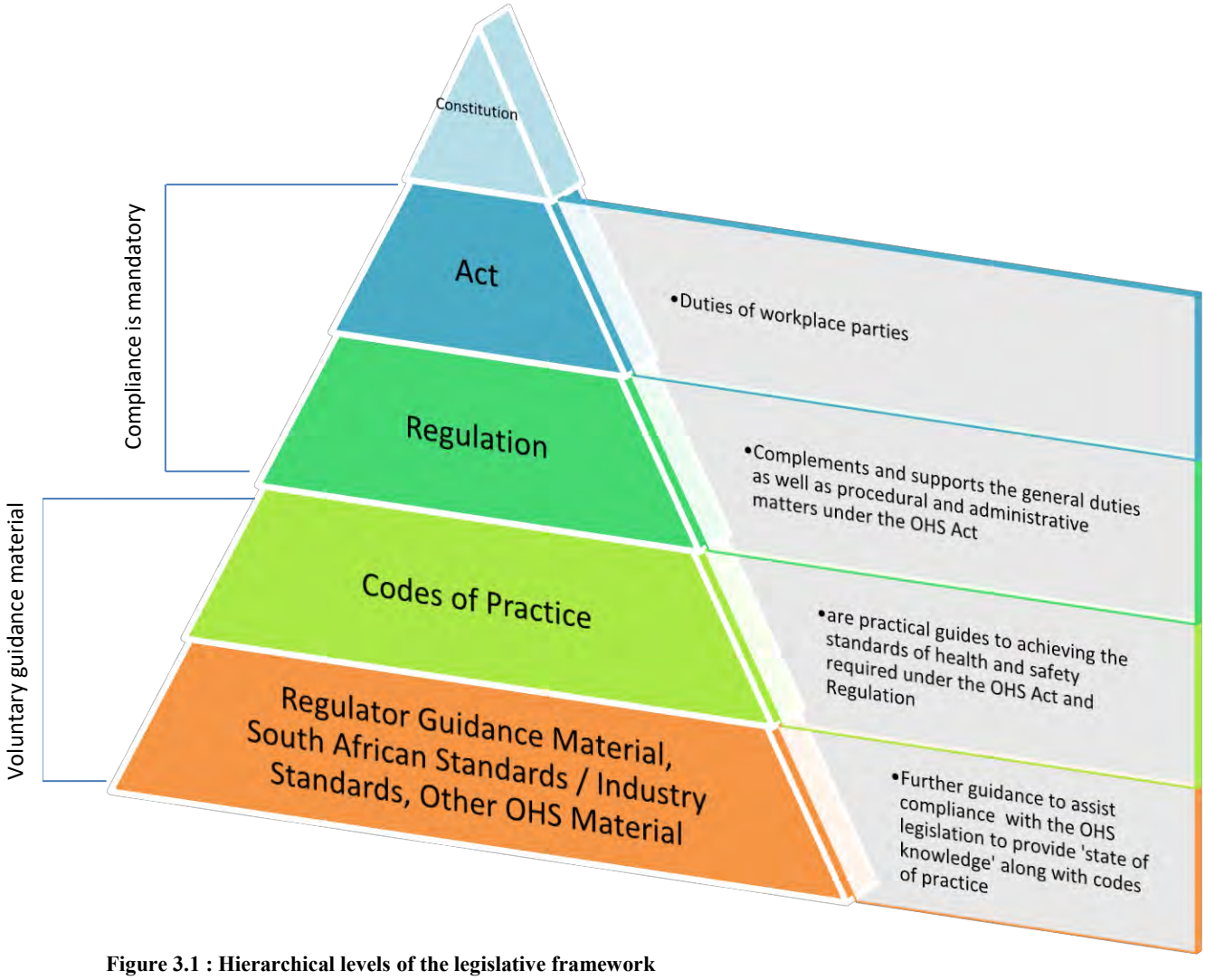


Figure 3.1 : Hierarchical levels of the legislative framework

In this study, the focus is on the upper tiers of the hierarchical levels, namely compliance with Acts and Regulations and the implication of this compliance on construction costs when implemented in order to demonstrate the relationship between legislation and construction environment / cost.

3.2.1 Constitution

A fundamental human right of every worker is to be able to return home at the end of each day; alive and healthy in the same physical condition that he/she commenced that working day

(CIDB, 2009). Every worker has the right to "decent work", a concept used by the International Labor Organization (ILO), which is work carried out in a safe physical environment under conditions that respect the rights of workers as defined in national law and international conventions (Murie, 2007).

In terms of the South African Constitution and Bill of Rights, every South African citizen has, but not limited to, the right to life (Constitution of the Republic of South Africa No. 108 of 1996[1], clause 11), the right to fair labour practices (Constitution of the Republic of South Africa No. 108 of 1996, clause 23), and the right to an environment that is not harmful to their health or well-being (Constitution of the Republic of South Africa No. 108 of 1996, clause 24). These rights are entrenched and enforced by means of various enabling Acts of Parliament.

3.2.2 Acts

The primary Acts that impact on construction H&S in South Africa are the Occupational Health and Safety Act No. 85 of 1993[2] (OH&S Act) as amended and the complementary Compensation for Occupational Injuries and Diseases Act No. 130 of 1993[3] (COID Act) as amended. The OH&S Act replaced the previous Machinery and Occupational Safety Act No. 6 of 1983, the Machinery and Occupational Safety Amendment Act No. 40 of 1989, the Machinery and Occupational Safety Amendment Act No. 97 of 1991 and the promulgation thereof reflected the increased emphasis on health (CIDB, 2009).

3.2.2.1. Cost implications of the OHS Act

The OH&S Act stipulates the steps to be taken in order to ensure a safe and healthy work environment for all employees on a construction site (Hermanus, 2001; 2007) and contractors are obliged to comply with the requirements of the Act (Windapo, 2013).

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[1] Available at http://www.acts.co.za/constitution_of_/index.html [Accessed 1 January 2016]

[2] Available at http://www.labour.gov.za/DOL/downloads/legislation/acts/occupational-health-and-safety/amendments [Accessed 1 January 2016]

[3] Available at http://www.labour.gov.za/DOL/downloads/legislation/acts/compensation-for-occupational-injuries-and-diseases [Accessed 1 January 2016]

The objectives of the OH&S Act are, as stated in the preamble of the OH&S Act, "to provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith".

Certain aspects of the OH&S Act may have implications on construction costs when implemented. The OH&S Act calls for a H&S policy (OH&S Act clause 7). The development of such a policy could result in the incurring of costs with further possible costs incurred in the dissemination and promotion of the policy. The OH&S Act requires that every employer provides and maintains a working environment that is safe and without risk to the health of their employees (OH&S Act clause 8). To provide such an environment the employer would need to ensure that regular maintenance of systems of work, plant and machinery be carried out, provide information and instruction regarding H&S, provide H&S training and provide proper supervision with regards to H&S aspects. All of these provisions may possibly involve cost. Not only does the OH&S Act require that employers provide a safe working environment to their employees but also to those other than their employees (OH&S Act clause 9). In the context of the construction industry, this would mean, for example, visitors having to undertake safety inductions before they are allowed on to site, which could have a cost implication. Further duties of the employer in terms of the OH&S Act is to inform the H&S representative(s) of the occurrence of an incident in the workplace as well as inform the H&S representative(s) of inspections, investigations or formal enquiries as notified by an inspector (OH&S Act clause 13).

The OH&S Act is underpinned by the philosophy of a shared responsibility for H&S and in practice a partnership between employer and employee – the employer providing a working environment that is safe and does not present threats to the health of the employee and employees taking responsibility for their own H&S at work. General H&S duties of employees include taking reasonable care for the health and safety of themselves and of other persons who may be affected by their acts or omissions, co-operating with their employer to ensure compliance with the OH&S Act as imposed on their employer, carrying out any lawful order given to them and obeying the H&S rules and procedures laid down by their employer, reporting any situation which is unsafe or unhealthy, and reporting any incident in which they may be

involved and which may affect their health or which has caused any injury to themselves (OH&S Act clause 14). To ensure that employees adhere to the OH&S Act, the employer may use an incentive scheme which could possibly have cost implications.

Chief executive officers are charged with certain duties namely ensuring that the duties of their employer as contemplated in the OH&S Act, are properly discharged (OH&S Act clause 16(1)). To be able to carry out their duty, the chief executive officers would need to have a good knowledge of H&S and this would be obtained through training courses focusing on H&S aspects. The chief executive officers may assign their duty to any person under their control who would then act subject to the control and directions of the chief executive officers (OH&S Act clause 16(2)). However, such a person would also require training in H&S, all of which could potentially lead to additional costs.

The OH&S Act further requires that every employer allow for the election of H&S representatives from their existing employees for the workplace (OH&S Act clause 17). These H&S representatives will require training, which, including the activities associated with the designation and functions of the H&S representative is to be performed during ordinary working hours. The implication is that any time spent on executing their functions as H&S representative is additional to their existing duties and could result in lost productive time which may have a cost implication. Functions of H&S representatives include reviewing the effectiveness of H&S measures, identifying potential hazards and potential major incidents at the workplace, examining the causes of incidents at the workplace in collaboration with their employer, compiling of incident reports, investigating complaints by any employee relating to that employee's health or safety at work, making representations to the employer on matters arising relative to their functions and other general matters affecting the health or safety of the employees at the workplace, inspecting the workplace, participating in consultations with inspectors, accompanying inspectors on inspections of the workplace, participating in internal H&S audits, compiling of H&S reports, and attending meetings of the H&S committees (OH&S Act clause 18). The same cost implication resulting from lost productive time can be implied for H&S committees. The OH&S Act requires that where two or more H&S representatives have been designated within an organisation, one or more H&S committees are to be established (OH&S Act clause 19(1)). The OH&S Act further requires that these committees meet at least once every three months (OH&S Act clause 19(4)) and are to keep record of the meetings held

and the recommendations made emanating from the meetings (OH&S Act clause 20), all of which has an implied cost attached to them either in terms of lost productive time or effort.

Other duties required by the OH&S Act which may result in costs accruing include investigations and formal inquiries which may be required upon the occurrence of incidents and which require the involvement of the H&S representative(s) (OH&S Act clause 31 and 32). Other possible cost considerations not forming part of this study but form part of the OH&S Act is the appeals process against decisions taken by inspectors (OH&S Act clause 35), and offences, penalties and special orders of court resulting from acts or omissions by employees or mandatories (OH&S Act clause 37 and 38).

3.2.3 Regulations

The Minister of Labour has under section 43 of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), after consultation with the Advisory Council for Occupational Health and Safety, promulgated the regulations. The regulations complement and support the general duties as well as procedural and administrative matters under the OH&S Act. A range of regulations, promulgated under the OH&S Act, impact on construction H&S, in particular the Construction Regulations promulgated in July 2003[4] and amended in February 2014[5] (CIDB, 2009). These include the provisions in particular that require parties to ensure that adequate financial provision has been made for H&S, competence and resourcefulness of various appointments before these are made.

[4] Available at http://www.labour.gov.za/DOL/legislation/regulations/occupational-health-and-safety/regulation-ohs-construction-regulations-2003 [Accessed 1 January 2016]

[5] Available at http://www.labour.gov.za/DOL/legislation/regulations/occupational-health-and-safety/construction-regulation-2014 [Accessed 1 January 2016]

Table 3.1: Summarised cost implications of the OHSA

	COST IMPLICATION					RESPONSIBLE PARTY		REFERENCE	COST CLASSIFICATION
Activity	**Staffing/ Labour**	**Frequency/ Time**	**Training**	**Promotion/ Dissemination**	**Equipment**	**Client**	**Contractor**	**OH&S Act No. 85 of 1993**	**Direct (D)/ Indirect (I)**
Health and Safety mandatory appointments	X					X	X	16(1); 16(2); 16(3)	D
Health and Safety representative/s	X		X	X		X	X	14; 17(1)	D
Health and Safety committee	X		X	X		X	X	14; 19(1)	D
Health and Safety committee meetings	X	X	X	X		X	X	13; 14; 19(4)	D
Compulsory/mandatory training costs			X			X	X	8	D
Induction training			X			X	X	9(1)	D
Health and safety policy		X		X		X	X	7(1); 7(3); 13	D
Health and safety inspections		X	X			X	X	16(1); 16(2); 16(3); 18(1); 18(2); 18(3); 20(1); 20(2)	D
Health and safety audits		X	X			X	X	16(1); 16(2); 16(3); 18(1); 18(2); 18(3); 20(1); 20(2)	D
Health and safety reports		X	X			X	X	16(1); 16(2); 16(3); 18(1); 18(2); 18(3); 20(1); 20(2)	D
Hazard identification and risk assessment (HIRA)	X	X	X	X		X	X	8; 16(1); 16(2); 16(3); 18(1); 18(2); 18(3); 20(1); 20(2)	D
Personal protective equipment			X		X	X	X	8; 23	D

3.2.3.1. Cost implications of the Construction Regulations 2014

The Construction Regulations of 2014 underpins the requirements of the OH&S Act by addressing the duties of the client, the designer, the contractor and the subcontractor in terms of construction H&S. As a result, certain duties may have cost implications and this study attempts to identify the duties which may impact construction costs.

In order to determine the impact of the construction H&S regulatory framework on the cost of construction, these H&S duties and requirements are categorised into staffing, training, promotion, equipment and project. Safety staffing costs comprise of mandatory appointments, H&S officers, H&S representatives, H&S committees and H&S committee meetings. Safety staffing costs are incurred at both project level and company level. The requirement for registration with a statutory body approved by the Chief Inspector for example, the South African Council for the Project and Construction Management Professions (SACPCMP), involves costs such application fees, examination fees, costs of interview, registration, continuous professional development (CPD), and costs of annual registration/subscription fees. It could be argued that the introduction of 3 tiers of registered persons is unnecessary given the provisions of the Act and the onus is on employers to empower those employees who are the H&S representatives by training them in H&S (Haupt, 2016a).

Safety training costs comprise of compulsory/mandatory training costs, in-house training costs, toolbox talks and induction training. Compulsory safety training courses include safety training courses for project managers, foremen and supervisors, workers, and operators/signalmen. In-house safety training activities and toolbox talks consist of H&S orientation before work commences each day, emergency response and drills for various possible situations, briefing on first-aid facilities, first aiders, and first aid procedures, briefing on major hazards on site, safety workshops for supervisors and safety seminars and exhibitions, and demonstrations of safe work procedures and first-aid drills, and other in-house training activities.

Safety promotion costs comprise of the development, promotion and production of H&S policy, H&S signage, H&S pamphlets and posters, HIV and AIDS management, and medical surveillance programs. These costs include expenditure on, for example, the printing of

pamphlets and posters, production of safety advertising boards and banners, and organising of safety campaigns.

Safety equipment are provided to protect workers from potential hazards on construction sites. They include Personal Protective Equipment (PPE), safety fences, safety barricades, and other facilities that help the workers to carry out the work 'safely'. Those equipment such as, for example, scaffolding, crane, hoist, and power/lighting which are essential for contractors to carry out construction work are not included in the safety equipment category.

Project-specific H&S costs comprise of the development, implementation and monitoring of the H&S plan, the compilation of the H&S file, the use of the H&S specification as part of hazard identification and risk assessment (HIRA), conducting a HIRA, H&S inspections, H&S audits, H&S reports, safe work or operating procedures, material safety data sheet management, medical certificates of fitness, fall protection plan, demolition plan, temporary support plan, excavation and lateral support plan, waste management plan, environmental management plan, and notification of construction work.

3.3 Elements of H&S Cost

3.3.1 Cost Consideration of the H&S Regulatory Framework by Stakeholders

3.3.1.1. Contractors

Previous research shows that the status quo is not viewed favourably by contractors (Malan and Smallwood, 2015). Most construction projects are awarded to contractors on the basis of competitive tendering, and usually to the lowest bidder (Russell et al. 1992 cited in Lingard and Rowlinson, 2005). However, in the context of intense competition, competitive tendering places a great deal of pressure on tenderers to keep their bids low to increase their likelihood of winning work. This pressure can discourage contractors from factoring into bids the cost of performing the work safely (Lingard and Rowlinson, 2005). The way in which contractors price work often fails to account for project OHS Requirements (ibid). It is common for the unit rate estimated for an activity to ignore H&S issues (Brook 1993, cited in Lingard and Rowlinson, 2005, pg.17).

