THE CONSTRUCTION HEALTH AND SAFETY REGULATION 2014 IMPACT ON CONSTRUCTION WORKERS WELL-BEING

BY

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PREFACE

This research has not been previously accepted for any degree and is not being currently considered for any other degree at any other university.
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I, Mohlomi Terah Raliile, declare that:

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iii. this dissertation does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons;
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DECLARATION 2: PUBLICATIONS

This section presents the details of contribution to publications that form part and/or include research presented in this thesis (include publications in preparation, submitted, in press and published and give details of the contributions of each author to the writing of each publication).

Publication 1

Raliile, MT*. and Haupt, T. (2019). Analysis of Recent Construction Regulation Changes and Their Impact On the Quality of Life of Construction Workers, 1st Association of Researchers in Construction Safety, Health and Wellbeing (ARCOSH) Conference at: Cape Town, South Africa, 3rd to 4th June 2019.

Publication 2

Raliile, MT*. and Haupt, T. (2019). Impacts of Recent Construction Health and Safety Legislation Changes On Construction Workers' Health and Wellbeing, organised by Association of Schools of Construction in Southern Africa (ASOCSA) Conference at: Durban, South Africa from 2nd to 3rd September 2019 (In Press).

Publication 3

Raliile, MT*, Haupt, T., and Akinlolu, M. (2019). Analysis of Recent Construction Health and Safety Legislation Changes, Their Impact On Performance Improvement, hosted by The 8th International Conference on Construction Engineering and Project Management (ICCEPM) Dec. 8-10, 2019, Hong Kong SAR (In Press).

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Student…… **Date…….**

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ABSTRACT

Globally, the construction industry is considered as one of the most dangerous industries. The industry is known to be a challenging regime in which to practice adequate health and safety as work activities take place in hazardous environments with exposures to heights; changing weather conditions and different locations. More so, construction workers are always expected to cope with the changing environments and different scopes of work. The construction industry is perceived to be fragmented, unfair and unpredictable regarding the adequate protection of construction site workers, often violating their fundamental human right. Recent construction H&S legislation in South Africa has been amended in an effort to achieve optimum health and safety throughout all construction project phases. However, it would appear that the primary purpose for compliance with health and safety legislation requirements among contractors is to avoid penalties and for profit maximisation. The purpose of this study was to analyse the recent construction H&S legislation changes (Construction Regulations 2014) and their impact of on construction workers' quality of life, wellbeing and their sustainability within the South African construction industry. An extensive review of literature on the topic was conducted from online databases, books, articles, reports and other studies. Furthermore, a quantitative study was employed and data were analysed using IBM Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics was adopted for the data analysis and further interpreted using inferential statistics. The total sample size for the study was 120 participants (80 managers and 40 construction workers) where a total of 80 construction companies in the Kwa-Zulu Natal province were conveniently sampled based on proximity and familiarity. The response rate for the study was 78.3%. A total of 64 managers (as representatives of the companies) and 30 construction workers completed close-ended questionnaires. Cronbach's Alpha reliability test was used to determine the internal consistency of the constructs that had been used to analyse compliance and impact of legislative changes on construction workers wellbeing and the internal consistency of the various scales was deemed acceptable for interpretation. Independent t-test was done to determine the statistical significance of the means between management and construction workers' responses. There was an overall statistical significance suggesting that both management and construction workers shared the same views on the impact of H&S legislation on construction workers wellbeing; onsite facilities; the level of compliance with the construction regulations 2014 onsite, and workers wellbeing. However, the respondents did not share the same views on whether there was management commitment; availability of H&S policies onsite; workers' involvement in H&S inspections, and also if there was sufficient knowledge of the construction

H&S legislation. Furthermore, the means from both respondents suggested the need to improve in all constructs. A Spearman's correlation was also conducted to determine any correlations and statistical significance between the constructs of the study. The findings indicated that the impact of the construction regulations 2014 on workers' wellbeing has not yet been determined to date. However, a statistical significance between the level of compliance with the regulations suggested there was a positive impact on improving construction workers wellbeing. The findings further indicated that there is a need for more knowledge on H&S legislation among management and workers as this significantly improves workers' wellbeing. However, a negative correlation between knowledge of H&S legislation and workers' involvement suggested that it might not be in the best interest for the contractors to see workers gaining more knowledge. Also, management did not allow enough budget to improve workers wellbeing and did not see the need to improve onsite facilities, and this might have been influenced by the good and healthy state of workers. Furthermore, it could be that workers were not demanding better site facilities. However, it was agreed that management commitment to legislation contributed extensively towards improving workers' quality of life and wellbeing as the main issue lies with the level of compliance which has a direct impact on implementation. Based on the findings, the paper proposes measures for contractors to engender full compliance and apply all aspects of the construction regulations; improve working conditions, consider the health and wellbeing of workers and treat health and safety as a value and not just a priority.

Keywords: Health and Safety, Legislation, Workers Wellbeing, Sustainability, Performance improvement

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

The construction industry is one of the largest global economies with an estimated $10 trillion spent on construction-related goods and services annually (McKinsey Global Institute, 2017). The industry contributes significantly to the overall growth of any country`s economy. According to the International Labour Organisation (ILO, 2015) the construction industry accounts for approximately 10% of the global Gross Domestic Product (GDP) and employs about 180 million people making up to 7% of global employment (ILO, 2015). In South Africa, the industry accounts for 3.9% of the country's GDP and in addition, employs more than 1.4 million people (Statistics South Africa (Stats SA), 2018) on approximately 12,500 construction sites (Department of Labour Government Statement Release, 2017). The construction industry has potential in reducing poverty, improving the living standards and working conditions through the implementation of internationally recognised labour standards (Murie, 2007).

However, the International Labour Organisation estimates that globally the cost of accidents across all sectors is 4%, making workplace prevention an issue of concern (ILO, 2017). It has also been reported that a worker dies every 15 seconds resulting in about 6,300 fatalities per day as a result of accidents and occupational disease (ILO & DoL, 2017). Furthermore, a total of 313 million injuries are encountered or 860,000 injuries per day. The construction industry alone contributes approximately one sixth of fatal workplace accidents globally (ILO, Global Wellness Institute, 2017). In South Africa alone, the cost of claims for fatalities, injuries and occupational diseases exceeds R2 billion annually (DoL, 2017).