Table 3.2: Summarised cost implications of the Construction Regulations

	COST IMPLICATION					RESPONSIBLE PARTY		REFERENCE	COST CLASSIFICATION
Activity	**Staffing/ Labour**	**Frequency/ Time**	**Training**	**Promotion/ Dissemination**	**Equipment**	**Client**	**Contractor**	**Construction Regulations of 2014**	**Direct (D)/ Indirect (I)**
Health and Safety mandatory appointments	X					X	X	5(5); 5(6); 16(1); 17; 18; 20	D
Health and Safety officer	X						X	8(5)	D
Health and Safety representative/s	X						X		D
Health and Safety committee	X						X		D
Health and Safety committee meetings	X	X					X	9(5)	D
Compulsory/mandatory training costs			X				X		D
In-house training costs			X				X		D
Toolbox talks			X				X		D
Induction training			X				X	7(5); 7(6)	D
Health and safety policy		X		X			X		D
Health and safety signage				X			X	13(2)(l)	D
Health and safety pamphlets and posters				X			X		D
HIV and AIDS management program				X			X		D
Medical surveillance program				X			X		D
Fall arrest equipment			X		X		X	10(4); 10(5)(d); 10(5)(e); 10(5)(f)	D
Fall prevention measures such as guard rails, barriers and toeboards			X		X		X	10(4); 10(5)(d); 10(5)(e); 10(5)(f); 13(2)(i)	D
Personal protective equipment			X		X		X	7(6)	D
Health and safety plan (development, monitoring and review)		X				X	X	5(1)(n); 7(1)(a); 9(1); 10(2)(e)	D

Table 3.3: Summarised cost implications of the Construction Regulations (continued)

	COST IMPLICATION					RESPONSIBLE PARTY		REFERENCE	COST CLASSIFICATION
Activity	**Staffing/ Labour**	**Frequency/ Time**	**Training**	**Promotion/ Dissemination**	**Equipment**	**Client**	**Contractor**	**Construction Regulations of 2014**	**Direct (D)/ Indirect (I)**
Health and safety file		X				X	X	3(6); 5(1)(s); 7(1)(b); 7(1)(e)	D
Health and safety specification		X				X		5(1)(b)	D
Hazard Identification and Risk Assessment (HIRA)		X	X	X		X	X	5(1)(a); 9(1); 9(2); 9(3); 9(4); 9(6); 10(2)(a); 10(5)(c)	D
Health and safety inspections		X				X		11(2)	D
Health and safety audits		X				X		5(1)(o)	D
Health and safety reports		X				X		5(1)(p)	D
Safe work or operating procedures (SWPs or SOPs)		X	X				X	9(1); 10(2)(a); 10(2)(d); 11(1); 12(3)(n); 13(2)(a); 13(2)(e); 13(2)(f); 14(2); 14(4); 14(11); 15; 16(2); 17; 18; 19; 20; 21; 22; 23	D

Table 3.4: Summarised cost implications of the Construction Regulations (continued)

	COST IMPLICATION					RESPONSIBLE PARTY		REFERENCE	COST CLASSIFICATION
Activity	**Staffing/ Labour**	**Frequency/ Time**	**Training**	**Promotion/ Dissemination**	**Equipment**	**Client**	**Contractor**	**Construction Regulations of 2014**	**Direct (D)/ Indirect (I)**
Method statement		X	X				X	10(2)(a); 11(1); 12(3)(n); 13(2)(a); 13(2)(e); 13(2)(f); 14(2); 14(11); 15; 16(2); 17; 18; 19; 20; 21; 22; 23	D
Material Safety Data Sheet (MSDS) management		X	X				X	9(1); 12(3)(i); 12(3)(j)	D
Medical certificate of fitness		X					X	7(1)(g); 7(8); 10(2)(b)	D
Fall protection plan	X	X	X	X	X		X	10(1); 10(2)(c); 10(3); 10(4)(a); 10(4)(c); 10(5); 17; 18	D
Demolition plan	X	X	X		X		X	14(1); 14(3); 14(4)	D

Table 3.5: Summarised cost implications of the Construction Regulations (continued)

	COST IMPLICATION					RESPONSIBLE PARTY		REFERENCE	COST CLASSIFICATION
Activity	**Staffing/ Labour**	**Frequency/ Time**	**Training**	**Promotion/ Dissemination**	**Equipment**	**Client**	**Contractor**	**Construction Regulations of 2014**	**Direct (D)/ Indirect (I)**
Temporary support plan	X	X	X	X	X		X	12(1); 12(2); 12(3)	D
Excavation and lateral support plan	X	X	X		X		X	13(1); 13(2)	D
Waste management plan (WMP)		X	X				X	14(6); 14(7); 14(12)	D
Environmental management plan (EMP)		X	X				X	14(9); 14(10)	D
Notification of construction work		X					X	4(1)	D
Application for construction work permit		X				X		3(1)	D

Murie (2007) argues that in a highly competitive market, the successful tenderer will frequently be the one that pays the lowest wages, does not provide H&S equipment or have insurance coverage for accidents, and has the largest proportion of informal workers, for whom no tax or social security is paid, and who are not covered in practice by any legal or social protection. This lowest-price culture in competitive bidding is incompatible with H&S.

3.3.1.2. Legislators

Little has been published assessing how the regulations have operated and what the effects have been in practice (Beal, 2007). Considerations are to be made on how the requirements of the regulations have been translated into reality, what effects the regulations have had on the work of designers and contractors, and what effects the regulations have had on construction safety (ibid) and the costs of construction.

Arguably before promulgation and introduction, proposed regulations should be subjected to regulatory impact analyses detailing the costs involved and the accruing benefits. However, the benefits side of a typical cost-benefit analysis is quite controversial, laden with huge uncertainty, based largely upon numerous modelling exercises, and does not rely to any large degree upon empirical analysis. The cost side of the analysis is less controversial, but still fraught with uncertainty (McGarity and Ruttenberg, 2002). Regulators not considering the cost impact of regulation is not unique to South Africa. In the 1999 GAO Retrospective Evaluation Report, it was stated that substantial resources are devoted to cost-benefit analyses when developing new regulations. However, the agency seldom looks back at the actual costs and benefits after those regulations have been implemented. There is very little empirical analysis of the actual costs that the regulated have incurred in complying with particular regulations (McGarity and Ruttenberg, 2002). According to the 1996 GAO Regulatory Burden Report, it is usually extremely difficult and frequently impossible to arrive at accurate retrospective assessments of the resources that regulated entities have devoted to compliance with particular regulatory interventions. This is due primarily to practical limitations on empirical analysis of relatively subtle behaviour of companies operating in complex and rapidly evolving competitive environments. It is also attributable, however, to the fact that no important economic actor has an incentive to find out how much regulations actually did cost once the strategic battle over the proposed regulation has ended and the companies and the agency have moved on to other things (ibid).

Most regulatory analysis fails to capture the dynamic and innovative ways in which the regulated often comply with performance-based regulations. When an agency is attempting to identify potential control technologies at the outset of the rulemaking process, companies have no incentive to devote resources to identifying innovative solutions to the problem that the agency is trying to solve. If anything, they are likely to point to expensive, existing "off-the-shelf" technologies in the hope that the agency will promulgate a lax standard. On the other hand, company scientists and engineers can respond to the incentives that a regulatory requirement provides by designing new controls, fashioning prevention techniques, or identifying substitutes for hazardous substances, all with a view toward achieving compliance with performance-based standards at a lower cost than installing the model technologies that agency cost assessors factored in to the ex-ante cost assessment. Cost assessors too often ignore the "learning curve" – industry's capacity over time to learn, innovate, and thereby reduce the cost of meeting regulatory requirements. Companies tend to adapt control technologies from other industries to meet new regulatory requirements. Sometimes they come up with innovative new control technologies to meet regulatory requirements. Many observers have noted the tendency of static cost analysis to ignore innovative responses to regulation (McGarity and Ruttenberg, 2002). Regulations do have a profound impact on the economy, and in some cases, they can increase costs so greatly as to put marginal companies out of business (ibid).

In a report released by Rogers in 2007 (cited in Wilson 2011), a key conclusion from this report was that local authorities lacked the resources needed to actively enforce regulations. This appears to be a global challenge when taking into consideration that the CIDB 2009 report arrived at the same or very similar conclusions where the Department of Labour Inspectorate was perceived to:

- make use of marginally appropriate checklists;
- be lacking in competencies;
- visit sites infrequently;
- visit a small percentage of sites;
- be poor in terms of liaison and promotion;
- be poor in terms of morale, motivation and job satisfaction;
- be ineffective in terms of enforcing legislation;
- not contributing to an improvement in H&S;
- be ineffective in terms of assuring H&S;
- be insignificant in terms of accident prevention; and

- ineffective in terms of conducting its duties (CIDB, 2009, pg. 14).

As stated by Wilson (2011), regardless of government policy intentions, businesses need to comply with legislative requirements either through being proactive or through reacting to enforcement measures. Williamson, Lynch-Wood, Prochorskaite, Abbot and Ogus (2008) (cited in Wilson, 2011) defined compliance as having knowledge of the rules and acting in accordance with the rules. The Merriam-Webster Dictionary online defines compliance as "*conformity in fulfilling official requirements"*; the Cambridge Dictionaries Online defines compliance as "*the act of obeying an order, rule, or request*". As cited in Wilson (2011) non-compliance is defined by Remas (2006) as: *"a failure of a permit requirement or infringement of legal instrument or voluntary code to which a site subscribes".* Although this initially seems to be the opposite of compliance, Fairman and Yapp (2005) and Hutter (1997) (cited in Wilson 2011) imply that the original definition of compliance is too simple and a more practical definition is, - "*that which is enforced by the regulatory authorities*". Hutter (1997) further stated that compliance does not have one definition and neither does non-compliance have only one explanation. The complicated nature of compliance is further emphasised by Hutter and Power (2000), who stated that compliance is a creative process involving negotiation and interaction between regulatory agencies and those they regulate, making it a fluid concept comprising of a variety of dimensions. Therefore, determining what is meant by compliance involves an assessment of the risks associated with any given activity and their acceptability. One of the difficulties of regulating industrial and commercial activity is finding a balance between the purpose of regulation and its cost.

3.3.2 Classification of Costs

The South African construction H&S legislative framework only addresses the direct costs which are the cost of compliance with the requirements and demands of the framework as shown in Tables 3.1 and 3.2.

3.3.2.1. Direct costs

Direct costs can be defined as a cost which is related to a particular cost objective and can be traced to the objective in an economically feasible way. Direct costs are well understood and can be quantified with reasonable ease and accuracy (Hinze, 2006, pg. 64). Direct costs can be

attributed to cost of compliance as well as cost of injuries. Direct costs are sometimes referred to as 'obvious' costs or 'insured' costs. Direct costs are normally reimbursable and can be extracted from the mandatory legislative and regulatory compliance requirements. The following are examples of direct costs, namely:

- Medical expenses
- Wages
- Repair or replacement costs
- H&S appointments
- H&S meetings
- Signage
- Training
- Workmens compensation and insurance premiums
- Induction program
- H&S plan
- H&S file
- H&S audits
- Fitness for work certificates
- H&S inspections
- SWPs or SWOPs
- H&S equipment
- PPE (Haupt, 2016b; Pillay, 2014; Hinze, 2006)

3.3.2.2. Indirect costs

On the other hand, indirect costs are costs which are related to a particular cost objective but cannot be traced to the objective in an economically feasible way. Indirect costs are allocated to cost objectives. Indirect costs are therefore difficult to measure. Indirect costs are sometimes referred to as 'hidden' costs, 'not obvious' costs or 'uninsured' costs. Indirect costs are normally not recoverable. Indirect costs have to be extracted from historical records which may not be detailed and are usually only computed after something has gone wrong possibly as a result of non-compliance. The following are examples of indirect costs, namely:

- Injured workers' lost time
- Lost supervisory time
- Co-workers' lost time

- Damaged equipment, plant and tools
- Counselling
- Funerals
- Overtime costs
- Loss of expertise
- Additional medical costs
- Damage to property
- Idle plant and equipment
- Recruitment cost
- Training of replacement/learning curve
- Legal costs
- Delays and disruptions
- Community costs
- Loss of reputation and goodwill
- Fines
- Costs of investigation
- Waste (Haupt, 2016b; Pillay, 2014; Hinze, 2006)

3.3.3 Computation of Costs

In the South African construction industry, small to medium firms often fail to provide adequate H&S on site, due to limited resources (CIDB, 2009; Malan and Smallwood, 2015) and perhaps even due to limited understanding of the regulatory framework. Larger construction firms have access to resources that enable these firms to provide for H&S, and have access to the necessary financial resources in order to carry the costs associated with H&S during the course of the project (ibid).

Hammond et al. (2011) state that there are expenses incurred directly by contractors in order to prevent accidents. However, the value of these expenses resulting from compliance with the Construction Regulations and OH&S Act, and the impact on construction costs is unknown. Wilson (2011) argues that some measures to protect the environment and human health do increase short term costs to business. Wilson (2011) further argues that it can sometimes be beneficial to set or maintain regulatory standards which exceed the minimum requirements of legislation.

As argued by Murie (2007), the capacity to implement legislative requirements and good contract compliance is often very weak among clients, employers, contractors and engineers, and therefore there is a need to convince all stakeholders involved of the benefits of compliance with the H&S regulations. However, this is a difficult task to do when the return on the investment is unknown. In order to determine the return on investment, the cost of compliance needs to be determined and this can be achieved through detailed specifications, which are needed to accurately cost and implement standards and verify compliance. The higher the investment, the higher the return on H&S performance. The costs of implementing the construction regulations can include the costs of: protective measures such as the provision of collective and individual protection from accidents and ill health; protective clothing; provision of basic services such as water supply and sanitation; social security, and insurance; capacity building and training; and consultation, facilitation, and promotion; as well as equal-opportunity costs and transactional costs, including dialogue and verification or monitoring. The increased costs associated with improved H&S provisions and social security contributions for all workers can be financed through higher bids from the contractors. Similarly, indirect cost associated with meetings, training, and record keeping can be incorporated as prime, base budget, costs. By including these costs in the overall budget for the project and making them part of the project specifications, they are taken out of competition.

In the South African construction environment, this could be achieved by including a provisional sum for H&S or by treating H&S as a trade, ensuring the H&S requirements are measured in detail, in the tender documentation (Malan and Smallwood, 2015). Furthermore, the cost allocated to H&S in the tender documentation/bids could be considered to not form part of the adjudication process to ensure that H&S is not marginalised through competitive bidding, nor bids being unsuccessful due to adequate financial H&S provision by the contractor (Ibid).

3.4 Commentary from other Research on Issues of Implementation and Costs

Wilson (2011) suggests that the understanding of risk constantly changes which results in compliance being emergent and businesses genuinely being unsure of actual legislative compliance requirements. Furthermore, companies and managers within businesses may differ greatly in their understanding of regulation and its demands and requirements. This may

suggest the reason why there are vast percentage ranges in allowances for cost of compliance. Fairman and Yapp (2005) (cited in Wilson, 2011) reported that the reasons for non-compliance were a lack of 'awareness' of legislative requirements, or inadequate knowledge about how to comply with requirements. The lack of awareness is often cited as the reason why businesses do not comply (ibid). In a study by Fairman and Yapp (2005) (cited in Wilson, 2011) they examined what 'awareness' actually meant and found that 'awareness' meant not being able to relate legislative requirements to individual business operations – it is about recognising noncompliance.

There are two predominant styles [of regulation]: 'command and control' and 'producer responsibility', with the latter being used more and more. Another alternative is to use 'self-regulation' whereby businesses regulate themselves. Most regimes tend to comprise a mixture of these approaches (Wilson 2011). Some research indicates that self-regulation and enforced self-regulation are cheaper for both regulators and the regulated compared with government enforcement in command and control regimes (Fairman and Yapp, 2005 cited in Wilson 2011). Williamson, Lynch-Wood and Ramsay (2006) suggested that there is no conclusive evidence of the negative impact of regulation on economic growth due to the difficulties of separating regulation from other factors that may impinge on firm performance. The authors explained that regulation plays an important role as it bridges the gap between a firm's profit-orientated self-interest and the interests of society (cited in Wilson 2011). White and Parasher (2007) suggested that environmental regulation can positively influence competitiveness (cited in Wilson 2011). The same suggestion could be made for H&S regulation.

McConnaughey (1978) as cited in Windapo (2013) in a previous study maintains that the level of safety or performance outcomes which a regulation is intended to provide, and therefore the resulting costs and benefits derived from its implementation, relates to the degree or level of risk which the regulation attempts to prevent or control. Lin and Mills (2001) acknowledge that the higher the investment in safety, the better the performance. According to McGarity and Ruttenberg (2002), the proper measure of the cost of complying with a regulation is the incremental cost above the "baseline" state of the world that would have existed in the absence of the regulations. The real resource cost of compliance according to McGarity and Ruttenberg (2002) consists of three elements: (1) costs associated with the purchase, installation, operation and maintenance of new equipment; (2) changes in the inputs or mixtures used in the production process; and (3) the capture of waste products that can either be disposed of, sold or reused.

There are various strategies and systems that have to be put in place for H&S on construction sites and that have to be paid for by contractors in order to comply with the legislation (CIDB 2009). Smallwood (2004) estimates that the cost of implementing H&S systems within a construction company lies between 0.5% and 3% of total project costs. For all but a very few health, safety and environmental regulations, cost according to McGarity and Ruttenberg (2002) is an important consideration because decision makers want to decide whether a given option is "worth it". The CIDB (2009) posits that if potential losses relative to labour, materials, plant and equipment as a result of not implementing the requisite preventive measures, are cited, contractors will address H&S issues.

According to Windapo (2013) the probability of an accident occurring, which is a component of the degree of risk is significantly and positively correlated with the cost of compliance and the perceived cost savings for complying with the OHSA regulatory requirements. The higher the probability of a risk event occurring, the more the contractor perceives the direct cost of compliance/implementation and the expected costs savings on accidents to be. The cost savings made by the contractor are perceived to decrease as compliance to OHSA regulatory requirements increases. The level of compliance of contractors is responsive to changes in perceived cost savings gained through compliance. Further, this compliance may increase (all else being equal) with money spent on the implementation of compliance requirements. The tendency for contractors to comply with regulatory requirements is not based on the degree of risk which the requirements attempt to prevent or control but on the perceived cost savings or loss from non-compliance or compliance respectively. The main causes of non-compliance are negligent attitudes, lack of knowledge (ignorance) and/or understanding of H&S regulations by construction site employees and contractors' profit motive. Interviewees believed that non-compliance because of cost mitigation is due to small contractors not including allowances for H&S requirements in their tenders as a deliberate strategy to win tenders (Ibid). Two of the interviewees stated that they did not comply with some of the requirements because they perceived them as unnecessarily expensive. In addition to providing a safe work environment, the interviewees stated that compliance also gives the firm a competitive advantage. Impliedly, the increased level of compliance could be an investment by contractors into the pursuit of corporate growth and profitability.

According to Windapo (2013), the level of a contractor's compliance with H&S regulatory requirements is significantly related to perceived cost savings and unrelated to the degree of

risk, which the regulation is trying to prevent. Further, OHSA compliance is considered by contractors to be unnecessarily costly and time consuming to implement and as a result, a contractor perceives that higher level of compliance requires more money. Cost savings are positively related with probability of accident occurrence which is a component of the degree of risk. These findings suggest that contractors have a fixation on cost saving where H&S is involved on projects and that the risk involved in certain construction activities are not given due consideration (Windapo, 2013).

According to Viscusi (1979), compliance to OHSA requirements will bring about safe working conditions on construction sites. The study by Windapo (2013) arrived at similar conclusions to Emrath (2011) that contractors considered precautions as an unnecessary cost; McGarity and Ruttenburg (2002) that cost is an important consideration in compliance; Williams (1995) that regulatory authorities impose regulations that are in practice unattainable or prohibitively expensive; and McConnaughey (1978) that cost savings derived from the implementation of H&S regulatory requirements on site are related to the degree of risk which the regulation attempts to prevent. Cost savings were related to probability of accident occurrence (Windapo, 2013).