Construction workers are exposed to more risks such as, chemicals, noise, adverse weather conditions, biological and ergonomic hazards than workers in other industries (Aires, Rubio & Gibb, 2016). According to International Labour Organisation (ILO), although construction industry employs only 7% of the global population, it accounts for 30-40% of the world's fatal injuries. It is estimated to claim more than 100,000 lives every year (one person every 5 minutes) as a result of bad and illegal working practices. Additionally, 100,000 workers die every year due to diseases related to past exposures to asbestos (ibid). Furthermore, workers encounter carcinogens on a daily basis as a result of exposure to radon, crystalline silica, solar

radiation, wood dust, diesel exhaust and mineral fibres. Chronic ills are widespread such as silicosis, respiratory diseases, skin problems, deafness and long term physical pain from hard labour (ibid).

The South African construction industry is known for its poor health and safety practices and this remains a cause for concern (CIDB Report, 2009). The nature of the industry is such that it is fragmented and involves multiple stakeholders (Deacon, 2016). According to Deacon, the latter results in lack of proper implementation and understanding of the significance of health and safety requirements as design and construction phases continue to be divorced. The volume of accidents in the South African construction industry is more startling (Henry Shields Attorneys, 2017). DoL Government Statement Release (2017) reported that South African construction industry contributed 12% of the country's GDP in 2016 however, 1.5 to 2.5 fatalities occurred per week.

The cost of construction accidents is about 5% of the overall contract value in South Africa (Smallwood, 2004). Additionally, provision for health and safety at inception is approximately 0.5% to 3% of the contract sum. The latter indicates that accidents cost more than the provision for H&S (Malan & Smallwood, 2015; Hefer, 2016). Table 1 indicates statistics from Federal Employers Mutual Assurance (FEM, 2018): where 8,218 accidents resulted in 61 fatalities, 1349 permanent disabilities not resulting in pension and 47,708 lost days. FEM insures about 20% of South African Contractors and the average cost per accident was R37,859.00.

Table 1-1 FEMs Stats 2018

Cause	% Accidents	Fatal Accidents	Lost Days	No. Of Accidents	Permanent Disabilities Not Resulting In Pension	Permanent Disabilities Resulting In Pension	Average Cost Per Accident
2018							
Caught in, on, between	6.74%	1	3,971	554	141	0	R29,636
Contact with electric Current	0.58%	1	292	48	15	0	R125,507
Contact with temp Extremes	2.03%	2	1,388	167	55	1	R66,439
Fall on to different levels	11.37%	8	9,817	934	178	2	R68,570
Fall on to same level	3.94%	1	1,850	324	48	1	R34,862
Inhalation, absorption, ingestion	1.52%	0	62	125	6	0	R11,247

Motor vehicle accident	11.04%	22	5,941	907	139	4	R88,482
Slip or over-exertion	14.33%	0	6,553	1,178	131	0	R20,095
Striking against	14.10%	3	4,480	1,159	205	0	R19,377
Struck by	32.67%	21	13,182	2,685	416	1	R26,885
Unclassified-not sufficient. Data	0.02%	0	0	2	1	0	R25,298
TOTAL FOR 2018	**100%**	**61**	**47,708**	**8,218**	**1,349**	**9**	**R37,859**

The Disabling Injury Incident Rate (DIIR) has been determined at 0.98/100 workers and fatality rate per 100,000 workers at 25.5 (CIDB, 2009).

Globally, research has indicated how industry stakeholders influence greatly to the improvement of health and safety (Smallwood & Haupt, 2005). Performance improvement in construction can be achieved through implementation of health and safety legislation to protect workers and communities (Adeyemo & Smallwood, 2017). Adeyemo & Smallwood (2017) further attest that prevention of construction accidents and injuries can be done through developing proper health and safety legislation. Construction regulations establish a general awareness on health and safety for all people involved in construction and also form a foundation for improving requirements for health and safety in the industry (Markram, 2005). According to Philip Vervey "Construction Regulations to Improve Safety" (2014:1) "The purpose of the construction regulations is to clearly define the legal parameters within which construction companies are supposed to operate."

The promulgation of the 2003 Construction Regulations (published July 2003) under the OH & S Act 85:1993 assigned health and safety responsibility to stakeholders: clients, designers and quantity surveyors (Smallwood & Haupt, 2005). The regulations were seen to have had an impact by increasing awareness in the industry (CIDB, 2009). However, to achieve optimum health and safety in all project phases, the regulations needed to be amended (CIDB, 2009). Integrating design and construction to achieve constructability has resulted in the promulgation of the latest construction regulations 2014 published on 7th February 2014. The latter placed more stringent health and safety obligations on all project stakeholders than the previous 2003 regulations (DoL, 2014).

The standards of health and safety set out to protect workers are often overlooked by management (Murie, (2007). OHSA (1993:1) state that "A fundamental human right of every worker is to be able to return home at the end of each working day; alive and healthy in the same physical condition that he/she commenced that working day." Figure 1 indicates the total

number of accidents, total fatalities, total accidents causing in permanent disabilities resulting in pension and those that result in pension. The period is from 2000 till 2018:

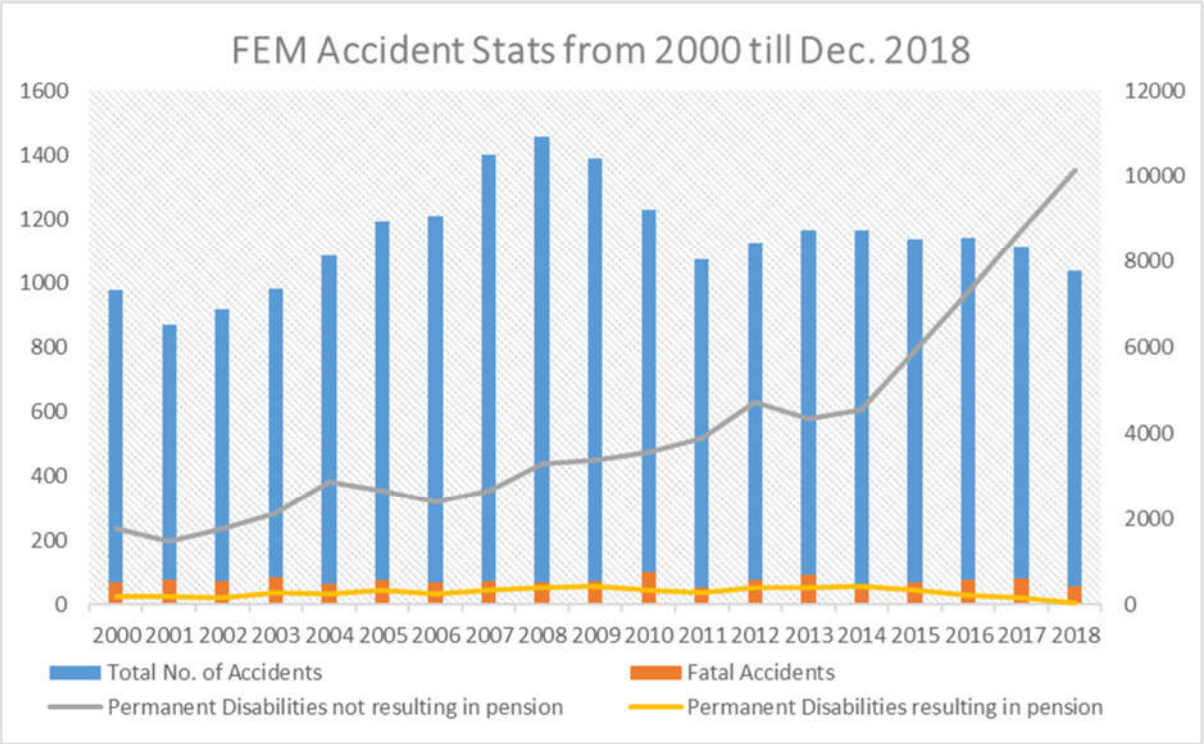

Figure 1-1: Accident Statistics (2000-2018)

1.2 PROBLEM STATEMENT

Recent legislation has been amended to achieve optimum H & S throughout all project phases (CIDB, 2009). However, workers' health remains an issue for concern. Construction workers' wellbeing and their quality of life is often overlooked. There is more emphasis on safety than health when dealing with construction health and safety matters. Workers are subjected to high risks due to the nature of the industry, are treated unfairly and regarded as disposable. Little to no coherence between compliance and impacts of legislation is seen, as contactors are not implementing all aspects of construction regulation to improve the quality of life and wellbeing of workers. Primarily, contractors comply with legislation to satisfy the requirements of the Department of Labour or Department of Public Works. Furthermore, contractors comply for profit maximisation and to avoid penalties or having their activities stopped. Compliance goes beyond checking boxes and PPE. This raises a question on sustainability of workers in an industry that is unsafe, unfair, unpredictable and does not protect its workers adequately as a result, violating the basic fundamental human right. The impact of recent legislation on workers` performance although formulated to challenge the status quo, has not yet been

determined to date. As a result, infringement of health and safety poses a threat to workers` wellbeing and sustainability in the industry.

1.2.1 Hypothesis

The hypothesis to be tested are:

- Management's commitment to legislation changes improves construction workers well-being.
- The impacts of recent construction health and safety legislation changes on workers well-being have not been realised to date.
- Contractors comply with health and safety legislation for profit maximisation and only because it is mandatory.
- Contractors do not apply all aspects of the construction legislation to improve construction workers well-being.

1.3 AIM AND OBJECTIVES

1.3.1 Aim

The study seeks to analyse the impact of the Construction Regulations 2014 on construction workers wellbeing within construction companies in South Africa.

1.3.2 Objectives

- To identify whether management’s commitment to construction health and safety legislation changes improves construction workers well-being.
- To identify whether the impacts of recent construction health and safety legislation changes on improving construction workers well-being have been realised to date.
- To identify whether contractors comply with health and safety legislation for profit maximisation and to avoid penalties.
- To identify whether contractors apply all aspects of the construction legislation to improve construction workers well-being.

1.4 METHODOLOGY

To achieve the objectives of the study, a quantitative research design was adopted and questionnaire surveys administered to gather data from contractors. The research will follow the sequence as follows:

- Extensive review of literature from books, journals, articles, reports and web based publications to obtain existing findings will be conducted in conjunction with the objectives of the study.
- Collection of data from construction companies through questionnaires, interviews and published case studies about the impacts of construction regulations on performance improvement in relation to workers wellbeing, their health and job sustainability on construction sites.
- Analysis of collected data
- Validation of findings from the analysed data to literature
- Formulation of sustainable and effective recommendations

Figure 1-2 illustrates the logical sequence of the research methodology and structure

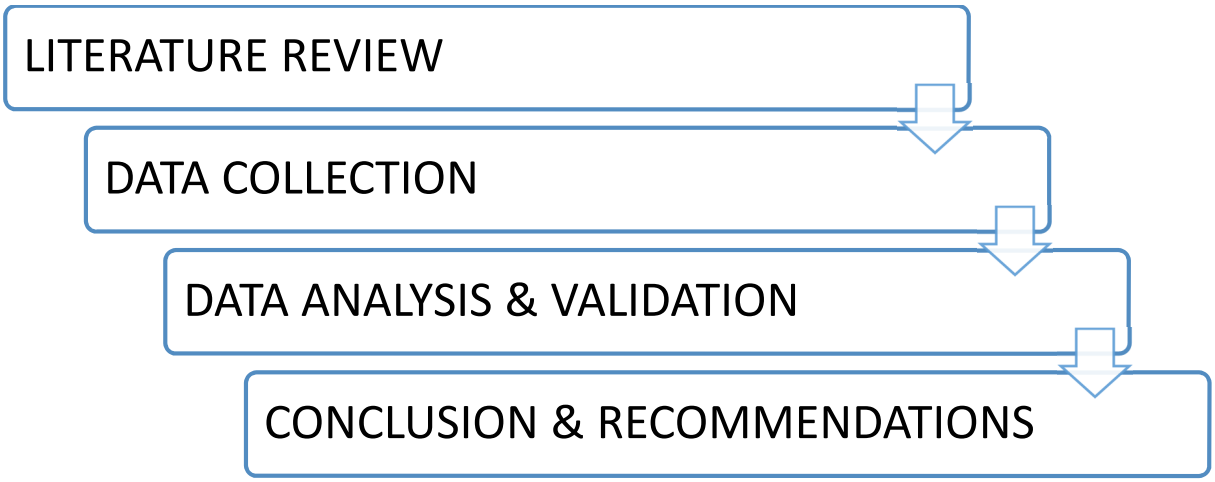

Figure 1-2: Research Methodology

1.5 LIMITATIONS

- The study is to be conducted over a 12 Month period July 2018 to December 2019
- The study is conducted in KwaZulu-Natal province only.
- The study focuses on impacts of recent legislation changes on construction workers' health, wellbeing, quality of life and sustainability in the work place.

1.6 ASSUMPTIONS

It is assumed that data acquired from various people/organisations will be accurate and the participants have sufficient knowledge and experience to provide quality data.

It is further assumed that responses from participants will be reliable, honest and accurate to be considered for this study.

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
- Accuracy in calculations.