The decision made by contractors to comply with H&S regulatory requirements is influenced by the perceived cost saving on account of compliance and that cost savings are influenced by the probability of accident occurrence which is an element of the degree of risk which the regulation is trying to prevent or control. The tendency for a building contractor to comply with statutory H&S requirements, decreases with increase in cost of compliance, and does not increase with degree of risk or perceived cost savings. The competitive nature of the construction industry drives the profit maximisation motive of the contractors. Non-compliance to H&S regulatory requirements by contractors because of cost implications will lead to unsafe work conditions, injuries and fatalities on construction sites. Contractors will benefit from a safe work environment, reduction in CoA and improved productivity with increased levels of compliance with H&S regulatory requirements. Although complying with the H&S regulatory requirements involves upfront costs, the safety and health of construction operatives should take precedence. Some elements of the H&S regulations are considered unnecessary, costly and time consuming in implementation by contractors and regulatory authorities should therefore expect issues of non-compliance to H&S regulations. Accidents

will continue to occur on construction sites due to the contractors cost saving mindset, and this should be of concern to both public and private clients (Ibid).

Safety investments could further be classified into basic safety investments and voluntary safety investments. Basic safety investments refer to the expenses of those accident prevention activities that are required by industry or government regulations and construction process on minimal safety standards. Voluntary safety investments refer to the expenses of those accident prevention activities that are generally determined by individual companies or projects. In a study executed by Feng (2013), it was found that the employment of safety professionals, provision of personal protection equipment and enforcement of formal safety training courses are less cost-effective in accident prevention than accident investigations, safety inspections, safety committees, safety incentives and in-house safety training and orientation. The implication of this finding is that if a company has satisfied the minimal safety requirement set by the industry or government regulations and the construction process, increased investments in the more cost-effective elements such as, for example, accident investigations, safety inspections, safety committees, safety incentives and in-house safety training and orientation would yield much greater benefits than the investments in those less cost-effective elements such as, for example, employment of safety professionals, provision of personal protection equipment and enforcement of formal safety training courses. This offers a better understanding of the theory behind the role of safety investments in accident prevention and provides the theoretical basis to support contractors' decisions to invest in safety (Ibid).

Similar to the Singapore Workplace Safety and Health framework, the South African OH&S legislative framework attempts to engender a paradigm shift in mindset where the focus is on reducing the risks and not complying with the prescriptive rules (Ibid). According to CIDB (2009) major distinguishing characteristics of the OH&S legislative framework in South Africa and particularly the Construction Regulations include:

- A departure from the traditionally prescriptive or "deemed-to-comply" or "command-and-control" approaches to a performance-based approach in terms of which no standards for compliance are set.

Prescriptive legislation	Performance legislation
Describes the means and methods of complying with the regulations by the contractor	Describes what has to be achieved to comply with the regulations and leaves the means and methods of complying up to the contractor

- The redistribution of responsibility for construction H&S away from the contractor, who was previously solely responsible, to include all participants in the construction process from the client through to the final end-user.
- The compelling of H&S management as an obligation into the planning and design of virtually all construction projects.
- Emphasis on the identification of construction hazards and the assessment of risks to eliminate, avoid or, at the very least, reduce perceived risks.
- Consideration of H&S issues not just during the construction life of the project, but from project inception through to the final demise of the facility by demolition, including the operation, utilisation and maintenance periods.
- The introduction of a new participant to the construction process, the client-appointed H&S agent, tasked on behalf of the client to coordinate the other participants and documents to facilitate better management of H&S on construction projects.
- Mandatory H&S specifications and plans as instruments facilitating exchange and communication of H&S issues between all participants in the construction process, on all projects.
- Mandatory compilation of an H&S file by the principal contractor to be handed over to the client upon completion of the facility.

The Construction Regulations acknowledge the roles of each participant in construction (Haupt, 2001).

H&S is still not afforded the necessary status, and clients still tend to believe that cost, quality, and time are the fundamental construction project parameters. H&S is not perceived as a basic requirement during construction and industry stakeholders do not see H&S as contributing to the value of the project (Malan and Smallwood, 2015).

Industry is required to take greater ownership of safety outcomes. Business should realise that good safety performance will enhance business competitiveness, e.g. good corporate image,

cost savings in terms of higher productivity and fewer disruptions to work due to accidents. The potential benefits of good safety performance may motivate businesses to voluntarily invest in accident prevention activities, instead of just complying with the rules and regulations (Feng, 2013). According to Bird and Germain (1996) many modern managers treat preventing accidents as an investment – an investment with significant returns, both humane and economic. Brody et al. (1990, cited in Feng, 2013) pointed out that when prevention activities are perceived as sufficiently profitable, the investor will likely undertake the investments voluntarily.

3.5 Chapter Summary

South Africa's legislative framework addresses H&S at three hierarchical levels, firstly in terms of the National Constitution, then in terms of Acts of Parliament, followed by Regulations. In this chapter, the focus was on the compliance with Acts and Regulations and the implication of this compliance on construction costs when implemented in order to demonstrate the relationship between legislation and construction environment / cost.

CHAPTER 4 : RESEARCH METHODOLOGY

4.1 Introduction

Research can be defined as a systematic investigation towards the advancement of knowledge (Fellows and Liu, 2008). Research can be further defined as a contribution to the body of knowledge, whether it is an original contribution or whether it is scholarly by analysing existing theories, ideas and findings of other research, by seeking to answer a particular question or to provide new insights (Ibid).

4.2 The Research Process

The research process can be illustrated as per Figure 4.1.

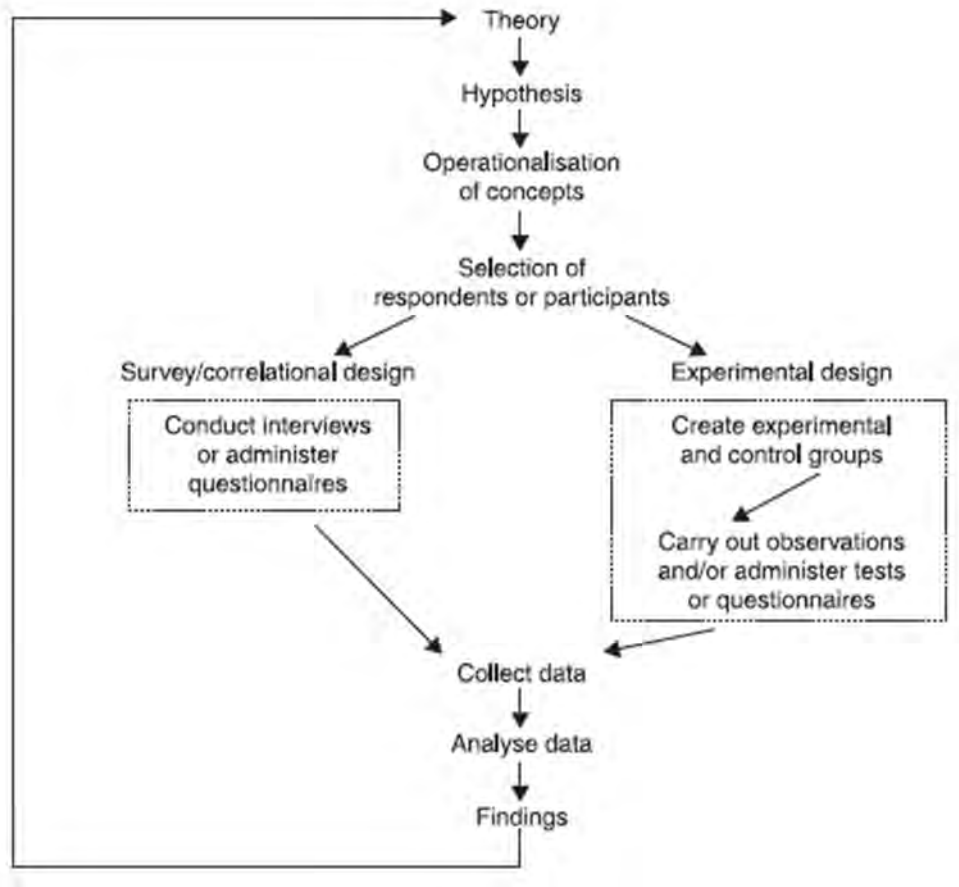

Figure 4.1 : The research process (Bryman and Cramer, 2005)

The first step in the research process is to search for and examine relevant theory and literature (Fellows and Liu, 2008). Another common term used for this process is literature review. This activity is ongoing throughout the entire research process but is most extensively executed at the beginning of the research and requires that the researcher be analytical by critically analysing the contribution of others (Naoum, 2006).

The next step in the research process is to formulate the hypothesis stemming from the literature review. The hypothesis will be subjected to testing by means of empirical evidence (Bryman and Cramer, 2005). To collect empirical evidence, the research strategy must be decided upon. In order to decide on the best strategy to collect empirical evidence, the researcher needs to understand the classifications of research and the types of research strategies.

Research can be classified into pure and applied research. According to Barney, et al (2007) pure research endeavours to discover theories and is exploratory in nature whereas applied research endeavours to develop end uses and practical applications. Research has two types of research strategies namely, quantitative research and qualitative research, and these types of research strategies "can be defined as the way in which the research objectives can be questioned" (Naoum, 1998, pg.37).

Quantitative research involves data which is objective and void of people's opinions and feelings (Welman, Kruger and Mitchell, 2005 cited in Human, 2013). According to Naoum (2006), the role of quantitative research is fact-finding based on evidence or records, and the nature of the data is hard and reliable. The relationship between researcher and subject is distant, and the relationship between theory/concepts and research is that of testing/confirmation in quantitative research (Ibid).

Qualitative research is subjective in nature and the data stems from the respondents' opinions and emotions (Welman, Kruger and Mitchell, 2005 cited in Human, 2013). Naoum (2006) states that the role of qualitative nature is attitude measurement based on opinions, views and perceptions measurement, and the nature of the data is rich and deep. The relationship between researcher and subject is close, and the relationship between theory/concepts and research is that of emergent/development in qualitative research (Ibid).

On deciding the best research strategy to be implemented, the research design can be developed. As defined by Frazer and Lawley (2000), a research design is a plan of how the information to address the hypothesis will be collected. Yin (2009) describes research design as the logical link between the data to be collected and the initial questions of study. Frazer and Lawley (2000) further state that the research design must be consistent with the problem identification. The research design includes the approaches to data collection of which there are two approaches namely, primary data collection, also known as fieldwork, and secondary data collection, also known as desk study. Primary data collection can be in the form of a survey approach, case study approach or problem-solving approach (Naoum, 2006). In a survey approach, the mode of observation/sources of data are structured questionnaires, structured telephone interviews, structured mail questionnaires and structured electronic questionnaires (Mouton, 2003). The mode of observation/sources of data in the case study approach are participant observation, semi-structured interviewing, use of documentary sources and other existing data (ibid). Secondary data collection can be in the form of archival data and stored either in a statistical or descriptive format (Naoum, 2006).

Sampling takes place in conjunction with research design and addresses from whom the information is to be obtained (Frazer and Lawley, 2000). Sampling identifies how many respondents are required and can also determine the administration method of the data collection (ibid). A sample is obtained from its population, and the characteristics of the sample represents the characteristics of the population as a whole (Naoum, 2006). The sample is determined either through random sampling, usually associated with the questionnaire approach, or selected sampling, usually associated with the interview approach (ibid). Upon finalisation of the research design and sampling, the next step in the process is to collect the data (Frazer and Lawley, 2000).

According to Naoum (2006) there are two major research techniques for data collection namely, postal questionnaire and personal interview. Each technique has its own associated advantages and limitations and is summarised in Table 4.1 below.

Table 4.1: Comparison between a Postal Survey and Interview Technique (Naoum, 2006)

Features	**Interviews**	**Postal Questionnaire**
Identity of Respondents	Known	Unknown
Interaction between Interviewer and Respondent	Close	Distant
Time Involving the Researcher	Long time to go through the interview	Short time
Cost	High	Significantly lower than the interviews
Sample	Small	Large
Quality of Information	Deep and detailed	Rich
Skill and Experience	The interviewer needs to have the skill to ask questions and, if necessary, to probe	No skill required
Control of the Process	High	Low
Flexibility	Allows great flexibility to reword questions and clarify terms that are not clear	Rigid. The answers are accepted as they are
Analysis of the Results	Difficult and become complicated in the unstructured interviews	Easy to analyse
Interviewer Bias	The flexibility of interviews allows for bias. Sometimes the non-verbal communication or behaviour of the interviewee may mislead the interviewer to incorrect judgement	If sample is selected appropriately, there should be no bias

Upon deciding which data collection technique to employ, the next step is to construct the questionnaire (Ibid). The questions formulated for the questionnaire, whether it is to be mailed or to be used for interviewing, is the foundation of the questionnaire, and must therefore be

relative to the aim, objectives and hypothesis of the study to present valid and reliable findings (Ibid).

Data analysis follows data collection and is the process by which raw data is turned into information through analysis. Upon completion of the data analysis, the findings and recommendations resultant from the data analysis are recorded and can be fed back relative to the theory and hypothesis.

Figure 4.1 is merely an illustration of the research process and may not always be reproduced in reality (Bryman and Cramer, 2005).

4.3 Research Approach

Based on the wise words of Albert Einstein "Not everything that can be counted counts, and not everything that counts can be counted", the researcher used a blended research strategy of qualitative and quantitative research. Fellows and Liu (2008) argued that the combination of qualitative and quantitative research can be very powerful in gaining insights and results, in assisting in making inferences and in drawing conclusions.

The research was conducted through primary data collection in the form of a survey approach and case studies approach. The data was collected by employing two research techniques, namely the postal questionnaire technique and the personal interview technique. Where two or more research techniques are employed to investigate the same thing, it is called a triangulated study (Ibid). Within the current triangulated study, both research techniques contained qualitative and quantitative research strategies. This was done to mitigate limitations as well as gain the advantages of each individual strategy, and of the combination – "a multi-dimensional view of the subject, gained through synergy" (Fellows and Liu, 2008, pg.20).

In order for the validity of a triangulated study not to be compromised, and for the results and conclusions to be appreciated, it was important that the research techniques adopted were implemented rigorously to try avoid bias and to obtain appropriate amounts of accurate data (Ibid). Furthermore, for the study to be valid, the researcher was required to be aware of methodological considerations, the advantages and disadvantages of the chosen research techniques, error sources, possible bias and strengths of triangulation (ibid).

4.3.1 The Survey Approach

Mouton (2003, pg.152) defines surveys as "studies that are usually quantitative in nature and which aim to provide a broad overview of a representative sample of a large population". The survey approach was chosen to test the hypotheses.

4.3.1.1 Postal Questionnaire Technique

The most common data collection technique for conducting surveys is the questionnaire (Naoum, 2006). The instrument used to source the data can be in the form of structured questionnaires, structured telephone interview schedules, structured mail/postal questionnaires and structured electronic questionnaires (Mouton, 2003).

4.3.1.2 Strengths and Limitations of Surveys

According to Mouton (2003), surveys enjoy the following strengths:

- Potential to generalise to large populations if appropriate sampling design has been implemented;
- High measurement reliability if proper questionnaire construction has been implemented; and
- High construction validity if proper controls has been implemented.

Mouton (2003) further listed the following limitations suffered by surveys:

- Lack of depth and insider perspective sometimes lead to criticisms of "surface level" analyses; and
- Survey data are sometimes very sample and context specific – this is especially true of public opinion polls.

4.3.1.3 Sources of Measurement Error in Surveys

Main sources of measurement error in surveys include

- sampling error;
- questionnaire error;
- high refusal rates;

- high non-response;
- interviewer effects;
- respondent effects;
- fieldwork error;
- data capturing error; and
- inappropriate selection of statistical techniques (Ibid).

4.3.1.4 Questionnaire Design

Questionnaire design is based on three fundamental stages namely identifying the first thought questions, formulating the final questionnaire, and wording of questions (Naoum, 2006). There are two primary forms of questions – open and closed (Fellows and Liu, 2008). Open questions require respondents to answer in full whereas closed questions contain predetermined answers. Limitations associated with open questions are that open questions may be difficult to answer, may not be answered complete and are very difficult to analyse (Ibid). Advantages associated with open questions is respondent opportunities to express views, easy to ask, more appropriate for interview questionnaires and useful to adopt for sensitive information (Naoum, 2006). Limitations associated with closed questions are artificially constrained responses (Fellows and Liu, 2008) and may introduce bias (Naoum, 2006) however, advantages associated with closed questions is that of quick and easy responses and straightforward analysis (ibid).

Questions can be either factual or an opinion type. Objective data is obtained through factual questions and subjective information is obtained through opinion questions (Ibid). The most common formats of opinion questions are checklist, grid, rating scales, likert scales, numerical rating scales, ranking and semantic differential scales (ibid). Rating scales, likert scales and ranking were used in the development, design and construction of the questionnaire. Rating scales enables the respondents to express their degree of agreement and disagreement on a particular scale (Ibid). Likert scales measure attitudinal statements on the survey object (ibid). Ranking requires the respondents to rank a set of attitudes or objects in ranking order (ibid).

The instrument was developed to address the following objectives:

- To determine whether the H&S framework has requirements that involve cost;
- To determine whether contractors implement the requirements of the H&S framework;

- To determine whether implementation of the H&S framework increases the cost of construction;
- To determine to what extent the implementation of the H&S framework increases the cost of construction; and
- To draw conclusions and make recommendations to industry stakeholders.

The instrument contained four sections namely:

- Profile/demographics;
- Knowledge of construction H&S legislative framework;
- Cost elements; and
- Additional information.

Section one of the instrument contained mainly open questions which were factual in nature. The questions in section two were closed questions subjective in nature. Section three of the instrument contained closed questions which were a combination of factual and opinion questions in the format of rating scales, likert scales and ranking. Section 4 contained an open question. An example of the instrument is incorporated under Appendix B.

4.3.1.5 Questionnaire Administration

Numerous organisations in the KwaZulu-Natal province were contacted via email requesting their participation. A cover letter was attached to the emails which explained the purpose of the research, the purpose of the questionnaire, the respondent's role in the survey, the respondent's anonymity and the time it would take to complete the questionnaire. Follow up emails were sent to the organisations as a reminder to participate in the survey.