1.8 SIGNIFICANCE OF THE STUDY

Several studies have been conducted to identify the impacts of the Construction Regulations 2003. However, there no studies on the extent to which the Construction Regulations 2014 have had an impact or how they have improved construction workers wellbeing since their implementation. The findings of this study shall contribute to the overall body of knowledge within the construction industry about the impact of recent construction legislation changes and their impact on workers' performance improvement in relation to their wellbeing and sustainability. Furthermore, this study shall inform the legislatures on the pros and cons of recent construction health and safety legislation changes and how they may be effectively implemented and revised in future in order to improve workers wellbeing, the quality of life and their sustainability in South Africa. Sustainability of construction workers in relation to improve quality of life will also inform the industry of the need to improve standards and strive for a zero accidents work place.

1.9 DEFINITION OF KEY TERMS

Accidents: 'an accident arising out of and in the course of employee's employment and resulting in a personal injury, illness or the death on the employee (OHS ACT, 1993:2004)'

'An unplanned event that results in injury or ill health to people or damage or loss to property, plant, materials, or the environment, or a loss of business opportunity' (Griffith and Howarth, 2000).

Incident: "any unplanned event that resulted in injury or ill health of people, or damage or loss to property, plant, materials or the environment or a loss of business opportunity" (HSE, 1999)

Occupational Health: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations by preventing departures from health, controlling risks and the adaptation of work to people, and people to their jobs. (ILO / WHO 1950)

Occupational Safety: legal right of a worker to work in a condition that is free from any known hazards (OHSA, 1993).

Quality of Life: according to the WHO, quality of life is "the individual's perception of their personal situation in their own life in the physical, social, mental and spiritual dimensions"

Wellbeing: according to the ILO, "Workplace Wellbeing relates to all aspects of working life, from the quality and safety of the physical environment, to how workers feel about their work, their working environment, the climate at work and work organization."

1.10 STRUCTURE OF THE STUDY

Chapter One: Introduction – the chapter presents the background of the study by exploring the state of construction health and safety globally and its place in the economy of a country. The chapter also presents the problem statement, hypothesis to be tested, aims and objectives, methodology, limitations and delimitations, assumptions, ethical considerations, significance of the study and the structure of the study.

Chapter Two & Three: Literature Review – the chapter explores various literature on the nature of the construction industry as well as health and safety legislative framework on African continent, the South African Constitution, Occupational Health & Safety Acts within

South Africa, Regulations and their significance, Standards (SANS), Basic codes of practice and Safe work procedures.

Chapter Four: Methodology – this chapter discusses data and tools used for gathering secondary and primary data and challenges encountered.

Chapter Five: Data Analysis – this chapter focuses on analysing data gathered from surveys and validating findings.

Chapter Six: Conclusion and Recommendations – the chapter establishes a link between data findings, problem statement, objectives and hypothesis of the subject under investigations and also focuses on testing the hypothesis.

1.11 CHAPTER SUMMARY

This chapter introduced the research topic, outlined research problems, proposed methodology, limitations of the study and the significance of the study. Health and Safety in construction has been an issue for decades with a staggering rate of accidents occurring within the South African construction industry. The promulgation of legislation has sort to improve workers' health and safety with the introduction of more stringent and unambiguous regulations in an attempt to reduce accident. This was done to achieve optimum health, zero fatalities of workers, improved quality of life and job sustainability in an accident prone industry. However, the impacts of legislation if any, have not been realised. The next chapter contains relevant literature and previous studies relative to the research problem.

CHAPTER 2

LITERATURE REVIEW

THE NATURE OF THE CONSTRUCTION INDUSTRY AND ITS IMPACT ON WORKERS WELLBEING

2.1 THE NATURE OF CONSTRUCTION INDUSTRY

The construction industry is one of the major sources of employment globally and is considered the second largest employer after agriculture (ILO, 2001; WIEGO, 2014). The industry makes significant contributions to the global economy in many countries as it provides jobs to many of the world's poorest and vulnerable (WIEGO, 2014). Construction projects are known for their complexity as they combine multi array of interdependent tasks all taking place at the same time. However, these processes are believed to be the most complex and risky undertakings of any industry (Gidado & Wood, 2008).

Construction is well known as a difficult and challenging industry with workers required to perform repetitive manual tasks involving heavy lifting, twisting, turning in awkward and cramped positions. Construction workers work in unpleasant conditions with noise, dust and sometimes with little light, low ventilation and are subjected to high rates of stuff turnover (Asanka & Ranasinghe, 2015). Moreover, Asanka & Ranasinghe (2015) note that the industry is still facing further challenges dealing with the increasing complexity in mega projects. In comparison to other industries, construction is believed to have the 3rd highest death rate (USA Bureau of Labour and Statistics, 2002).

Procurement procedures contribute significantly to the improvement of occupational health and safety on construction projects. However, the most common procedure for awarding public sector tenders in developing countries is through competitive tendering by the government (Wells & Hawkins, 2010). This method of procurement is normally evaluated on the basis of lowest price meaning that contractors must keep their prices low which affects labour as it forms part of the major cost items (ibid). In this regard, for contractors to secure lower prices they compromise on welfare facilities, protective equipment and safe working environment for its workforce (ibid). Murie (2007) adds that the low price culture in highly competitive tendering compromises health and safety requirements and encourages low wage payments of labourers, lack of safety equipment, lack of insurance coverage for accidents and promotes influx of informal workers for whom no tax or social security is paid.

The construction industry is characterised as one of the most accident prone businesses (Othman, 2012). Furthermore, labour rights issues are most striking in this sector as it relies heavily on manpower especially migrant labour and primarily unskilled workers, as a result earn low-wages (Nieuwenkamp, 2016). The industry is known to be a challenging regime in which to practice adequate health and safety as it takes place in hazardous environments with exposures to heights, changing weather conditions and different locations with construction workers always expected to cope with changing environments and different scopes of works (Bomel, 2001; Ishri, 2010). Ishri (2010) highlights the industry as fragmented due to multiple stakeholders involved from project inception and identifies the following as the results for fragmentation:

- Increased costs
- Low productivity
- Poor communication
- Increase and often unnecessary documentation
- Ineffective and inefficient project management
- Unnecessary delays
- Unsatisfactory quality performance
- Poor safety performance (Ishri, 2010:13)

Furthermore, Egan (1998) attests that the extensive use of subcontractors in construction attributes to increased contractual disputes and lack of productivity.

One of the attributes of construction is its low profit margins. This feature can be related to a number of factors such as late payments or no payments for work completed (SA Construction Industry Survey, 2016). In addition to low profit causes as highlighted in the Survey, Group Five identified some of the key factors as being inflation, lack of government spending on infrastructure development, consumption-driven activities which are supportive of real estate, retail and other consumer factors as well as highly competitive tendering which forces contractors to drop prices.

Egan (1998) further attests the industry has unrealistically low profit margins and most clients especially government, equate price with cost which has an impact on improvement in the industry. In South Africa, the rate of business failure is high as companies are experiencing profits as low as 1% (CIDB, 2004). The latter in relation to performance makes it hard for any improvements especially health and safety as most government tenders are awarded to large

contractors with the necessary skills (Wandapo & Cattell, 2011). Wandapo & Cattell (2011) further add that most companies registered with CIDB are small contractors, according to CIDB Report (2016), 85,7% of construction companies registered were Grade 1 Contractors. These contractors find it hard to grow.

Construction is also identified as the second most corrupt sector globally and the same is true for South Africa (CIDB, 2016). According to South African Construction Industry Report (2016), the industry faces challenges where tenders are involved. The report indicates that most tenders are awarded without observing to the recommendations of the tender committee (ibid). CIDB (2014) has indicated that approximately 12% of public sector tenders are awarded illegally without adhering to the recommendations of the tender committee.

2.3 COMPLIANCE WITH HEALTH & SAFETY IN THE CONSTRUCTION INDUSTRY

The construction industry has less than 50% rate of compliance with health and safety requirements with unacceptably high rates of incidents as a result of poor workmanship and lack of proper supervision on site (CIDB, 2016). Some accidents are attributed to senior managements' lack of commitment, lack of communication and lack of training (Laney, 1982). ILO (2011) reports that, despite government and trade union efforts, accidents will continue to happen on site due to lack of safety adherence by contractors. Lack of health and safety in construction is highest among Small Medium Micro Enterprises (SMME) who share a common misconception that they undertake less risky jobs (Okorie & Aikbavboa, 2016).

Okorie & Aikbavboa (2011) ILO (2011) further highlights the following as reasons for lack of compliance among SMME's:

- Insufficient financial and organisational resources;
- Limited health and safety knowledge; and
- Lack of effective health and safety skills to prevent occurrences.

Large construction projects are considered safer than small and limited scope projects (Asanka & Ranasinghe, 2015). They refer to a study based on the Australian Construction Industry which indicated 79.5% of construction accidents attributed to small and medium projects while only 20.5% to larger projects. Globally, poor health and safety training of construction workers is common among small contractors and small contractors do not have a good record of

investing in health and safety training as compared to large contractors (Okorie & Aikbavboa, 2016; WHO, 2010).

2.3.1 Performance of The Construction Industry Relative to Workers Wellbeing

The construction industry is heavily reliant on manpower, more so because of their direct involvement with the actual construction activities and this proves workers' health and safety must be given priority (Okoro et al., 2016). Furthermore, accidents can be reduced, employability of workers improved and performance improved. However, health and safety of construction workers has been a cause for concern for decades and justifiably so, since construction workers are considered invaluable to construction processes (ibid).

The total formal employment for construction is 8% in South Africa (SA) (Stats SA, 2018). According to the CIDB Labour & Work Conditions in SA Construction Industry (2015), construction accounts for 8% formal employment and informal employment across all sectors in SA with the construction industry alone accounting for 460,000 informal workers of the 1.46 million total employed (CIDB, 2015). Furthermore, 70% of those employed in construction are semi-skilled and unskilled. Employment status have also changed in the industry due to economic pressures resulting from cyclical nature of the industry, more stringent labour regulations causing disposal of labour to keep only core supervisory staff, and increased subcontracting (CIDB, 2015). The latter also notes unskilled labour jobs are regarded as dirty, dangerous and hard and this has opened an opportunity for labour exploitation in many countries as this jobs are taken by migrants and marginalised individuals (ibid). The industry also accounts for 16% of the country's total informal employment (ibid). Informal workers are subjected to illegal practices such as exploitation from contractors since their employment is not regulated by government (ILO, 2001: Mkenda & Aikaeli, 2015: Wells, 2007).

The ILO identified over 110 million informal construction workers globally in 2007. The construction industry is faced with employment challenges as contractors are finding it hard to get a steady flow of work due to a widespread system of contracting (ILO, 2013). This has increased the number of informal workers globally as friction exists between employers who tend to adjust with the current situation through labour outsourcing while workers demand job security (ibid). Workers are employed on a short term basis, per project duration. The practice of "fixed term employment contract" is seen as a solution to unstable employment practices in the construction industry. Under the conditions of the contract, employers can state which benefits are applicable and retrench employees at will without any severance payments (Henry

Shields, 2018). Furthermore, the author attests that employers practice this forms of contracts to circumvent Basic Conditions of Employment Act (75 of 1997) and Labour Relations Act (66 of 1995). Rolling over is defined as the practice of renewing a fixed term contact after it expires (SA Labour Guide, 2018). This practice is common among contractors in SA. However, it infringes the rights of workers under the Basic Conditions of Employment Act.

2.3.2 Exploitation of The Workforce in Construction

The construction industry is a sector that lends itself to exploitation as it involves complex supply chains for large companies with multiple subcontractors, labour agencies and takes place in different locations around the world (CIOB, 2016). Interrelationships in supply chain within the construction industry breeds corruption since there is lack of visibility and there is a lot of fragmentation. CIOB (2016) identified the following as the most common labour abuses in the construction industry:

- Non-payment or late payment of wages. Employers not recognising all the hours worked. Illegal deductions. Some employers will delay payment for months or even years, leaving the workers literally starving, yet too frightened to complain.
- Inappropriate accommodation in cramped, unsanitary, crowded conditions and often far from site requiring long commutes.
- Workers forced to work in unsafe conditions and very long shifts. Agents forcing them to work on multiple locations taking on more than one job.
- Restriction of movement as workers have passports removed and are unable to leave the country or seek alternative work.
- Accommodation is far from food outlets so that workers must pay for expensive canteen food. Deductions for food are made from wages, even though workers were promised that food and accommodation were inclusive.
- Unfair contracts that are not in the labourers' native language and labourers do not understand what they are signing. Despite this, the contract may be declared "legal" by employers and the courts.
- Frequent threats of violence leave workers fearful and frightened to speak out.
- Workers are unable to organise or form unions as they do not have a platform to raise issues with the client or main contractor. (CIOB, 2016:14)

Globally, there is an estimated 40,3 million people who are victims of modern day slavery (ILO, 2017). Furthermore, with 7% of global employment attributed to construction, the sector has the second highest number of forced labour at 18% (ibid). Employment conditions for these employees are extremely poor, demanding and dangerous resulting in high accidents. In addition, construction work has low social status, its problems have low visibility and the resolution for these problems have low priority. "Conditions are not recognized, if recognized are not diagnosed, if diagnosed are not attributed to work, and whether recognized or not are rarely compensated or effectively treated" (Murie, 2007:6).