4.3.2 The Case Study Approach

Mouton (2003, pg.149) defines case studies as 'studies that are usually qualitative in nature and that aim to provide an in-depth description of a small number (less than 50) of cases'. The case study approach was selected to validate the empirical research.

4.3.2.1 Personal Interview Technique

The interview technique is one of six sources of evidence in case study research (Yin, 2009) and is suitable when a case study needs to be investigated in detail to elicit answers pertinent to the research hypotheses (Naoum, 2006). This data collection technique collects factual information as well as opinions (ibid).

4.3.2.2 Strengths and Limitations of Case Studies

According to Mouton (2003), case studies enjoy the following strengths:

- High construct validity;
- In-depth insights; and
- Establishing rapport with research subjects.

Mouton (2003) further listed the following limitations suffered by case studies:

- Lack of generalisability of results;
- Non-standardisation of measurement; and
- Data collection and analysis can be very time-consuming.

4.3.2.3 Sources of Measurement Error in Case Studies

Main sources of measurement error in case studies include:

- potential bias of researcher; and
- lack of rigour in analysis (Ibid).

These sources of measurement error in case studies are supported by Yin (2009) where lack of rigour and biased views by the researcher is the greatest concern in case study research.

4.3.2.4 Case Study Design

There are four types of designs for case studies namely single-case holistic designs, single-case embedded designs, multiple-case holistic designs and multiple-case embedded designs (Yin, 2009). Multiple-case studies were selected as 'the evidence from multiple cases is often considered more compelling, and the overall study is therefore regarded as being more robust' (Herriott and Firestone, 1983 cited in Yin, 2009, pg. 53).

There are six sources of evidence most commonly used in executing case studies namely, documentation, archival records, interviews, direct observations, participant-observation, and physical artifacts (Yin, 2009). Interviews are one of the most important sources of case study information, and are usually associated with the survey approach (Ibid). Taking this into account, case study interviews were conducted and combined with the survey approach.

Case study interviews can take place in three forms:

- unstructured or in-depth interview;
- semi-structured or focused interview; and
- structured interview (Naoum, 2006; Yin, 2009).

The case study research was done in the form of a series of structured interviews. Structured interviews provide answers that are more accurate, have a relatively high response rate and the answers can be explored (Naoum, 2006). As observed by Yin (2009), this type of case study interview followed the instrument used in the survey approach (Appendix B).

4.3.2.4 Case Study Administration

Arrangements were made with three organisations within the Durban surrounds of Kwa-Zulu Natal to conduct structured interviews. With permission from the organisations, the interviews were recorded to assist at the later stages of analysis and to ensure accuracy and objectivity in recording responses (Fellows and Liu, 2008).

4.4 Triangulation

Four types of triangulation can be done in evaluations namely data triangulation, investigator triangulation, theory triangulation and methodological triangulation (Patton, 2002 cited in Yin, 2009). Data triangulation encourages data collection from multiple sources to validate same facts or phenomena. Data triangulation only takes place when multiple sources of evidence converge as illustrated in Figure 4.2 below. The potential problems of construct validity can also be addressed through data triangulation due to multiple sources of evidence essentially providing multiple measures of the same phenomenon (Yin, 2009).

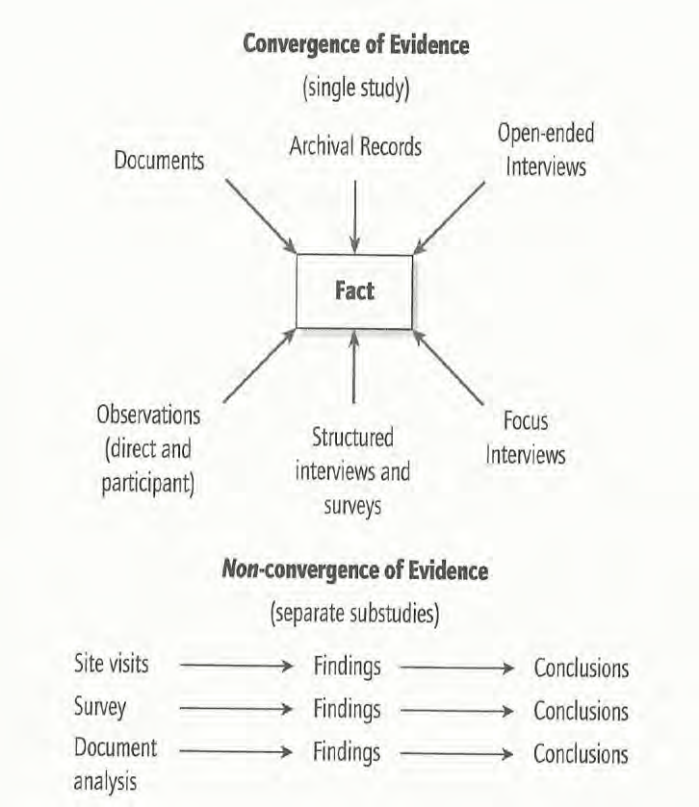

Figure 4.2 : Convergence and non-convergence of multiple sources of evidence (Yin, 2009)

The case studies conducted in this research used interviews of three (3) organisations as a source of evidence triangulating on the same set of research questions.

4.5 Population and Sample

The Oxford Advanced Learner's Dictionary defines sampling as the process of taking a sample. A sample is obtained from its population, and the characteristics of the sample represents the characteristics of the population as a whole (Naoum, 2006). The sample is determined either through random sampling, usually associated with the questionnaire approach, or selected sampling, usually associated with the interview approach (ibid).

In order to determine a sample size for the survey approach, the researcher obtained the population size with which the research project is concerned from Master Builder's KwaZulu-Natal. The population size was approximately 735. Using a normal distribution, a confidence level of 90% and a margin of error of 10%, the sample size was calculated to be 62.

Only 30 completed questionnaire responses were received, representing a response rate of 48%. According to Fellows and Liu (1997) a response rate for postal questionnaires can be expected to be between 25% and 35%.

In the case of the case study approach, selected and purposive sampling was used to identify three organisations with whom to conduct a structured interview. The three organisations selected to participate in the interviews were homogenous and shared similar characteristics. They were all large organisations and were very experienced with the building process.

4.6 Reliability and Validity

The quality of research designs is judged by four tests. As argued by Kidder and Judd (1986, pg. 26-29) cited in Yin (2009), construct validity, which is the first test, identifies whether the correct operational measures for the concepts are being studied. Test two seeks to establish a causal relationship, whereby certain conditions are believed to lead to other conditions, as distinguished from spurious relationships, and this test is known as internal validity (ibid). External validity, test three, defines the domain to which a study's findings can be generalised (ibid). Lastly, the fourth test, reliability demonstrates that the operations of a study can be repeated with the same results (ibid). The most commonly used Cronbach's Alpha reliability coefficient was determined and reported for all scaled responses. All scales with coefficient values greater than 0.7 were regarded as being highly reliable and internally consistent.

4.7 Data Analysis

The data was captured using IBM SPSS version 24. The data was analysed using the descriptive statistics method. The following aspects were determined namely frequency distribution, measurement of central tendency and measurement of dispersion.

Frequency distribution can be presented in the form of tabulation, bar charts, pie charts or graphs. Measures of central tendency is applied when the most typical value for a group of data is required. These statistics are known as the mean, the median and the mode. Measurement of dispersion based on the mean shows the degree by which numerical data tend to spread about an average value. 'Normal distribution is an important expression in the field of statistics because the selection of some inferential statistics depends on whether the data is normally

distributed or not' (Naoum, 1998, pg. 111). Some principle properties of the normal distribution curve are that it is symmetrical and bell-shaped, the mode, the median and the mean coincide at the centre of the distribution, and the curve is based on an infinite number of observations (Nachmias and Nachmias, 1996 cited in Naoum, 1998).

4.8 Chapter Summary

This chapter outlined the methods that were used to gather data from respondents. The design of the questionnaires was described. Validity and reliability of the instruments were discussed in some detail. Additionally, the sample selection and questionnaire administration process were outlined. In the next chapter the findings of the surveys will be analysed and presented to link the theoretical foundation of the preceding chapters.

CHAPTER 5 : CONTRACTOR SURVEY ANALYSIS

5.1 Introduction

The following chapter contains the research findings of the data that was collected by means of the questionnaire survey. The findings are compared to the findings of reviewed literature. For data to have value, it must be subjected to analysis. This analysis must be correctly interpreted for the drawing of valid conclusions.

5.2 Sample Profile / Demographics

The final sample size of the contractors was 30 duly completed questionnaires despite the earlier calculated preferred sample size being 62.

The median number of permanent employees was 55 employees ranging from 5 to 504 employees. The median turnover over a period of 5 years was R22 million ranging from R15 million to R700 million turnover. The median number of contracts executed per year was 8.5 ranging from 2 to 200 contracts.

Contractors sourced their work as follows:

- Negotiated – median of 16% with 27.3% not having obtained any work in this manner whereas 1 respondent exclusively obtained their work on a negotiated basis;
- Private tender – median of 40% with 18.5% having exclusively obtained work in this manner; and
- Public tender – median of 40% with 20% not having obtained any work in this manner whereas 4% exclusively obtained their work through public tender.

Most respondents were registered with the Construction Industry Development Board (CIDB) with 25.9% of the respondents not being registered with CIDB. Of the respondents registered with the CIDB, 55.6% were registered with a grading >5.

The primary area of operation for most respondents was within the KwaZulu-Natal province with only 20% of the respondents executing work in other additional regions. One respondent executed their work exclusively in the Free State.

5.3 Reliability

Internal consistency estimates reliability by grouping questions in a questionnaire that measure the same construct. Table 5.1 shows the Cronbach's alpha co-efficient for the scaled responses of each of the five key constructs. All constructs were found to have statistically acceptable levels of internal consistency, namely Cronbach's Alpha values > 0.700 (Pallant, 2013). There is therefore between 69.8% and 90.9% probability that the constructs each measured a single underlying concept with an error of at most 5%. The scales used to measure the impact of the construction H&S regulatory framework on construction costs are therefore acceptable in terms of their reliability or internal consistency.

Table 5.1: Reliability Statistics

Construct	Cronbach's Alpha	No of Items
Knowledge of Legislative Framework	0.896	5
Impact of Legislative Framework	0.728	5
Frequency of Consideration of Legislative Framework	0.698	5
Perceptions of Costing and Financial Provision for H&S	0.891	19
Importance of Project Parameters	0.909	7

5.4 Interpretation of Scales

For this purpose of this study, range interpretation of scales was developed by calculating the group interval coefficient value. The group interval coefficient value was calculated by dividing the difference between the highest and lowest value in the scale by the determined number of the scale (Can, Günhan and Erdal, 2012).

For the data interpretation range of a 5-point scale, the group interval coefficient value was calculated as (5 - 1) / 5 = 0.80 and the following intervals were taken as reference values in the evaluation of the responses obtained (ibid).

Table 5.2: Data Interpretation Range – 5-point Scale

Range	5-point Likert Scale				
	Agreement	**Impact**	**Frequency**	**Knowledge**	**Importance**
4.21 – 5.00	Strongly Agree	Major Impact	Always	Excellent	Very
3.41 – 4.20	Agree	Moderate Impact	Often	Good	Moderately
2.61 – 3.40	Neutral	Neutral	Sometimes	Some	Neutral
1.81 – 2.60	Disagree	Minor Impact	Rarely	Little	Slightly
1.00 – 1.80	Strongly Disagree	No Impact	Never	None	Not at all
0.00	Unsure	Unsure	Unsure	Unsure	Unsure

(Adapted from Can, Günhan and Erdal, 2012)

The range interpretations as shown in Table 5.2 are used throughout the analysis where 5-point scales were used.

5.5 Knowledge of Legislative Framework

Respondents were asked about their knowledge of construction H&S legislative framework on a 5-point scale where 1 = none, 2 = little, 3 = some, 4 = good and 5 = excellent knowledge. Their responses ranked by the means are shown in Table 5.3

Table 5.3: Knowledge of Legislative Framework (N = 30)

Legislation	Mean	SD	Interpretation	Rank
OHS Act	4.07	0.83	Good	1
Construction Regulations 2014	3.83	0.99	Good	2
Construction Regulations 2003	3.52	1.30	Good	3
COID 1993	3.23	1.30	Some	4
Constitution	3.10	1.09	Some	5

The respondents reported that they possessed a good knowledge of the OHS Act (mean = 4.07), Construction Regulations 2014 (mean = 3.83) and Construction Regulations 2003 (mean = 3.52). They possessed some knowledge of COID 1993 (mean = 3.23) and the Constitution (mean = 3.10). The findings suggest that the respondents would have difficulty in complying

with the requirements of the H&S legislative framework given their less than excellent knowledge of the various pieces of relevant legislation. It is likely that they would not know nor comprehend the extent of the requirements that they would have to comply with.

5.6 Impact of Legislative Framework

Respondents were asked to what extent complying with the provisions of the legislation impacted the overall cost of construction on a 5-point scale where 1 = no impact, 2 = minor impact, 3 = neutral, 4 = moderate impact and 5 = major impact. Their responses ranked by the means are shown in Table 5.4.

Table 5.4: Impact of Legislative Framework (N = 30)

Legislation	Mean	SD	Interpretation	Rank
OHS Act	3.93	0.87	Moderate	1
Construction Regulations 2014	3.90	0.92	Moderate	2
Construction Regulations 2003	3.83	1.04	Moderate	3
COID 1993	3.73	1.17	Moderate	4
Constitution	3.30	1.60	Neutral	5

The respondents reported that complying with the provisions of the OHS Act (mean = 3.93), Construction Regulations 2014 (mean = 3.90), Construction Regulations 2003 (mean = 3.83) and COID 1993 (mean = 3.73) had a moderate impact on the overall cost of construction. They were neutral about the impact compliance with the constitution (mean = 3.30) has had on the overall construction costs. The findings are consistent with the level of knowledge of the regulatory frameworks because had the level of knowledge of the legislative framework been excellent, the respondents would most likely have realised that the impact of the legislative framework on the overall costs of construction was significantly more than just moderate.

A minority of respondents were unsure about what extent compliance with the Constitution, Construction Regulations 2003 and COID 1993 impacted the overall cost of construction.

One of the respondents commented that *'cost to become compliant has a large impact on companies'*.

5.7 Frequency of Consideration of Legislative Framework

Respondents were asked how frequently they considered the compliance requirements of the legislation when compiling competitive bids on a 5-point scale where 1 = never, 2 = rarely, 3 = sometimes, 4 = often and 5 = always. Their responses ranked by the means are shown in Table 5.5

Table 5.5: Frequency of Consideration of Legislative Framework (N = 30)

Legislation	Mean	SD	Interpretation	Rank
OHS Act	4.80	0.66	Always	1
Construction Regulations 2014	4.63	0.76	Always	2
Construction Regulations 2003	4.45	1.21	Always	3
COID 1993	4.21	1.11	Always	4
Constitution	3.77	1.72	Often	5

The respondents reported that they always considered the OHS Act (mean = 4.80), Construction Regulations 2014 (mean = 4.63), Construction Regulations 2003 (mean = 4.45) and COID 1993 (mean = 4.21) when compiling a competitive bid. The Constitution (mean = 3.77) was often considered when compiling a competitive bid or tender. The findings suggest that even though consideration of the legislation is always made in competitive bids, this only extends as far as the level of knowledge of the respondents and may not be as comprehensive and complete as required by the legislation itself with the possible outcome that aspects requiring action or interventions might be overlooked with dire consequences should something go wrong.

A minority of respondents either did not know or were unaware of how frequently the compliance requirements of the Constitution, Construction Regulations 2003 and COID 1993 were considered when compiling competitive bids. This finding might be as a result of some of the respondents not being directly involved in the computation of final bids or tenders.

5.8 Perceptions of Costing and Financial Provision for H&S

Respondents were presented with a series of 19 statements about perceptions of costing and financial provision for H&S using a 5-point scale where 1 = strongly disagree, 2 = disagree, 3

= neutral, 4 = agree and 5 = strongly agree. Their responses ranked by the means are shown in Table 5.6.

Table 5.6: Perceptions of Costing and Financial Provision for H&S (%) N = 30

Statement	Frequency					Unsure	Mean	SD	Interpretation	Rank
	1	2	3	4	5					
Competitive tendering without reference to H&S marginalises H&S	10.3		6.9	72.4		10.3	4.48	1.30	Strongly Agree	1
A detailed H&S section should be included in the Preliminaries	13.7		6.9	79.3		0.0	4.31	1.37	Strongly Agree	2
Competitive tendering marginalises H&S	10.0		16.7	66.7		6.7	4.30	1.32	Strongly Agree	3
Clients should include the same amount for H&S so tenderers are not disadvantaged	16.7		10.0	70.0		3.3	4.23	1.45	Strongly Agree	4
Appropriate contract documentation promotes H&S	13.4		13.3	63.3		10.0	4.17	1.37	Agree	5
A provisional sum should be provided for H&S in the Preliminaries	20.0		0.0	80.0		0.0	4.17	1.62	Agree	6
H&S specifications are project specific	13.8		10.3	72.4		3.4	4.07	1.28	Agree	7
Standard contract documentation generally makes cursive reference to H&S	10.0		20.0	56.7		13.3	4.07	1.41	Agree	8
The implementation of the Construction Regulations has resulted in a positive change in performance with regards to H&S track record	16.7		13.3	60.0		10.0	4.07	1.48	Agree	9
H&S specifications are included with tender documentation	16.7		13.3	63.3		6.7	4.00	1.44	Agree	10
H&S financial provision by contractors results in unsuccessful tenders/bids	13.3		20.0	60.0		6.7	3.93	1.46	Agree	11
H&S specifications include designer ‘design and construction’ method statements	33.3		6.7	43.3		16.7	3.80	1.71	Agree	12
Contract document enabled financial provision for H&S promotes H&S	30.0		10.0	50		10.0	3.73	1.66	Agree	13
Contractors do not know enough to price adequately for H&S	30.0		13.3	53.3		3.3	3.57	1.68	Agree	14
Pricing for H&S in tenders makes bids less competitive	23.4		20.0	53.3		3.3	3.47	1.46	Agree	15
H&S specifications highlight hazards	35.8		17.9	35.7		10.7	3.43	1.73	Agree	16

Statement	Frequency					Unsure	Mean	SD	Interpretation	Rank
	1	2	3	4	5					
Contract documentation does not promote H&S	33.3		10.0	50.0		6.7	3.27	1.60	Neutral	17
Contractors are afforded the opportunity to price items included in H&S specifications on an equitable basis	44.8		6.9	41.4		6.9	3.17	1.79	Neutral	18
Tender documents always allow for H&S costs to be shown	50.0		20.0	26.6		3.3	2.90	1.35	Neutral	19

The majority of the respondents strongly agreed that competitive tendering without reference to H&S marginalised H&S (mean = 4.48) and that competitive tendering marginalised H&S (mean = 4.30). Some comments of respondents included

"it is often the case that H&S cost are neglected by the successful tenderer",

"our competitors do not make the provisions we do".