2.3.3 Causes of Construction Accidents and their Impacts on Workers Wellbeing

Despite the high rate of accidents in the industry, accidents are foreseeable although not foreseen by those undertaking them (Bomel, 2001). ILO Construction OS&H (2008) indicated that construction accidents and preventative measures are well known. However, they are fuelled by failure to manage risk or by employers' negligence. Samuel (2015) identified that root causes of accidents lie within the upper stream of management. Asanka & Ranasinghe, (2015) attest that most construction accidents can be prevented through involvement of project management systems. Furthermore, three root causes of accidents are attributed to failure to identify hazards prior to work, proceeding with work despite visible hazards and neglecting initial unsafe conditions and proceeding with work (Ibid).

The top four causes of construction accidents have been identified as Falls, struck by Object, Electrocutions & Caught in/between (OHSA, 2015). Statistics for the fatal four were as follows; Falls – 364 out of 937 total construction worker deaths in 2015 (38.8%), Struck by Object – 90 (9.6%), Electrocutions – 81 (8.6%), Caught in/between – 67 (7.2%) (Jones, cited in OHSA 2015).

Table 2-1: FEMA, Most common causes of construction accidents in SA accounting to more than 80%

	2017		2016	
Description	Percentage of Accidents	Total Accidents	Percentage of Accidents	Total Accidents
Struck By	31,81%	2615	33,86%	2883
Striking Against	15,67%	1288	14,86%	1265
Slip Or Over-Exertion	13,03%	1071	13,27%	1130
Motor Vehicle	11,80%	970	10,61%	903
Fall Onto Different Levels	10,99%	903	11,60%	988

Over and above, other causes of construction accidents are attributed to the following social factors:

- Working long hours on site which leads to fatigue, lack of motivation and reduced mental acuity
- Morale and attitude are also caused by social conditions where workers share sites and equipment with other trades, poor site conditions, over-inspections and absenteeism
- High staff turnover and absenteeism

  (CIDB Labour & Work Conditions in SA Construction Industry, Status & Recommendations, 2015:1)

Construction workers' health related interventions have been ignored and more focus has been on occupational safety in the past (Harinarain & Haupt, 2014). In order for the industry to perform, its workforce needs to be healthy however, there has been a decline in number of construction workers resulting from lack of responsiveness as a result of occupational diseases such as HIV/AIDS. Construction companies feel that the latter is not their problem. Harinarain & Haupt (2014) highlight construction workers' vulnerability to the pandemic is a result of its migratory labour force making them prone to visiting prostitutes or having multiple partners as they are separated from their partners for a long time.

The adaptation of construction health and safety as a value and not a priority must be realised as this is a prerequisite to addressing and optimising other constituents of health and safety culture (Haupt & Smallwood, 2004). James, (2011) further adds that people issues are integral to the company as the company is its people. Management within a company must be responsible for the wellbeing of workers and adequate Employment Assistant Programs in construction must be in place to support workers in a demanding work environment. "Failure by organisations to adopt employee assistance into their culture will inevitably lead to the escalation of sickness and the deterioration of organisational performance." (Matlala, 1999:24).

The global construction workforce is ageing and this will impact South Africa (Eppenberger, 2009). The author adds that this is caused by changes in demography and loss of interest in a career in construction by youth. Haupt (2014) also adds the industry does not attract young people. Older workers as a result are a valuable resource in construction as they possess the necessary skills, experience, are loyal and produce work of high quality (Eppenberger, 2009: Eaves et al., 2015). However, they are exposed to a number of hazards, are perceived to be

against personal protective equipment (PPE), other health and safety regulations initiatives and work at a slower pace (ibid). The negatives outweigh the positives in this regard as construction projects are carried out within short durations and rely on high levels of productivity (Eaves et al, 2015). It is imperative to improve the wellbeing of the older construction workforce to yield productivity within the industry.

Smallwood (2000) portrays the detrimental effects of construction activities on wellbeing of construction workers and their performance at work as follows:

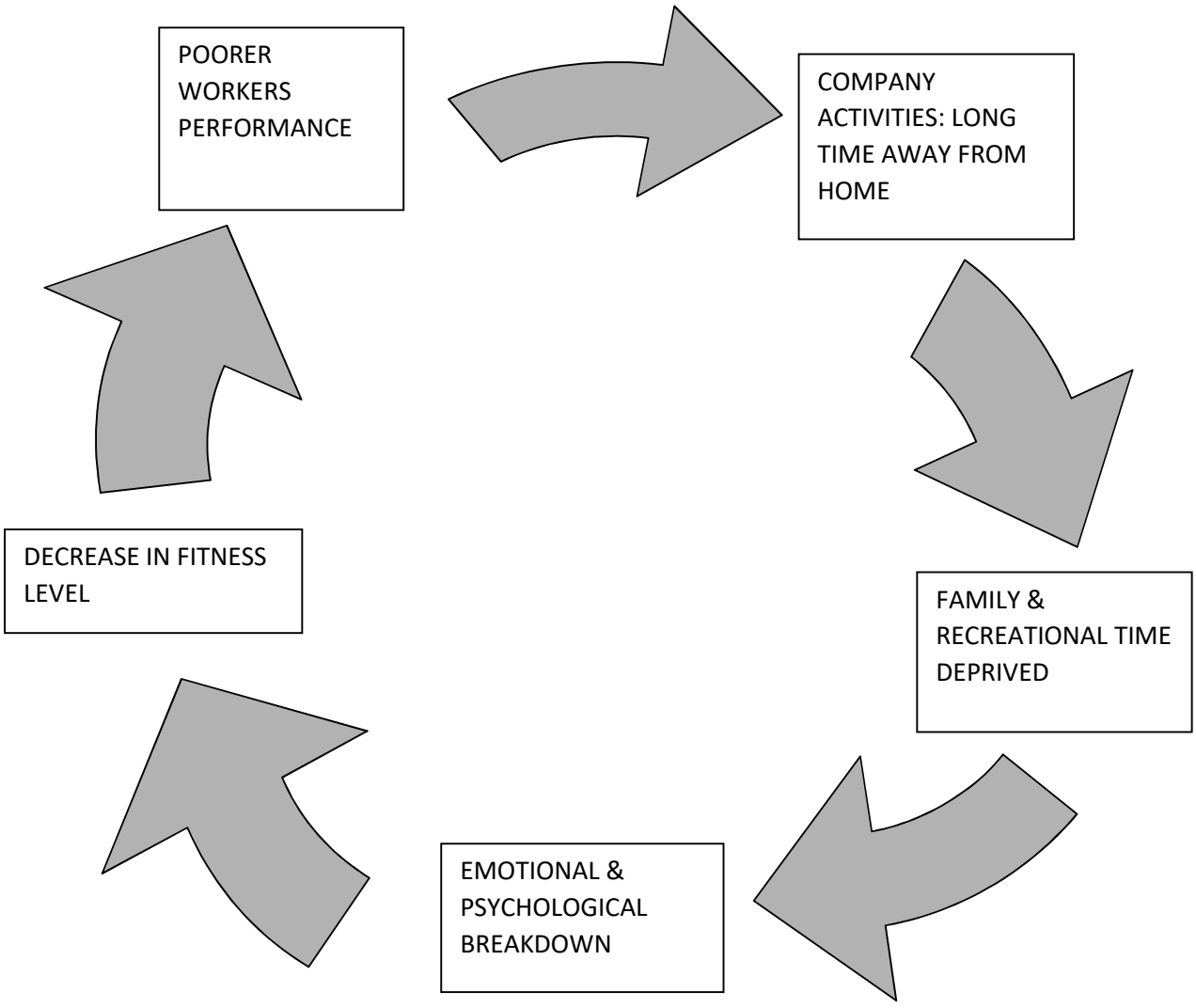

Figure 2-1: Detrimental effects of construction activities on wellbeing and employees' work performance (Smallwood, 2000)

Over and above the social and human costs as a result of health problems and fatalities, escalating economic burdens are experienced as a result of unhealthy workforce and this has a

detrimental impact on global economy due to low productivity and increased medical expenses (Buehler, Werna & Brown, 2017). Moreover, poor wellbeing of the workforce costs the global economy 10 to 15% (Ibid). It is imperative to enhance the wellness of the workforce as 50% spend their time in the workplace and this is an opportunity to advocate awareness (Schwab, 2013).

2.4 IMPROVING THE WELLBEING OF CONSTRUCTION WORKERS

There are several interventions to improve construction workers' wellbeing. Construction workers' wellbeing may be improved through training, skills development and providing adequate supervision on site (Bester, 2016). Furthermore, Bester (2016) advises on the use of proper tools and equipment, provision of fall prevention equipment and regular screening of workforce for narcotics. Technological innovations with regards to health and safety may also be used to improve workers' health and safety on site (Buehler et al. 2017). "Super-strength operators" may be used in the case of elderly workers to enhance their strength by wearing flexible and mobile exoskeleton. These technologies known as "wearable robotics" such as AWN-03; provide back support, they sense the workers body motion by sending signals to the motor to rotate gears enabling workers to lift and hold heavy items reducing lower back stress by at least 15kg (Lung & Man, 2018). Another wearable robotic known as FORTIS Exoskeleton enhances users' durability by lifting heavy loads such as rebar and industrial tools and can adapt to different body types and heights (ibid).

Other technologies include Augmented and virtual reality which can be used to simulate site conditions and further identify unforeseen risks on site (Buehler et al. 2017). These technologies have been used to train construction professional in a simulated risk-free virtual construction site such as the Build Management Simulation Centre (Zhou, Whyte & Sacks 2011). Virtual Reality is defined as technology that uses software and hardware technologies to provide interactive 3D and real-time computer applications (Lung & Man, 2018). Augmented Reality is defined as "an enhanced version of reality where live direct or indirect views of physical real-world environments are augmented with superimposed computer-generated images over a user's view of the real-world enhancing users' current perception of reality" (realitytechnologies.com, 2018).

Other human machine interfaces such as smart PPE, smart hard hats and wearable sensors may be used to detect exact moments when workers lose balance, trip or fall, allow site managers

to know where workers are working and the conditions on site, and give feedback through cloud based interfaces on workers physical and mental stress levels (Raymond, 2016; Lee, 2018). Furthermore, Lee (2018) attests that the wearing of this sensors by workers does not interfere with job activities as they provide "sensory/haptic feedback" (re-creation of a sense of *touch* through application of force, vibration or motion) which means advanced waveforms and vibrations convey information to workers and supervisors monitoring performance. This can range from safety alarms to positioning information alerting workers to focus on the task at hand. "All construction industries have the opportunity to advance the use of technology and, as a result, make workforce engagement safer" (Buehler et al., 2017:1).

2.5 IMPROVING THE WELLBEING OF WORKERS THROUGH CONSTRUCTION REGULATIONS

The key objective of health and safety legislation is to prevent accidents within the work place, improve the lot of construction workers, and this can be achieved through effective implementation of proper legislation (Ibid). Overall, construction regulations have had a positive impact and increased awareness among project participants (CIDB, 2009). The intended impacts of Construction Regulations have widely been spread. Furthermore, the increased awareness dominates followed by stakeholders' awareness. This awareness has influenced greatly on the improvement of health and safety as well as increased financial provisions. This has further resulted in improved site conditions and fewer accidents (Smallwood & Haupt, 2005).

Regulations and legislation are key in directing and controlling activity, improving responsibility of business owners and health and safety (Rust & Koen, 2011). Technology is advancing at a rapid rate, shaping the future of workplace safety (Open access government, 2018). However, the Construction Regulations do not directly respond to the use of technology and does not prevent it either. The construction industry is renowned for its low levels of innovation and employers are more concerned about bottom-line and profit maximisation than investing in what will make work easier, safer and improve workers' wellbeing (Rust & Koen, 2011).

Traditionally, fundamental project parameters were defined as time, cost and quality, and due to the nature of the activities, the industry is accident prone as work is carried outside under adverse weather conditions that do not favour health and safety (Smallwood & Haupt, 2005; Othman, 2012; Agumba & Haupt, 2012). Increased health and safety awareness on project

performance has been realised and has spawned attention of different stakeholders (Smallwood & Haupt, 2005). In construction, an ideal project is a one completed within budget, time, quality and zero accidents (Davies & Tomasin, 1990).