A minority (10%) of respondents were unsure about whether competitive tendering without reference to H&S marginalised H&S. As previously stated this view might be as a result of their non-involvement or limited involvement in the preparation of bids.

Just over half (53%) of the respondents agreed that pricing for H&S in tenders made bids less competitive (mean = 3.47) and 60% agreed that H&S financial provision by contractors resulted in unsuccessful tenders/bids (mean = 3.93). Respondents strongly agreed that clients should include the same amount for H&S so tenderers were not disadvantaged (mean = 4.23). Less than half (41%) of the respondents felt that contractors were afforded the opportunity to price items included in H&S specifications on an equitable basis (mean = 3.17). Comments of respondents included

"companies such as my own are often out priced as we do allow for adequate H&S provisions where some of our competition does not",

"competing on smaller projects against lesser opposition, the cost could be the difference between winning and losing a project",

"if HSE was to be contractually standardised and paid on proven cost this will most definitely help with even playing fields and make the overall tender process more competitive".

Just more than three-quarters (79.3%) of the respondents strongly agreed that a detailed H&S section should be included in the Preliminaries section of Bills of Quantities (mean = 4.31). Most (80%) of the respondents agreed that a provisional sum should be provided for H&S in the Preliminaries (mean = 4.17). Half of the respondents felt that tender documents do not always allow for H&S costs to be shown (mean = 2.90) whereas only 27% of the respondents felt that tender documents always allowed for H&S costs to be shown. Some comments were

"H&S should be a provisional sum",

"it would be of utmost importance if the BoQ included an amount for SHE on a project and is to be spent by the contractor as instructed by the PA/RE",

"normally in the P&G section, an item is reserved for pricing safety but is non-specific".

Half of the respondents agreed that contract documentation did not promote H&S (mean = 3.27) whereas 63.3% of the respondents agreed that **appropriate** contract documentation promoted H&S (mean = 4.17). Furthermore, 50% of the respondents agreed that contract documents that allowed for financial provision for H&S promoted H&S (mean = 3.73). Just more than half (57%) of respondents agreed that standard contract documentation generally made cursive reference to H&S (mean = 4.07). It must be noted that 13% of the respondents were unsure about whether standard contract documentation generally made cursive reference to H&S. A minority (10%) of respondents were unsure about whether appropriate contract documentation and contract document enabled financial provision for H&S promoted H&S.

With regards to H&S specifications, the majority agreed that H&S specifications were included with tender documentation (mean = 4.00) and 72% agreed that H&S specifications were project specific (mean = 4.07). However, less than half of the respondents felt that H&S specifications included designer 'design and construction' method statements (mean = 3.80) and highlighted hazards (mean = 3.43). It must be noted that 17% of the respondents were unsure about whether H&S specifications included designer 'design and construction' method statements, and 11% of the respondents were unsure about whether H&S specifications highlighted hazards.

Respondents seemed equally divided as to whether H&S specifications highlighted hazards or not with 18% expressing neutral sentiments.

It must be noted that 20% of the respondents remained neutral on the statements regarding standard contract documentation generally making cursive reference to H&S, H&S financial provision by contractors resulting in unsuccessful tenders/bids, pricing for H&S in tenders making bids less competitive and tender documents always allowing for H&S costs to be shown.

More than half (53%) of the respondents agreed that contractors did not know enough to price adequately for H&S (mean = 3.57) with only 30% of the respondents disagreeing that contractors did not know enough to price adequately for H&S. Respondents commented with

"not convinced that we account for all costs in tenders",

"education to contractors on the importance of H&S is very poor. Too many companies doing the bare minimum and not budgeting for H&S puts the employees at risk",

"more training about H&S is required for contractors",

"the reason why the industry doesn't give H&S the attention it deserves is due to the fact that most aren't educated on the impact it has and the money that can be saved with compliance",

"course has shed a lot of light on the importance of OH&S and the long term saving when a contractor is compliant",

"appears as if you can never do enough or allow enough for H&S",

The majority of the respondents agreed that the implementation of the Construction Regulations had resulted in a positive change in performance with regards to H&S track record (mean = 4.07). According to some of the respondents,

"The allowance of costs of H&S on projects has increased project costs, but also the requirement to be compliant has resulted in reduction of incidents on projects. Reduced

incidents have led to increase in production which eventually contributes to increased profit, and reduction in downtime. H&S is vital and encourages a culture of working safe always.",

"We will never compromise on safety",

"the larger organisations are already well accustomed to the costs of health and safety",

"safety comes first all else can wait"

A minority (10%) of respondents were unsure about whether the implementation of the Construction Regulations had resulted in a positive change in performance with regards to their H&S track records.

Respondents were requested to provide information about whether their organization computed the percentage that H&S constituted of their tender cost estimates and project costs. From Table 5.7 it is evident that only 17.2% and 20.7% of construction organisations computed the contribution of H&S to their tender cost estimates and project costs respectively. This finding is indicative of the lack of knowledge of the industry of the necessary financial provision for effective management of construction H&S on their projects as well as the need to track these costs. Of concern is the high proportion of respondents that were unsure, namely 31.0% and 27.6% respectively.

Table 5.7: H&S Contribution (%) N = 30

Cost	Unsure	No	Yes	%	% Range
Tender cost estimate	31.0	51.7	17.2	5	1 – 6
Project cost	27.6	51.7	20.7	5	1 – 100

5.9 Importance of Project Parameters

Respondents were requested to rate on a 5-point scale the importance of various project parameters to their organisations, where 1 = not at all, 2 = slightly, 3 = neutral, 4 = moderately and 5 = very important.

Table 5.8: Importance of Project Parameters (%) N = 30

Project parameter	Mean	SD	Interpretation	Rank
Project time (duration)	4.69	0.89	Very important	1
Project quality	4.62	1.05	Very important	2
Project cost	4.45	1.06	Very important	3
Project utility (fit-for-purpose)	4.36	0.87	Very important	4
Project H&S	4.28	1.07	Very important	5
Environment	3.96	1.17	Moderately important	6
Construction ergonomics	3.75	1.24	Moderately important	7

From Table 5.8 it is evident that the various project parameters were all regarded with varying degrees of importance. Project H&S (mean = 4.28) ranked behind the traditional project parameters of time (mean=4.69), quality (mean=4.62) and cost (mean = 4.45) in terms of importance. The industry has clearly not made the requisite paradigm shift to accord project H&S equal importance to these traditional parameters.

5.10 Pricing for Construction H&S Requirements

Respondents were presented with a list of construction H&S cost requirements under the categories staffing, training, promotion, equipment and project and were asked to indicate which requirements on the list were included in their project costing and where the costs were allocated in the project cost.

5.10.1 Staffing

Table 5.9 shows that over 80% of the respondents indicated that they priced for H&S mandatory appointments, H&S officer appointments and H&S representative appointments. Over three-quarters (76%) of the respondents indicated that they did not price for H&S committees and 60% indicated that they did not include H&S committee meetings in their project costing. According to one of the respondents

"cost of H&S representative, committee and committee meetings [are] absorbed by project cost".

Table 5.9: Staffing Cost Allocation (N = 30)

Requirement	Prelims	Trade rates	Not allocated	Unsure	% of total project cost allocation
H&S mandatory appointments	70.0	13.3	6.7	6.7	3.3
H&S officer	80.0	10.0	3.3	3.3	3.3
H&S representative/s	70.0	16.7	6.7	3.3	3.3
H&S committee	34.5	6.9	51.7	6.9	0.0
H&S committee meetings	34.5	10.3	48.3	6.9	0.0

From Table 5.9 it is evident that 80% of the respondents allocated the costs of H&S officer appointments to Preliminaries. Most (70%) of the respondents allocated the costs of H&S mandatory appointments and H&S representative appointments to Preliminaries. More than half (52%) of the respondents did not allocate the cost of H&S committees and 48% did not allocate the cost of H&S committee meetings to the project cost respectively. These high percentages are very concerning as they infer that these costs were not tracked and contractors were not aware of the cost of these legislative H&S requirements.

5.10.2 Training

Table 5.10 shows that majority of the respondents stated that they priced for compulsory/mandatory training costs (69%), toolbox talks (60%) and induction training (67%) in the project cost. Only half of the respondents priced for in-house training costs on the project.

Table 5.10: Training Cost Allocation (N = 30)

Requirement	Prelims	Trade rates	Not allocated	Unsure	% of total project cost allocation
Compulsory/mandatory training costs	53.3	26.7	13.3	3.3	3.3
In-house training costs	36.7	20.0	36.7	3.3	3.3
Toolbox talks	43.3	26.7	23.3	3.3	3.3
Induction training	50.0	16.7	23.3	3.3	6.7

From Table 5.10 it is evident that 50% of the respondents confirm that the compulsory/mandatory training costs and induction training costs were allocated to preliminaries together with toolbox talks (43%) and in-house training costs (37%). It must be noted that some of the respondents stated that they allocated their training costs to trade rates and some respondents did not allocate training costs to project costs.

5.10.3 Policies, Programs and Promotion

Table 5.11: Policies, Programs and Promotion Cost Allocation (N = 30)

Requirement	Prelims	Trade rates	Not allocated	Unsure	% of total project cost allocation
H&S policy	53.3	13.3	23.3	3.3	6.7
H&S signage	70.0	6.7	13.3	6.7	3.3
H&S pamphlets and posters	53.3	6.7	30.0	3.3	6.7
HIV and AIDS management program	40.0	10.0	40.0	3.3	6.7
Medical surveillance program	50.0	13.3	26.7	6.7	3.3

From Table 5.11 it is evident that just over three-quarters (76%) of the respondents indicated that they did price for H&S policies in their project costing. It is further evident that 53% of the respondents allocated the cost for H&S policies in the Preliminaries. The rest of the respondents allocated the costs in the trade rates and 23% did not allocate the cost to the project cost which suggests that this cost was not tracked.

Even though the majority (62%) of the respondents priced for medical surveillance programs in the project cost, 48% did not price for HIV and AIDS management programs in the project cost. Half of the respondents allocated the cost of the medical surveillance programs in the preliminaries section of the project cost and 27% of the respondents did not allocate the cost to the project cost suggesting that this cost was not tracked. Less than half (40%) of the respondents allocated the cost of the HIV and AIDS management programs in the preliminaries and 40% of the respondents did not allocate the cost to the project cost indicative that this cost was not tracked. The rest of the respondents allocated the cost of the medical surveillance programs and HIV & AIDS management programs in the trade rates.

Most (86%) of the respondents indicated they priced for H&S signage in the project cost and 70% allocated the cost in the preliminaries. The rest of the respondents did not allocate the cost of H&S signage to the project cost. More than half (59%) of the respondents priced for H&S pamphlets and posters, and 53% allocated the cost to the preliminaries. It must be noted that 30% of the respondents did not allocate the cost for H&S pamphlets and posters in the project cost which suggest that these costs were not tracked.

5.10.4 Equipment

Table 5.12: Equipment Cost Allocation (N = 30)

Requirement	Prelims	Trade rates	Not allocated	Unsure	% of total project cost allocation
Fall arrest equipment	56.7	20.0	6.7	10.0	6.7
Fall prevention measures	48.3	24.1	10.3	10.3	6.9
Personal protective equipment	72.4	17.2	0.0	3.4	6.9

From Table 5.12 it is evident that most respondents indicated that fall arrest equipment (79%), fall prevention measures (83%) and personal protective equipment (90%) were priced in the project cost. It is further evident that 57% allocated the cost of fall arrest equipment to the preliminaries of the project cost and 20% of the respondents allocated the cost to the trade rates. Less than half (48%) of the respondents allocated the cost of the fall prevention measures to the preliminaries and 24% allocated the costs to the trade rates. Just under three-quarters (72%) of the respondents allocated the cost of the personal protective equipment to the preliminaries and 17% of the respondents allocated the cost to the trade rates. It must be noted that 10% of the respondents were unsure about where the costs of the fall arrest equipment and fall prevention measures were allocated. The rest of the respondents did not allocate the cost of fall arrest equipment and fall prevention measures to the project cost.

5.10.5 Project

Table 5.13 shows that most of the respondents indicated that they priced for the H&S plan (90%), H&S file (86%) and medical certificates of fitness (83%) in the project costing. One of the respondents stated that *"all employees must have medical certificates of fitness which has*

a cost implication". According to more than three-quarters of the respondents, they priced for Hazard Identification and Risk Assessment (HIRA) (79%), H&S inspections (79%), fall protection plan (79%) and H&S specifications (76%) in the project costing. It is unclear whether they priced for compliance with the H&S specifications which should have been prepared by clients or the actual preparation of this document. Less than three-quarters (72%) of the respondents indicated that they priced for safe work or operating procedures (SWPs or SOPs). The majority of the respondents priced for temporary support plan (70%), excavation and lateral support plan (70%), H&S reports (66%) and H&S audits (62%) in their project costing. More than half of the respondents priced for demolition plans (59%), notification of construction work (59%), Material Safety Data Sheet (MSDS) management (59%) and Waste management plans (WMP) (57%). Half of the respondents priced for environmental management plan (EMP) in the project costing.

Table 5.13: Project Cost Allocation (N = 30)

Requirement	Prelims	Trade rates	Not allocated	Unsure	% of total project cost allocation
H&S plan	83.3	6.7	3.3	6.7	0.0
H&S file	80.0	6.7	6.7	6.7	0.0
H&S specification	73.3	6.7	10.0	10.0	0.0
Hazard Identification and Risk Assessment (HIRA)	73.3	6.7	13.3	3.3	3.3
H&S inspections	63.3	10.0	16.7	6.7	3.3
H&S audits	60.0	6.7	23.3	6.7	3.3
H&S reports	65.5	6.9	13.8	10.3	3.4
Safe work or operating procedures (SWPs or SOPs)	65.5	6.9	13.8	10.3	3.4
Material Safety Data Sheet (MSDS) management	46.7	10.0	33.3	6.7	3.3
Medical certificate of fitness	56.7	13.3	20.0	3.3	6.7
Fall protection plan	57.1	10.7	21.4	7.1	3.6
Demolition plan	50.0	14.3	25.0	10.7	0.0
Temporary support plan	44.4	22.2	25.9	3.7	3.7
Excavation and lateral support plan	42.9	21.4	28.6	3.6	3.6
Waste management plan (WMP)	44.8	10.3	37.9	3.4	3.4
Environmental management plan (EMP)	48.3	6.9	34.5	6.9	3.4
Notification of construction work	67.9	3.6	21.4	3.6	3.6

From Table 5.13 it is evident that most respondents allocated the cost of H&S plan (83%), and H&S file (80%) to the preliminaries. Minority of the respondents either allocated the costs to trade rates, did not allocate the costs or were unsure where the costs were allocated in the project cost. Less than three-quarters (73%) of the respondents allocated the cost of H&S specification, and Hazard Identification and Risk Assessment (HIRA) to the preliminaries of the project cost. Minority of the respondents allocated the costs to the trade rates. Just over 10% of the respondents did not allocate the costs of Hazard Identification and Risk Assessment (HIRA) and H&S specification to the project cost, and 10% of the respondents were unsure where the cost of Hazard Identification and Risk Assessment (HIRA) were allocated in the project cost.

Majority of the respondents indicated that they allocated the cost of notification of construction work (68%), H&S reports (66%), safe work or operating procedures (SWPs or SOPs) (66%), H&S inspections (63%) and H&S audits (60%) to the preliminaries of the project cost. Minority of the respondents either allocated the cost to the trade rates or were unsure where the costs were allocated. It was concerning that the cost of notification of construction work (21%), H&S reports (14%), safe work or operating procedures (SWPs or SOPs) (14%), H&S inspections (17%) and H&S audits (23%) were not allocated to the project cost as this infers that these costs were not tracked.

More than half (57%) of the respondents allocated the cost for fall protection plan and medical certificate of fitness in the preliminaries of the project cost. Minority of the respondents either allocated the cost to the trade rates or were unsure where the cost was allocated. Once again, it is concerning that 21% of the respondents did not allocate the cost of fall protection plan to the project cost. Furthermore, it was concerning that 20% of the respondents did not allocate the cost of medical certificate of fitness to the project cost. This infers that these costs were not tracked.

Half of the respondents indicated that they allocated the cost of demolition plan to the preliminaries of the project cost and 25% of the respondents did not allocated the cost of demolition plan to the project cost. This was concerning as it suggests that the cost of demolition plan was not tracked.

Less than half of the respondents allocated the cost of environmental management plan (EMP) (48%), Material Safety Data Sheet (MSDS) management (47%), waste management plan

(WMP) (45%), temporary support plan (44%), and excavation and lateral support plan (43%) to Preliminaries. More than 20% of the respondents allocated the cost of temporary support plan and excavation and lateral support plan in the trade rates. The cost of environmental management plan (EMP) (35%), Material Safety Data Sheet (MSDS) management (33%), waste management plan (WMP) (38%), temporary support plan (26%), and excavation and lateral support plan (29%) were not allocated by the respondents to the project cost. This was concerning as it suggests that the costs were not tracked. The rest of the respondents were unsure about where the costs were allocated in the project cost.

In general, a few respondents indicated that they allocated a percentage of total project cost against all of the various items without specifically stating what that percentage was.

5.11 Pricing for Construction Activities

Respondents were presented with a list of construction activities and were asked to indicate their awareness of whether additional measures were introduced or considered against the listed activities which affected their pricing strategy/approach since the promulgation of the Construction Regulations 2003 and Construction Regulations 2014. Respondents were further asked to indicate to what extent the additional measures had influenced the costs of the listed construction activities.

A notable statement made by one of the respondents was *"we have seen in the industry that the [construction activities] have incurred additional costs, one of the areas is training as the regulations have forced the smaller contractors to ensure that competency is proven and one of these ways is training"*.

From Table 5.14 it is evident that 75% of the respondents indicated that additional measures were introduced/considered which affected their pricing strategy/approach for the construction activity 'activities involving working at height', and that these additional measures had influenced the construction costs ranging from 2% to 100% with a median of 15% influence. One of the respondents stated that increased training for 'activities involving working at height' had influenced the cost of this construction activity.

Table 5.14: Construction Activity Pricing and Allocation (N = 30)

Construction activity	Yes	No	Unsure	% Median	% Range
Activities involving working at heights	75.0	17.9	7.1	15	2 – 100
Formwork erection and removal	55.6	33.3	11.1	12.5	0 – 100
Demolition work	55.6	37.0	7.4	10	0 – 100
Crane erection	52.0	28.0	20.0	5	0 – 100
Roof construction	51.9	40.7	7.4	5	1 – 80
Excavation and earthwork	48.1	48.1	3.7	10	0 – 100
Steel erection	48.1	37.0	14.8	15	0 – 60
Temporary works	48.1	44.4	7.4	10	1 – 100
In-situ cast reinforced concrete slabs	33.3	59.3	7.4	5	0 – 100
Reinforcing steel fixing	30.8	61.5	7.7	5	0 – 60
Ceiling erection	25.9	63.0	11.1	5	0 – 80
Glazing	22.2	74.1	3.7	10	0 – 80
Wall and floor tiling	14.8	74.1	11.1	4.5	0 – 80
Plastering	11.1	85.2	3.7	5	0 – 50
Brickwork	7.4	88.9	3.7	10	0 – 50

Respondents indicated that additional measures were introduced/considered for the following construction activities, namely

- Formwork erection and removal (56%);
- Demolition work (56%);
- Crane erection (52%); and
- Roof construction (52%).

The respondents indicated that the additional measures introduced/considered influenced the costs of these construction activities as follows:

- Formwork erection and removal - ranging from 0% to 100% with a median of 12.5% influence;
- Demolition work - ranging from 0% to 100% with a median of 10% influence;
- Crane erection - ranging from 0% to 100% with a median of 5% influence; and
- Roof construction - ranging from 1% to 80% with a median of 5% influence.

However, the majority of the respondents were not aware of any additional measures being introduced/considered which had affected their pricing strategy/approach for the following construction activities, namely

- Reinforcing steel fixing (62%);
- Ceiling erection (63%);
- Glazing (74%); and
- Wall and floor tiling (74%).

The respondents that were aware of any additional measures introduced/considered for reinforcing steel fixing, ceiling erection, glazing, wall and floor tiling, plastering and brickwork which affected their pricing strategy/approach reported that these measures influenced the costs as follows:

- Reinforcing steel fixing – ranging from 0% to 60% with a median of 5% influence;
- Ceiling erection – ranging from 0% to 80% with a median of 5% influence;
- Glazing – ranging from 0% to 80% with a median of 10% influence;
- Wall and floor tiling – ranging from 0% to 80% with a median of 4.5% influence;
- Plastering – ranging from 0% to 50% with a median of 5% influence; and
- Brickwork – ranging from 0% to 50% with a median of 10% influence.

Less than half of the respondents indicated that additional measures were introduced/considered for the following construction activities namely

- Excavation and earthwork (48%);
- Steel erection (48%); and
- Temporary works (48%).

These respondents indicated that the additional measures introduced/considered influenced the costs of the above construction activities as follows:

- Excavation and earthwork - ranging from 0% to 100% with a median of 10% influence;
- Steel erection - ranging from 0% to 60% with a median of 15% influence; and
- Temporary works - ranging from 1% to 100% with a median of 10% influence.

One of the respondents commented that *"lots of emphasis [is being placed] on temporary works"*.

More than half (59%) of the respondents were not aware of any additional measures introduced/considered for in-situ cast reinforced concrete slabs which affected their pricing

strategy/approach. The respondents that were aware of any additional measures introduced/considered for in-situ cast reinforced concrete slabs which affected their pricing strategy/approach stated that the measures influenced the costs ranging from 0% to 100% with a median of 5% influence.

The rest of the respondents were unsure of any additional measures that were introduced/considered which affected their pricing strategy/approach since the promulgation of the Construction Regulations 2003 and Construction Regulations 2014. It must be noted that for the construction activities of crane erection and steel erection, 20% and 15% of the respondents respectively were unsure of any additional measures that were introduced/considered which affected their pricing strategy/approach since the promulgation of the Construction Regulations 2003 and Construction Regulations 2014.

5.12 Construction Cost Increase

Respondents were asked to indicate by what percentage had the overall cost of construction increased as a result of compliance with the requirements of the construction H&S legislative framework.

Table 5.15: Construction Cost Increase (%) N = 30

Unsure	0%	>0% <= 10%	>10% <= 20%	>20% <= 30%	>30% <= 40%	>40% <= 50%	>50% <= 60%	>60% <= 70%	>70% <= 80%	>80% <= 90%	>90% < 100%	100%
10.0	0.0	43.3	26.7	10.0	3.3	0.0	0.0	0.0	0.0	3.3	3.3	0.0

From Table 5.15 it is evident that 70% of the respondents indicated that the overall cost of construction had increased in the region of 10% as a result of compliance with the requirements of the construction H&S legislative framework.

5.13 Chapter Summary

This chapter analysed the data that was collected by means of the questionnaire survey to draw valid conclusions regarding the impact of the construction H&S regulatory framework on construction costs. The research findings have been discussed and compared against the literature reviewed. The findings suggest that industry would have difficulty in complying with the requirements of the H&S legislative framework given their less than excellent knowledge of the various pieces of relevant legislation. It is likely that they would not know nor comprehend the extent of the requirements that they would have to comply with. The findings relative to perception of H&S costing and financial provision is indicative of the lack of knowledge of the industry of the necessary financial provision for effective management of construction H&S on their projects as well as the need to track these costs. The conclusions and recommendations resulting from the findings are discussed in the final chapter.

CHAPTER 6 : CASE STUDIES

6.1 Introduction

To validate the findings of the questionnaire survey, arrangements were made with three organisations within the Durban surrounds of Kwa-Zulu Natal to discuss how construction H&S was managed with particular reference to costing on specific projects and within the organisation as a whole. The findings of each case study are presented below.

6.2 Case Study No. 1

6.2.1 Company Profile

The organisation is a multidisciplinary building company employing on average 187 permanent employees, and executing four (4) contracts per year with an estimated turnover of R600,000,000 over the last five years. The organisation works exclusively in the private sector with 30% of their work being negotiated. The organisation has been awarded a 9GB grading with the Construction Industry Development Board (CIDB). The organisation executes most of its projects in the Kwa-Zulu Natal region. The safety manager of the organisation was interviewed for this case study, with input from the quantity surveyor regarding cost allocations for H&S.

6.2.2 Company Knowledge of Construction H&S Legislative Framework

The organisation rates its knowledge of the constitution as limited but has an excellent knowledge of the OHS Act, Construction Regulations 2003 and Construction Regulations 2014. The organisation's knowledge of COID 1993 is rated as good. The organisation stated that complying with the provisions of the OHS Act, Construction Regulations 2003 and Construction Regulations 2014 has had a major impact on the overall cost of construction whereas the constitution has had no impact on the overall cost of construction. Complying with the provisions of COID 1993 also has had an impact on the overall cost of construction. The organisation stated that it always considers the compliance requirements of the OHS Act, Construction Regulations 2003 and Construction Regulations 2014 when compiling a competitive bid with some reference to COID 1993 regarding incident and investigation

registration although, according to the organisation, the bid specifications do not go into much detail with regards to COID 1993. The organisation is unsure with regards to their consideration of the compliance requirements within the Constitution when compiling a competitive bid as they have never been required by the bid specifications to refer to the Constitution.

6.2.3 Project Profile

The specific project chosen to discuss H&S costings was a shopping mall. The work consisted of alterations and additions to an operational shopping mall approximately 3300m2 in size, which included demolition and construction of retail and parking decks. The project value was R46 million over an eight (8) month project duration. There were nine (9) staff and twenty-five (25) labourers employed on the project. The pricing strategy applied to the project was that of a priced bill of quantities with a closed tender procurement strategy. There were forty-seven (47) subcontractors (which included labour only ones) employed on the project of which eleven (11) were selected subcontractors, one (1) was nominated and twenty- six (26) were domestic subcontractors. The H&S component of the project came to an approximate value of R52,600 which included the cost of safety personnel, training, personal protective equipment, medicals and fall prevention. The project had one hundred and ninety-two (192) incident free days.

6.2.4 Pricing and Cost Allocation of Construction H&S Requirements

Table 6.1 indicates whether construction H&S requirements were priced on the project, and where those costs were allocated.

Table 6.1: Case Study 1 Pricing and Cost Allocation of Construction H&S Requirements

	Yes	No	Prelims	Trade rates	Not allocated	% of total project cost allocation
1. Staffing						
1.1 H&S mandatory appointments	X		X			0.4%
1.2 H&S officer	X		X			0.4%
1.3 H&S representative/s	X		X			0.4%
1.4 H&S committee		X			X	
1.5 H&S committee meetings		X			X	
2. Training						
2.1 Compulsory/mandatory training costs	X				X	
2.1 In-house training costs	X				X	
2.2 Toolbox talks		X			X	
2.3 Induction training	X	X			X	
3. Promotion						
3.1 H&S policy		X			X	
3.2 H&S signage	X		X			0.02%
3.3 H&S pamphlets and posters	X				X	
3.4 HIV and AIDS management program		X			X	
3.5 Medical surveillance program	X		X			0.03%
4. Equipment						
4.1 Fall arrest equipment	X		X			
4.2 Fall prevention measures	X	X	X			0.05%
4.3 Personal protective equipment	X		X			0.02%
5. Project						
5.1 H&S plan		X			X	
5.2 H&S file	X				X	
5.3 H&S specification		X			X	
5.4 Hazard Identification and Risk Assessment (HIRA)		X	X			
5.5 H&S inspections	X				X	
5.6 H&S audits	X				X	
5.7 H&S reports	X				X	
5.8 Safe work or operating procedures (SWPs or SOPs)		X			X	
5.9 Material Safety Data Sheet (MSDS) management		X			X	
5.10 Medical certificate of fitness	X		X			
5.11 Fall protection plan		X	X			
5.12 Demolition plan		X	X			
5.13 Temporary support plan		X	X			
5.14 Excavation and lateral support plan		X	X			
5.15 Waste management plan (WMP)		X	X			
5.16 Environmental management plan (EMP)	X		X			
5.17 Notification of construction work		X	X			

The organisation stated that the requirement of a H&S committee was not priced when compiling the bid and was absorbed as part of the cost of doing business. Similarly, the requirement for toolbox talks is also absorbed into the general running costs of the business. On this project, even though induction training was executed, it was not priced in the bid as it was not a specific requirement from the client and was absorbed by the organisation. The organisation stated that only where there are specific requirements included in the specifications from the client with regards to particular induction training requirements, do they allow and allocate a cost for it in their bids. The organisation stated that where they absorb the costs of requirements, they do have a tracking mechanism to determine their investment in H&S induction training.

The organisation does not track the costs of the H&S policy and the HIV and AIDS management program as this gets absorbed into the general running costs of the organisation. The employees are however informed of the H&S policy and the HIV and AIDS management program annually, and during the year when necessary, of which records are kept.

The cost of the H&S file was absorbed by the organisation, which included the costs of the H&S plan, the H&S specification, hazard identification and risk assessment, safe work or operation procedures, material safety data sheet, fall protection plan, demolition plan, temporary support plan, excavation and lateral support plan, waste management plan and notification of construction work.

6.2.5 Additional Measures Introduced since the Promulgation of the Construction Regulations Affecting the Pricing Strategy/Approach of Construction Activities

Table 6.2 indicates whether additional measures which were introduced or considered since the promulgation of the Construction Regulations affected the pricing strategy/approach of construction activities and to what extent the additional measures influenced the costs with respect to the construction activities.

Table 6.2: Case Study 1 Additional Measures Introduced and Cost Influence on Construction Activities

Construction activity	Yes	No	% Variation
Activities involving working at heights		X	
Excavation and earthwork		X	
In-situ cast reinforced concrete slabs		X	
Formwork erection and removal		X	
Reinforcing steel fixing		X	
Steel erection		X	
Demolition work		X	
Temporary works	X		0.025%
Brickwork		X	
Plastering		X	
Glazing		X	
Roof construction		X	
Ceiling erection		X	
Wall and floor tiling		X	
Crane erection		X	

According to the organisation, the legislative changes had minimal impact on the construction activities as listed in Table 6.2. Any additional measures that may have been introduced formed part of the organisation's culture of best practice and not resultant of legislative changes. The only construction activity which has been impacted through the introduction of additional measures, since the promulgation of the Construction Regulations, is Temporary Works. This is resultant of the Construction Regulations 2014 requiring the appointment of a Temporary Works Designer, which is an engineer registered with the Engineering Council of South Africa (ECSA), the approval of Temporary Works Drawings and the inspection of Temporary Works, which by inference, influences the cost of the construction activity.

The organisation defined their culture of best practice as all employees being subjected to training on all construction activities irrespective of project specifications, client requirements and legislative requirements. The cost of this best practice is absorbed into the overall running

costs of the organisation as the organisation stated that they take safety very seriously and endeavour to prevent accidents. The cost is tracked under the organisation's training costs.

6.2.6 H&S Statements

In Table 6.3 the organisation was requested to indicate to what extent they agree with the following statements where 1 = strongly disagree and 5 = strongly agree.

Table 6.3: Case Study 1 H&S Statements

Statement	1	2	3	4	5	Unsure
A detailed H&S section should be included in the Preliminaries					X	
A provisional sum should be provided for H&S in the preliminaries					X	
Competitive tendering marginalises H&S					X	
Competitive tendering without reference to H&S marginalises H&S					X	
Standard contract documentation generally makes cursive reference to H&S					X	
H&S specifications are project specific		X				
H&S specifications are included with tender documentation				X		
Contractors are afforded the opportunity to price items included in H&S specifications on an equitable basis				X		
H&S financial provision by contractors results in unsuccessful tenders/bids					X	
H&S specifications include designer 'design and construction' method statements	X					
H&S specifications highlight hazards*		X				
Tender documents always allow for H&S costs to be shown			X			
Pricing for H&S in tenders makes bids less competitive					X	
Clients should include the same amount for H&S so tenderers are not disadvantaged					X	
Appropriate contract documentation promotes H&S					X	
Contractors do not know enough to price adequately for H&S				X		
Contract documentation does not promote H&S			X			
Contract document enabled financial provision for H&S promotes H&S					X	
The implementation of the Construction Regulations has resulted in a positive change in performance with regards to H&S track record		X				

* Hazards include among other, hazardous chemical substances in materials, heavy blocks and / or kerb stones

The organisation believed that H&S specifications are too generic, not project specific, do not highlight/identify hazards and are sometimes outdated. The organisation further believed that the H&S specifications with regards to 'design and construction' method statements are very vague and as a result, the cost of construction may increase during the course of the project. To mitigate this, the organisation indicated that, should they discover that the 'design and construction' method statement is vague or unsuitable resulting in safety concerns/issues, they would enter discussions with the client and provide solutions to address the safety concerns so as not to place them at a disadvantage in terms of competitive tendering and allocating a sufficient H&S financial provision. The safety manager had no knowledge of whether such discussions/negotiations has ever resulted in their organisation not being successful in a bid.

The organisation further stated that the enforcement of the regulations by the relevant authorities is inadequate and therefore believe the implementation of the Construction Regulations has had minimal impact with regards to a positive change in H&S performance and track record.

6.2.7 Summary

The organisation indicated that they compute the percentage that H&S constitutes in the tender cost estimate at 1.3% and in the project cost at 1.5%. The project parameters namely, cost, environment, H&S, quality, time and utility are very important parameters within the organisation, with construction ergonomics indicated as neutral importance.

The organisation believed that the overall cost of construction increased by >0% - ≤10% as a result of compliance with the requirements of the construction H&S legislative framework.

6.3 Case Study No. 2

6.3.1 Company Profile

The organisation is a family owned building company, specialising in health care, shopping centres, office blocks, tourism, industrial, education and turnkey industrial projects. The organisation employs on average 15 permanent employees, and executes fifteen (15) contracts per year with an estimated average turnover of R120,000,000 over the last five years. The organisation works exclusively in the private sector with 75% of their work sourced through tenders and 25% of their work being negotiated. Currently the organisation is not registered with the Construction Industry Development Board (CIDB). The organisation has put in an application for registration and expect to be awarded a 7G or 8GB grading with the Construction Industry Development Board (CIDB). The organisation operates exclusively in the Kwa-Zulu Natal region. The director of the organisation was interviewed for this case study, with input from the quantity surveyor regarding cost allocations for H&S.

6.3.2 Company Knowledge of Construction H&S Legislative Framework

The organisation rates its knowledge of the constitution, OHS Act, Construction Regulations 2003, Construction Regulations 2014 and COID 1993 as excellent. The organisation stated that complying with the provisions of the Construction H&S Legislation has had quite a significant impact on construction costs. The organisation further stated that it always considers the compliance requirements of the Constitution, OHS Act, Construction Regulations 2003, Construction Regulations 2014 and COID 1993 when compiling a competitive bid.

6.3.3 Project Profile

The specific project chosen to discuss H&S costings was a production factory on an existing site in Phoenix Industrial Park. The premises were occupied during construction. The work consisted of expanding the existing bottling line, including storage, warehousing, truck canopy, extension to hardstand for vehicle access, transport yard, distribution dockleveller extension, retaining walls and tank bases. The project value was estimated to be R67 million with an estimated project duration of eight (8) months at tender stage. The final project value was R77 million with a project duration of twelve (12) months. There were twenty (20) staff/labourers

employed on the project. The pricing strategy applied to the project was that of a priced bill of quantities with a closed tender procurement strategy. At the time of tender there were four (4) bidders including the organisation. There were twelve (12) to fifteen (15) subcontractors employed on the project of which ten percent (10%) were nominated subcontractors, forty percent (40%) were selected subcontractors and fifty percent (50%) were domestic subcontractors. The H&S component of the project came to an approximate value of R377,000 (0.56% of total tender price) at tender stage which included the cost of staffing, training, promotion, equipment, personal protective equipment, medical certificates, H&S plan, waste and environmental plan as well as the H&S costs of the subcontractors. There were two (2) incidents classified as minor cuts and three (3) labourers were discharged.

6.3.4 Pricing and Cost Allocation of Construction H&S Requirements

Table 6.4 indicates whether construction H&S requirements were priced on the project, and where those costs were allocated.

The percentages reflected in Table 6.4 were as at tender stage and did not include the H&S costs of the subcontractors. Subcontractors were required to price the same resulting in the percentage becoming exponentially higher. The organisation indicated that when the H&S costs of the subcontractors were added, the total H&S costs constituted approximately 0.56% of the total project cost at tender stage. A cost which was not accounted for in this project was that of the scaffold inspector which may increase the percentage allocated to H&S when added. On this specific project, a foreman carried out the scaffold. The organisation did not price for a H&S committee nor did they price for the H&S committee meetings in their bid. The organisation did not view this as a cost but rather as a pro-active initiative and further believed that pricing for committee meetings would have been a very difficult task. The organisation stated that the training costs formed part of the overheads of the organisation and were not allocated against the specific project. The organisation further stated that they claimed for reimbursement of the training costs through skills development. The organisation believed that H&S promotion by means of pamphlets and posters is not an effective tool and rather promoted H&S through signage, induction training and toolbox talks.

Table 6.4: Case Study 2 Pricing and Cost Allocation of Construction H&S Requirements

	Yes	No	Prelims	Trade rates	Not allocated	% of total project cost allocation
1. Staffing						
1.1 H&S mandatory appointments	X		X			
1.2 H&S officer	X		X			0.06%
1.3 H&S representative/s	X		X			0.12%
1.4 H&S committee		X			X	
1.5 H&S committee meetings		X			X	
2. Training						
2.1 Compulsory/mandatory training costs	X				X	
2.1 In-house training costs	X				X	
2.2 Toolbox talks	X				X	
2.3 Induction training	X				X	
3. Promotion						
3.1 H&S policy	X		X			0.01%
3.2 H&S signage	X		X			0.01%
3.3 H&S pamphlets and posters		X			X	
3.4 HIV and AIDS management program		X			X	
3.5 Medical surveillance program	X		X			
4. Equipment						
4.1 Fall arrest equipment	X		X			0.04%
4.2 Fall prevention measures	X		X			
4.3 Personal protective equipment	X		X			0.02%
5. Project						
5.1 H&S plan	X		X			0.01%
5.2 H&S file	X		X			
5.3 H&S specification	X		X			
5.4 Hazard Identification and Risk Assessment (HIRA)	X		X			
5.5 H&S inspections	X		X			
5.6 H&S audits	X		X			
5.7 H&S reports	X		X			
5.8 Safe work or operating procedures (SWPs or SOPs)	X		X			
5.9 Material Safety Data Sheet (MSDS) management	X		X			
5.10 Medical certificate of fitness	X		X			0.02%
5.11 Fall protection plan	X		X			
5.12 Demolition plan	X		X			
5.13 Temporary support plan	X		X			
5.14 Excavation and lateral support plan	X		X			
5.15 Waste management plan (WMP)	X		X			0.14%
5.16 Environmental management plan (EMP)	X		X			
5.17 Notification of construction work	X		X			

On this specific project, the HIV and AIDS management program was administered through the client organisation and the organisation did make their employees aware of this service. Access to and operations on the site could not take place without having undergone a medical surveillance program which is accredited. The organisation stated that all H&S costs are tracked as individual line items by means of cost codes/centres.

6.3.5 Additional Measures Introduced since the Promulgation of the Construction Regulations Affecting the Pricing Strategy/Approach of Construction Activities

Table 6.5 indicates whether additional measures which were introduced or considered since the promulgation of the Construction Regulations affected the pricing strategy/approach of construction activities and to what extent the additional measures influenced the costs with respect to the construction activities.

Table 6.5: Case Study 2 Additional Measures Introduced and Cost Influence on Construction Activities

Construction activity	Yes	No	% Variation
Activities involving working at heights	X		0.1%
Excavation and earthwork		X	
In-situ cast reinforced concrete slabs		X	
Formwork erection and removal		X	
Reinforcing steel fixing		X	
Steel erection		X	
Demolition work		X	
Temporary works		X	
Brickwork		X	
Plastering		X	
Glazing		X	
Roof construction		X	
Ceiling erection		X	
Wall and floor tiling		X	
Crane erection		X	

According to the organisation, since the promulgation of the Construction Regulations, the construction activity involving working at heights was a very costly construction activity on the project due to additional measures by the client organisation having only recognised two accredited training organisations in South Africa, one situated in Kwa-Zulu Natal and the other situated in Gauteng, and as a result, the organisation was compelled to only use the client nominated training organisation even though there are other training organisations available. This led to a 0.1% variation due to the additional measures taken.

6.3.6 H&S Statements

In Table 6.6 the organisation was requested to indicate to what extent they agree with the following statements where 1 = strongly disagree and 5 = strongly agree.

The inclusion of a financial provision for H&S, irrespective of whether reference was or was not made to H&S in the tender documentation, has not resulted in the organisation's bids being unsuccessful. This is due to the market within which the organisation operates. The organisation stated that where unknown H&S requirements were specified in tender documentation, the organisation would familiarise themselves with the requirements to enable the organisation to price adequately for the H&S requirements.

The organisation believed that H&S officers who practiced a performance based approach to H&S led to less incidents and was more cost effective. A prescriptive based approach by H&S officers tended to become very costly especially in terms of lost time. The organisation further stated that there was inconsistency with regards to the interpretation of the implementation of legislation which tended to influence the costs with regards to H&S. Regarding the project, according to the organisation, the client organisation believed that reports on all types of incidents demonstrated the awareness of H&S and its importance.

Table 6.6: Case Study 2 H&S Statements

Statement	1	2	3	4	5	Unsure
A detailed H&S section should be included in the Preliminaries					X	
A provisional sum should be provided for H&S in the preliminaries					X	
Competitive tendering marginalises H&S		X				
Competitive tendering without reference to H&S marginalises H&S		X				
Standard contract documentation generally makes cursive reference to H&S				X		
H&S specifications are project specific					X	
H&S specifications are included with tender documentation					X	
Contractors are afforded the opportunity to price items included in H&S specifications on an equitable basis				X		
H&S financial provision by contractors results in unsuccessful tenders/bids		X				
H&S specifications include designer 'design and construction' method statements					X	
H&S specifications highlight hazards*					X	
Tender documents always allow for H&S costs to be shown					X	
Pricing for H&S in tenders makes bids less competitive		X				
Clients should include the same amount for H&S so tenderers are not disadvantaged					X	
Appropriate contract documentation promotes H&S					X	
Contractors do not know enough to price adequately for H&S		X				
Contract documentation does not promote H&S		X				
Contract document enabled financial provision for H&S promotes H&S				X		
The implementation of the Construction Regulations has resulted in a positive change in performance with regards to H&S track record				X		

* Hazards include among other, hazardous chemical substances in materials, heavy blocks and / or kerb stones

6.3.7 Summary

The organisation indicated that they compute the percentage that H&S constitutes in the tender cost estimate and in the project cost ranging from 0.5% to 0.75%. The project parameters namely, time and utility are very important parameters within the organisation, with H&S and quality indicated as important. Project cost, environment and construction ergonomics was indicated as neutral importance. The organisation believed that the overall cost of construction

increased by >0% - ≤10% as a result of compliance with the requirements of the construction H&S legislative framework.

The organisation believed that H&S should be treated as a trade within the tender documentation as H&S legislative requirements has a definite cost implication on the overall project. The organisation further believed that induction training should accommodate the language diversity of South Africa by offering induction training in the home language of the labourers to ensure full understanding of the importance of H&S. A shortcoming identified by the organisation was that induction training mostly takes place in the English language which is often not fully understood by the labourers resulting in increased monitoring of the labourers which has an influence on cost in terms of productivity. A further shortcoming identified on the project was the issuing of permits which resulted in lost productive time.

6.4 Case Study No. 3

6.4.1 Company Profile

The organisation is the oil and gas sector of a multidisciplinary building company employing on average 134 permanent employees and executing ten (10) contracts per year. The organisation works both in the public and private sector with 20% of their work sourced through negotiated/private tenders and 80% of their work sourced through public tenders. The organisation has been awarded a grading of nine (9) with the Construction Industry Development Board (CIDB). The organisation executes most of its projects in the Kwa-Zulu Natal region. The SHEQ manager of the organisation was interviewed for this case study, with input from the estimator regarding cost allocations for H&S.

6.4.2 Company Knowledge of Construction H&S Legislative Framework

The organisation rates its knowledge of the constitution and COID 1993 as knowledgeable but has a good knowledge rating of the OHS Act, Construction Regulations 2003 and Construction Regulations 2014. The organisation stated that complying with the provisions of the Construction H&S Legislation in terms of the constitution, OHS Act and COID 1993 has had a high impact on construction costs. The organisation further stated that the Construction Regulations 2003 and Construction Regulation 2014 has had a major impact on the construction

costs. The organisation stated that it always considers the compliance requirements of the Constitution, OHS Act, Construction Regulations 2003, Construction Regulations 2014 and COID 1993 when compiling a competitive bid.

6.4.3 Project Profile

The specific project chosen to discuss H&S costings was a feeder line project. The work consisted of the fabrication and installation of 16,498m of fuel feeder pipeline. The project value was estimated to be R131,100,000 with an estimated project duration of ten (10) months at tender stage. There were one hundred and eighteen (118) staff/labourers employed on the project. The pricing strategy applied to the project was that of a competitive bid compilation in terms of cost and time. At the time of tender there were four (4) bidders including the organisation. There were four (4) subcontractors employed on the project namely hydro testing, painting, structural steel fabrication and pipe fabrication. The H&S component of the project came to an approximate value of R1,240,000 which included the cost of personal protective equipment, inductions and badging, medicals, notice boards and signage, regulatory requirements for fire extinguishers and first aid boxes, and waste skips. There was approximately nine hundred thousand (900,000) Lost Time Injury (LTI) free hours with one (1) medical treatment case.

6.4.4 Pricing and Cost Allocation of Construction H&S Requirements

Table 6.7 indicates whether construction H&S requirements were priced on the project, and where those costs were allocated.

The cost of the H&S committee and committee meetings would be the rate of pay against the time spent on this requirement however the organisation does not extrapolate this cost to be reflected as a separate line item cost. The same occurs for the H&S plan. In-house training costs are funded from the skills development fund and not specifically allocated to the project. However, the organisation stated that the training costs, costs associated with HIV and AIDS management program and costs for medical certificates for direct field staff/labour would be project specific and allocated to the trade rates.

Table 6.7: Case Study 3 Pricing and Cost Allocation of Construction H&S Requirements

	Yes	No	Prelims	Trade rates	Not allocated	% of total project cost allocation
1. Staffing						
1.1 H&S mandatory appointments	X		X			0.52%
1.2 H&S officer	X		X			
1.3 H&S representative/s		X			X	
1.4 H&S committee		X			X	
1.5 H&S committee meetings		X			X	
2. Training						
2.1 Compulsory/mandatory training costs	X		X	X		0.07%
2.1 In-house training costs		X	X	X		
2.2 Toolbox talks		X	X	X		
2.3 Induction training	X		X	X		
3. Promotion						
3.1 H&S policy	X		X			0.01%
3.2 H&S signage	X		X			
3.3 H&S pamphlets and posters	X		X			
3.4 HIV and AIDS management program	X		X	X		
3.5 Medical surveillance program	X		X			
4. Equipment						
4.1 Fall arrest equipment	X			X		0.31%
4.2 Fall prevention measures	X			X		
4.3 Personal protective equipment	X			X		
5. Project						
5.1 H&S plan		X			X	0.05%
5.2 H&S file	X		X			
5.3 H&S specification	X		X			
5.4 Hazard Identification and Risk Assessment (HIRA)	X		X			
5.5 H&S inspections	X		X			
5.6 H&S audits	X		X			
5.7 H&S reports	X		X			
5.8 Safe work or operating procedures (SWPs or SOPs)	X		X			
5.9 Material Safety Data Sheet (MSDS) management	X		X			
5.10 Medical certificate of fitness	X		X	X		
5.11 Fall protection plan	X		X			
5.12 Demolition plan	X		X			
5.13 Temporary support plan	Not Applicable					
5.14 Excavation and lateral support plan	Not Applicable					
5.15 Waste management plan (WMP)	X		X			
5.16 Environmental management plan (EMP)	X		X			
5.17 Notification of construction work	X		X			

6.4.5 Additional Measures Introduced since the Promulgation of the Construction Regulations Affecting the Pricing Strategy/Approach of Construction Activities

Table 6.8 indicates whether additional measures which were introduced or considered since the promulgation of the Construction Regulations affected the pricing strategy/approach of construction activities and to what extent the additional measures influenced the costs with respect to the construction activities.

Table 6.8: Case Study 3 Additional Measures Introduced and Cost Influence on Construction Activities

Construction activity	Yes	No	% Variation
Activities involving working at heights	X		0%
Excavation and earthwork			
In-situ cast reinforced concrete slabs			
Formwork erection and removal			
Reinforcing steel fixing			
Steel erection		X	
Demolition work		X	
Temporary works			
Brickwork			
Plastering			
Glazing			
Roof construction			
Ceiling erection			
Wall and floor tiling			
Crane erection		X	

During the project, a design change regarding working at heights took place which resulted in the organisation having to appoint a specialist to sign off the scaffold design. The organisation did not incur any costs however, the scaffolding subcontractor may have incurred costs. Due to the nature of the work executed by the sector within the organisation, the construction activities list as follows are not applicable to the sector:

- Excavation and earthwork

- In-situ cast reinforced concrete slabs
- Formwork erection and removal
- Reinforcing steel fixing
- Temporary works
- Brickwork
- Plastering
- Glazing
- Roof construction
- Ceiling erection
- Wall and floor tiling

6.4.6 H&S Statements

In Table 6.9 the organisation was requested to indicate to what extent they agree with the following statements where 1 = strongly disagree and 5 = strongly agree.

The organisation believed that the H&S requirements can be measured and should therefore not be included as a provisional sum in the preliminaries. The nature of the sector requires H&S to be visible. In some instances, client organisations in this sector would not allow contracting organisations to tender if the organisation is not able to demonstrate that H&S is the top priority within the organisation. Unsuccessful tenders would not be because of H&S financial provisions made by the contractors. Rather, the non-financial provision of H&S in this sector may lead to unsuccessful bids.

Table 6.9: Case Study 3 H&S Statements

Statement	1	2	3	4	5	Unsure
A detailed H&S section should be included in the Preliminaries					X	
A provisional sum should be provided for H&S in the preliminaries		X				
Competitive tendering marginalises H&S		X				
Competitive tendering without reference to H&S marginalises H&S					X	
Standard contract documentation generally makes cursive reference to H&S	X					
H&S specifications are project specific					X	
H&S specifications are included with tender documentation					X	
Contractors are afforded the opportunity to price items included in H&S specifications on an equitable basis	X					
H&S financial provision by contractors results in unsuccessful tenders/bids	X					
H&S specifications include designer 'design and construction' method statements					X	
H&S specifications highlight hazards*					X	
Tender documents always allow for H&S costs to be shown					X	
Pricing for H&S in tenders makes bids less competitive	X					
Clients should include the same amount for H&S so tenderers are not disadvantaged	X					
Appropriate contract documentation promotes H&S					X	
Contractors do not know enough to price adequately for H&S	X					
Contract documentation does not promote H&S	X					
Contract document enabled financial provision for H&S promotes H&S					X	
The implementation of the Construction Regulations has resulted in a positive change in performance with regards to H&S track record					X	

* Hazards include among other, hazardous chemical substances in materials, heavy blocks and / or kerb stones

6.4.7 Summary

The organisation indicated that they compute the value that H&S constitutes in the tender cost estimate and in the project cost but not on a percentage basis. All the project parameters namely, cost, environment, construction ergonomics, H&S, quality, time and utility are very important parameters within the organisation. The organisation believed that the overall cost of

construction increased by >0% - ≤10% as a result of compliance with the requirements of the construction H&S legislative framework.

The organisation has incurred costs with regards to the H&S staff being required to be registered with the South African Council for the Project and Construction Management Professionals (SACPCMP). Due to the volatile nature of the oil and gas industry in terms of material handling, the issuing of permits is a very important aspect of construction within this industry as the permits reflect all relevant and required information pertaining to the construction of works. The organisation identified a shortcoming with the issuing of permits namely lost productive time. This is however tracked and costs allocated against. A project post mortem takes place at the end of every project to compile historical data including cost data to enable the organisation to improve on the next project.

6.5 Chapter Summary

All three organisations strongly agreed that a detailed H&S section should be included in the preliminaries. Two of the organisations even went so far in stating that H&S should be treated as a trade within the tender documentation as H&S legislative requirements has a definite cost implication on the overall project.

The organisations in case study two (2) and three (3) disagreed that competitive tendering marginalises H&S and the organisations in case study one (1) and three (3) strongly agreed that competitive tendering without reference to H&S marginalises H&S. The organisations in case study two (2) and three (3) further disagreed that H&S financial provision by contractors results in unsuccessful tenders/bids whereas the organisation in case study one (1) strongly agreed that H&S financial provision by contractors results in unsuccessful tenders/bids. This could be due to the nature of the project referred to in case study two (2) and three (3) where industrial projects have stringent H&S requirements. Similarly, case study two (2) and three (3) reflected that pricing for H&S in tenders does not make bids less competitive whereas case study one (1) reflected that pricing for H&S in tenders does make bids less competitive.

According to case study two (2) and three (3), the implementation of the construction regulations has resulted in a positive change in performance with regards to H&S track record.

All three case studies reflected that the overall cost of construction increased by >0% - ≤10% as a result of compliance with the requirements of the construction H&S legislative framework.

CHAPTER 7 : CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This chapter provides a summary of the key findings and conclusions of the study, and provides recommendations for future studies relative to the research objectives. The purpose of the study was to investigate the impact of the construction H&S regulatory framework on construction costs. Globally, safety and health regulations have been subjected to major revisions during the last three decades. The South African Construction Regulations were promulgated on 18 July 2003 in terms of section 43 of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and amended on 7 February 2014. Since the introduction of very specific H&S regulations in the South African construction industry, there are, as far as the researcher is aware, very few, if any, studies which have quantified the cost of the implementation of the provisions of this legislation.

7.2 The Problem Statement

The problem statement that formed the basis of the study is restated as follows:
The magnitude of the additional construction costs as a result of the implementation of the provisions of the current H&S regulatory framework in South Africa has to date not been investigated or determined resulting in all construction project participants not being aware of how much would be adequate for the H&S provisions required.

7.3 The Hypotheses of the Study

The hypotheses to be tested in the study were:

H1 - Compliance with the current construction H&S legislative framework in South Africa affects the cost of construction.
H2 - Contractors are unaware of the extent of the provision for H&S in their bids / projects.
H3 - Contractors do not account for the cost of compliance with the construction H&S legislative framework.

7.4 The Research Objectives

The study research objectives were:

- To determine whether the H&S framework has requirements that involve cost;
- To determine whether contractors implement the requirements of the H&S framework;
- To determine whether implementation of the H&S framework increases the cost of construction;
- To determine to what extent the implementation of the H&S framework increases the cost of construction; and

7.5 Hypotheses Testing

7.5.1 Hypothesis One

Hypothesis One : Compliance with the current construction H&S legislative framework in South Africa affects the cost of construction.

This study found that complying with the provisions of the legislative framework namely OHS Act, Construction Regulations and COID, had a moderate impact on the overall cost of construction. The impact has resulted in a reported 10% increase in construction costs.

According to a study undertaken by Guasch and Hahn (1999), compliance with regulations are in practice prohibitively expensive and the extra precautions are considered an unnecessary cost especially when they would apply only in some cases. In a report released by the CIDB (2009) designers and contractors viewed regulations as additional burdens with which they must comply and involve additional cost. Studies have shown that the true costs of construction injuries can have a substantial impact on the financial success of a construction organization and may increase overall construction costs by as much as 15% (Everett and Frank, 1996). Hinze (2006) suggested that the level of H&S investment should range between 1% and 10% of the project cost. Smallwood (2004) estimated that the cost of implementing H&S systems within a construction company lies between 0.5% and 3% of total project costs.

The findings of the study in terms of this hypothesis are supported by literature and previous studies. Therefore, the hypothesis that compliance with the current construction H&S legislative framework in South Africa affects the cost of construction cannot be rejected.

7.5.2 Hypothesis Two

Hypothesis Two : Contractors are unaware of the extent of the provision for H&S in their bids / projects.

This study has shown that 82.8 % and 79.3% of the contractors did not compute the extent of the provision for H&S in their tender cost estimates and project costs respectively. This finding is indicative of the lack of knowledge of the industry of the necessary financial provision for effective management of construction H&S on their projects as well as the need to track these costs. The findings further suggest that the respondents would have difficulty in complying with the requirements of the H&S legislative framework given their less than excellent knowledge of the various pieces of legislation. It is likely that they would not know the extent of the requirements that they would have to comply with. Furthermore, it is likely that different interpretations, of the extent of the requirements and of the costs which should be included as investments in H&S, exist. To overcome this lack of knowledge and difference in interpretation it is likely that there is a preference for a detailed H&S section in the bill of quantities, or at the very least, a provisional sum for H&S.

Fairman and Yapp (2005) reported that the reasons for non-compliance were a lack of 'awareness' of legislative requirements, or inadequate knowledge about how to comply with requirements. They found that 'awareness' meant not being able to relate legislative requirements to individual business operations.

The findings of the study in terms of this hypothesis are supported by literature and previous studies. Therefore, the hypothesis that contractors are unaware of the extent of the provision for H&S in their bids / projects cannot be rejected.

7.5.3 Hypothesis Three

Hypothesis Three : Contractors do not account for the cost of compliance with the construction H&S legislative framework

This study has found that many of the construction H&S cost requirements as extrapolated from the legislation were not tracked for example the cost associated with H&S committees, and H&S committee meetings. Very few contractors indicated the H&S cost as a percentage of the total project cost which suggested that the costs were not tracked.

Hammond et al. (2011) state that there are expenses incurred directly by contractors in order to prevent accidents. However, the value of these expenses resulting from compliance with the Construction Regulations and OH&S Act, and the impact on construction costs is unknown. Lingard and Rowlinson (2005) stated that the way in which contractors price work often failed to account for project H&S requirements. Brook (1993, cited in Lingard and Rowlinson, 2005) further stated that it is common for the unit rate estimated for an activity to ignore H&S issues.

The findings of the study in terms of this hypothesis are supported by literature and previous studies. Therefore, the hypothesis that contractors do not account for the cost of compliance with the construction H&S legislative framework cannot be rejected.

7.6 Recommendations

Based on the research findings from this study, the following are recommended:

- Where the traditional procurement strategy/system is being applied by clients which involves bills of quantities, the quantity surveying fraternity needs to ensure that they are academically prepared and knowledgeable enough to be able to produce a detailed H&S bill much in the same way as they do trade bills. The benefit of this approach would be to provide an equitable basis on which the H&S requirements of projects can be priced by contractors and adjudicated so that clients are in a better position to appoint contractors on the basis of adequate provision for construction H&S as required by the H&S legislative framework.
- Where other forms of procurement are used more innovative and informative bases need to be developed to enable contractors to make adequate allowance for H&S without prejudicing their chances of securing work, informed adjudication processes and ease of client decisions to appoint a contractor on the basis of adequate provision for construction H&S as required by the H&S legislative framework.

- Contract documents currently in use in the South African construction sector such as the Joint Building Contract Committee (JBCC) suite of contracts, General Conditions of Contract (GCC) and New Engineering Contract (NEC) must make appropriate reference to and allowance for H&S financial provision.

This suite of recommendations will enable contractors to make adequate and proper allowance for the H&S legislative and project requirements in their project bids enhancing the likelihood of these costs being tracked.

7.7 Recommendations for Future Study

- The survey should be expanded from a provincial to a national level and should include all stakeholders and not just contractors.

7.8 Conclusions

From the findings of the study, it can be concluded that the H&S framework has requirements that involve cost. It can further be concluded that contractors implement the requirements of the H&S framework to the extent of their knowledge and understanding only of these requirements. Implementation of the H&S framework increases the cost of construction. It has not been possible to determine to what exact extent the implementation of the H&S framework increases the cost of construction because of the failure of contractors to track these costs accurately. Many of them did not allocate costs specifically to items requiring them to do so by the legislative and regulatory framework. However, the findings suggest that the increase in cost could be in the region of 10%. The findings are indicative of the lack of knowledge and understanding of the legislative and regulatory requirements of the South African construction H&S framework by contractors in KZN but due to the small sample size may not be conclusive, precise or generalizable to the entire construction industry. This knowledge and awareness deficiency results in possible inadequate financial provision for H&S in competitive bids or on projects. Further, clients are not in a position to comply with the framework that requires them to ensure that contractors have made adequate financial provision for H&S because of no uniform approach to allowing contractors to price for H&S.

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APPENDIX A : ETHICAL CLEARANCE

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

16 May 2016

Mrs Elke Helene Hefer 215082611
School of Engineering
Howard College Campus

Dear Mrs Hefer

Protocol reference number: HSS/0495/016M
Project Title: The impact of the Construction Health and Safety Regulatory Framework on Construction Costs

Full Approval – Expedited Application

In response to your application received 29 April 2016, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....

Dr Shamila Naidoo (Deputy Chair)
Humanitities & Social Scinces Research Ethics Committee

/pm

Cc Supervisor: Professor TC Haupt
Cc Academic Leader Research: Professor Christina Trois
Cc School Administrator: Ms Fiona Higgins

APPENDIX B : SAMPLE OF QUESTIONNAIRE INSTRUMENT

The following is an example of the instrument which was utilised to conduct the questionnaire survey and case study interviews.

26 June 2016

Confidentiality Agreement for Research Project:

The Impact of the Construction Health and Safety Regulatory Framework on Construction Costs

To Whom It May Concern:

I, Elke Helene Hefer, am currently registered for studies leading to the Masters in Quantity Surveying. A requirement to be met in the awarding of the Masters in Quantity Surveying is that an approved research project should be undertaken leading to a submission of a dissertation.

The study involves the impact of the construction health and safety regulatory framework on construction costs. The study is significant in that the findings will contribute to the existing body of knowledge by providing an understanding of the H&S framework and which aspects of the framework involve costs. A further contribution will be given through the determination of the implementation of the H&S framework requirements and to what extent the implementation has an impact on construction costs. The findings of the study will enable industry stakeholders to understand and know the implementation costs which will further enable industry to make adequate provision for the protection / health and safety of the workers. The findings will further enable industry stakeholders to have a deeper understanding of the underpinning philosophy of the regulations derived from a combination of prescriptive and performance legislation which will have an impact on the calculation of the cost of compliance. Sustainability of the construction industry will be improved through the understanding and knowledge of the implementation costs of the H&S framework**.**

Please note that only summary data will be included in the report and that your name will not be included. Your anonymity and confidentiality is of utmost importance and will be maintained throughout the study. Your participation in the study is completely voluntary. You also have the right to withdraw at any time during the study.

Please note that this investigation is being conducted in my personal capacity. Should you need to contact me regarding any aspect of this research, you can do so either by email on: 215082611@stu.ukzn.ac.za or telephonically on: 084 232 0007

My academic supervisor is Prof. Theo Haupt, based in the School of Engineering on the Howard campus of the University of KwaZulu Natal. He can be contacted by email at: haupt@ukzn.ac.za or telephonically at: 031 260 2687

I would highly appreciate your participation, as it would help me to complete this research project. I appreciate the time and effort it will take for you to participate in this study.

Regards,

Elke Hefer (Student Number 215082611)

Supervisor: Prof Theo Haupt

Part 1 – Profile / Demographics

1.1 How many permanent employees on average are employed in your organisation? _____

1.2 What was the average turnover of your organisation over the last five years? _____

1.3 How many contracts on average are executed per year? _____

1.4 What percentage of your work is sourced as follows?

Negotiated	Private	Public
_____%	_____%	_____%

1.5 What is your CIDB grading? _____

1.6 In which region do you execute most of your projects?

Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape

Part 2 – Knowledge of Construction Health and Safety Legislative Framework

2.1 Rate your knowledge of the following (1 = no knowledge and 5 = excellent knowledge)

Legislation	1	2	3	4	5
Constitution					
OHS Act					
Construction Regulations 2003					
Construction Regulations 2014					
COID 1993					

2.2 To what extent does complying with the provisions of the following impact the overall cost of construction (1 = no impact and 5 = major impact)?

Legislation	1	2	3	4	5	Unsure
Constitution						
OHS Act						
Construction Regulations 2003						
Construction Regulations 2014						
COID 1993						

2.3 How frequently do you consider the compliance requirements of the following when compiling a competitive bid (1 = never and 5 = always)?

Legislation	1	2	3	4	5	Unsure
Constitution						
OHS Act						
Construction Regulations 2003						
Construction Regulations 2014						
COID 1993						

Part 3 – Cost Elements

3.1 Do you price for the following construction health and safety requirements?

	Yes	No	Unsure
1. Staffing			
1.1 Health and Safety mandatory appointments			
1.2 Health and Safety officer			
1.3 Health and Safety representative/s			
1.4 Health and Safety committee			
1.5 Health and Safety committee meetings			
2. Training			
2.1 Compulsory/mandatory training costs			
2.1 In-house training costs			
2.2 Toolbox talks			
2.3 Induction training			
3. Promotion			
3.1 Health and safety policy			
3.2 Health and safety signage			
3.3 Health and safety pamphlets and posters			
3.4 HIV and AIDS management program			
3.5 Medical surveillance program			
4. Equipment			
4.1 Fall arrest equipment			
4.2 Fall prevention measures such as guard rails, barriers and toeboards			
4.3 Personal protective equipment			
5. Project			
5.1 Health and safety plan			
5.2 Health and safety file			
5.3 Health and safety specification			
5.4 Hazard Identification and Risk Assessment (HIRA)			
5.5 Health and safety inspections			
5.6 Health and safety audits			
5.7 Health and safety reports			
5.8 Safe work or operating procedures (SWPs or SOPs)			
5.9 Material Safety Data Sheet (MSDS) management			
5.10 Medical certificate of fitness			
5.11 Fall protection plan			
5.12 Demolition plan			
5.13 Temporary support plan			
5.14 Excavation and lateral support plan			
5.15 Waste management plan (WMP)			
5.16 Environmental management plan (EMP)			
5.17 Notification of construction work			

3.2 Where do you allocate these costs?

	Prelims	Trade rates	Not allocated	Unsure	% of total project cost allocation
1. Staffing					
1.1 Health and Safety mandatory appointments					
1.2 Health and Safety officer					
1.3 Health and Safety representative/s					
1.4 Health and Safety committee					
1.5 Health and Safety committee meetings					
2. Training					
2.1 Compulsory/mandatory training costs					
2.1 In-house training costs					
2.2 Toolbox talks					
2.3 Induction training					
3. Promotion					
3.1 Health and safety policy					
3.2 Health and safety signage					
3.3 Health and safety pamphlets and posters					
3.4 HIV and AIDS management program					
3.5 Medical surveillance program					
4. Equipment					
4.1 Fall arrest equipment					
4.2 Fall prevention measures					
4.3 Personal protective equipment					
5. Project					
5.1 Health and safety plan					
5.2 Health and safety file					
5.3 Health and safety specification					
5.4 Hazard Identification and Risk Assessment (HIRA)					
5.5 Health and safety inspections					
5.6 Health and safety audits					
5.7 Health and safety reports					
5.8 Safe work or operating procedures (SWPs or SOPs)					
5.9 Material Safety Data Sheet (MSDS) management					
5.10 Medical certificate of fitness					
5.11 Fall protection plan					
5.12 Demolition plan					
5.13 Temporary support plan					
5.14 Excavation and lateral support plan					
5.15 Waste management plan (WMP)					
5.16 Environmental management plan (EMP)					
5.17 Notification of construction work					

3.3 Since the promulgation of the Construction Regulations 2003 and Construction Regulations 2014, as far as you are aware have any additional measures been introduced or considered that have affected your pricing strategy/approach to the following construction activities?

Construction activity	Yes	No	Unsure
Activities involving working at heights			
Excavation and earthwork			
In-situ cast reinforced concrete slabs			
Formwork erection and removal			
Reinforcing steel fixing			
Steel erection			
Demolition work			
Temporary works			
Brickwork			
Plastering			
Glazing			
Roof construction			
Ceiling erection			
Wall and floor tiling			
Crane erection			

3.4 To what extent have the additional measures influenced the costs with respect to the following construction activities (indicate the % variation)

Construction activity	%
Activities involving working at heights	
Excavation and earthwork	
In-situ cast reinforced concrete slabs	
Formwork erection and removal	
Reinforcing steel fixing	
Steel erection	
Demolition work	
Temporary works	
Brickwork	
Plastering	
Glazing	
Roof construction	
Ceiling erection	
Wall and floor tiling	
Crane erection	

3.5 To what extent do you agree with the following statements where 1= strongly disagree and 5= strongly agree **(please note the 'unsure' response)**?

Statement	1	2	3	4	5	Unsure
A detailed H&S section should be included in the Preliminaries						
A provisional sum should be provided for H&S in the preliminaries						
Competitive tendering marginalises H&S						
Competitive tendering without reference to H&S marginalises H&S						
Standard contract documentation generally makes cursive reference to H&S						
H&S specifications are project specific						
H&S specifications are included with tender documentation						
Contractors are afforded the opportunity to price items included in H&S specifications on an equitable basis						
H&S financial provision by contractors results in unsuccessful tenders/bids						
H&S specifications include designer 'design and construction' method statements						
H&S specifications highlight hazards*						
Tender documents always allow for H&S costs to be shown						
Pricing for H&S in tenders makes bids less competitive						
Clients should include the same amount for H&S so tenderers are not disadvantaged						
Appropriate contract documentation promotes H&S						
Contractors do not know enough to price adequately for H&S						
Contract documentation does not promote H&S						
Contract document enabled financial provision for H&S promotes H&S						
The implementation of the Construction Regulations has resulted in a positive change in performance with regards to H&S track record						

* Hazards include among other, hazardous chemical substances in materials, heavy blocks and / or kerb stones

3.6 Does your organization compute the percentage that H&S constitutes of the following **(please note the 'unsure' response. If 'Yes', please record the percentage in the adjacent cell)**?

Cost type	Unsure	No	Yes	Percentage
Tender cost estimate				_____%
Project cost				_____%

3.7 On a scale of **1 (not)** to **5 (very)**, how important are the following project parameters to your organization **(please note the 'unsure' option)**?

Parameter	**Unsure**	**Not …… Very**				
		1	**2**	**3**	**4**	**5**
Project cost						
Environment						
Construction ergonomics						
Project H&S						
Project quality						
Project time						
Project utility (fit-for-purpose)						

3.8 By what percentage has the overall cost of construction increased as a result of compliance with the requirements of the construction health and safety legislative framework?

Unsure	0%	>0% <= 10%	>10% <= 20%	>20% <= 30%	>30% <= 40%	>40% <= 50%	>50% <= 60%	>60% <= 70%	>70% <= 80%	>80% <= 90%	>90% < 100%	100%

Part 4 – Additional Information

4 Do you have any comments in general regarding the impact the current H&S regulatory framework has on construction costs?

Please record your details below to facilitate contacting you, in the event that a query should arise.
Please note that the data provided in this questionnaire will be treated in the strictest confidence.

ORGANISATION: _____

MAIN CONTRACTOR ☐ SUBCONTRACTOR ☐ OTHER _____ ☐

(Please Specify)

ADDRESS: _____ PHONE: ( ) _____

_____ FAX: ( ) _____

_____ MOBILE: _____

_____ E-MAIL: _____

CONTACT PERSON: _____

DECLARATION OF CONSENT

I_____(Full Name)
hereby confirm that I have read and understand the contents of the letter and the nature of the research project has been clearly defined prior to participating in this research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

Participants Signature_____

Date_____