2.6 CHAPTER SUMMARY

This chapter discussed the nature of the construction industry. The construction industry is a complex and dangerous sector where accidents are most alarming. Compliance with health and safety requirements is of great concern as health and safety is not given attention by most stakeholders. Construction workers wellbeing and health are directly affected by poor health and safety practices. Workers are considered disposable and less valuable to the construction activities and as a result, sustainability of the workforce is becoming a challenge. Interventions through effective implementation of health and safety legislation needs to be realised to improve the overall quality of life, health, performance improvement and employability of workers as this has detrimental impacts on global economy.

CHAPTER 3

LITERATURE REVIEW

SOUTH AFRICAN LEGISLATIVE AND REGULATORY FRAMEWORK

3.1 LEGISLATION

Encyclopaedia Britannica (2008:1) defines Legislation as "the preparing and enacting of laws by local, state, or national legislatures" (law-making branch of a government). "Legislation is a law that has been made and enacted by a legislature, such as a parliament" (lawgovpol, 2014). The legislation is one of the most significant government tools for managing society and protecting citizens. It defines amongst others, the rights and responsibilities of people and authorities to whom the legislation applies. On the contrary, a law has little or no significance if there is neither discipline nor enforcement (De Jeger, 2000). The legislation is important for some reasons, such as setting principles and controls to govern the actions of people and groups in both public and private spheres (https://www.reference.com/government-politics/importance-legislation-28cea6731f25cf).

3.2 REGULATORY FRAMEWORK

It is also imperative to define the meaning of "regulatory framework" as the term may draw confusion. *A framework* may be defined as "a particular set of rules, ideas, or beliefs which are used to deal with problems or to decide what to do" (Collins Dictionary, 2019:1). It is further defined as a basic underlying structure to a set of regulations (Rabeau, 1998)

Regulations, on the other hand, are defined as rules based on and meant to carry out a specific section of legislation (such as for the prevention of accidents on a construction site). "Regulations are usually enforced by a regulatory agency formed or mandated to carry out the purpose or provisions of legislation also called regulatory requirement" (Business Dictionary, 2019:1). The Canadian Department of Justice defines regulations as follows:

> *"Regulations are a form of law, often referred to as delegated or subordinate legislation. They have the same binding effect as Acts and usually state rules that generally apply, rather than to specific persons or things. However, regulations are not made by parliament. Rather, they are made by persons or bodies to whom Parliament has delegated the authority to make them, such as the Governor in Council,*

a minister or an administrative agency. Authority to make regulations must be expressly delegated by Act." (A guide to making federal acts and regulations, 1995:16).

A regulatory framework can be defined as the basic steps that regulators must complete to implement regulations (Rabeau, 1998). Rabeau (1998:5) further defines a regulatory framework as the "high-level questions that a conscientious regulator would ask of themselves throughout the process of regulations development. Questions such as, 'why do I need to regulate this behaviour'? 'Who is harmed by the behaviour?' 'Is this harm serious enough to warrant government intervention?"

3.3 CONSTRUCTION HEALTH AND SAFETY LEGISLATIVE FRAMEWORK

Globally as a result of poor health and safety performance, there have been several interventions to promote the wellbeing of construction workers through the introduction and revision of construction regulations (CIDB, 2009). Primarily the purpose of introducing health and safety legislation is to prevent accidents and their consequences, disablement and fatality as well as ill health in the workplace. To achieve its objective, good legislation should be supported by effective, sensible and accountable enforcement (Ibid).

In the USA, the impetus for passing Occupational Safety and Health Act of 1970 (OSH Act) by Congress was a result of workplace accidents claiming an average of 14,000 lives annually, causing 2.5 million disabilities and approximately 300,000 new cases of occupational diseases (Goetsch, 2013). This reports by the US Department of Labour would ensure a sound piece of legislation by Congress. The purpose as stated by Congress is "...to assure so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources" (OSHA, 1970:3). Furthermore, indicating that no worker should have to choose between their life and their job. Under this act, standards for construction health and safety OSHA CONSTRUCTION STANDARDS were promulgated under section Code of Federal Regulations (CFR) Part 1926 subparts A – Z (Goetsch, 2013).

Since 1989, a series of European Directives in collaboration with the ILO's convention 167 and recommendations 175 changed the outlook on safe work procedures throughout SME's involved in all industries (HSE, 1999). Furthermore, the employer's responsibilities increased, new worker's obligations introduced as well as more involvement required from managers in the management of risks in health and safety (ibid). In 1992, in response to an unacceptably

high number of construction accidents, the European Parliament and the Council of the European Union issued Directives 92/57/EEC (Aires et al., 2016). The directive lays down the minimum health and safety requirements at temporary or mobile construction sites within the European Countries (Summerhayes, 2002). Aires et al. (2016) further note that since the implementation of the directive, members of the European Union evidenced a positive impact of the Directive as a result of fewer accident reports although several other measures were implemented to improve health and safety. However, it is argued that it is complicated to establish a direct connection between accidents and regulations.

The EU Directive 92/57/EEC became a vehicle for implementation of the United Kingdom's Construction Design and Management (CDM) Regulations 1994 into British law. All members of the EU were required to transpose the directive into their national legislative framework by 31st December 1993 (Aires et al., 2016). The former was implemented in response to unsafe work procedures on construction sites as a result of uncoordinated and fragmented construction activities (Summerhayes, 2002). The CDM Regulations strategy is to reduce fatalities and injuries associated with construction work by further influencing related occupational health and welfare (ibid). Moreover, the CDM Regulations aim at disrupting the cultural norm initiated by the Health and Safety Act 1974; the Act had a prescriptive approach instead of the 'deemed to satisfy' approach. Further modifications of the regulations were made and were published as Construction (Health, Safety and Welfare) Regulation 1996. New amendments were enacted and the most recent being Construction (Design and Management) Regulations 2007 (Aires et al., 2016).

3.3.1 SOUTH AFRICAN HEALTH AND SAFETY LEGISLATIVE FRAMEWORK

There is a range of legislation that impacts the health and safety of workers in South Africa either directly or indirectly referring to health and safety (CIDB, 2009). The range includes the national law/the Constitution (Act 108 of 1996), Basic Conditions of Employment Act No. 75 of 1997, National Building Regulations and Standards Acts No. 103 of 1977 and standard forms of construction contracts used in South Africa. There are, however, primary acts which impact the construction industry in South Africa namely: Occupational Health and Safety (OH&S) Act No. 85 of 1993 under which Construction Regulations were promulgated in 2003 and the Compensation for Occupational Injuries and Diseases (COID) Act No. 130 of 1993 (ibid).

GENERAL LEGISLATION

3.3.1.1 The Constitution

The Constitution is the supreme law in the Republic of South Africa and contains the 'Bill of Rights" which is the cornerstone for democracy in South Africa, binding all citizens to affirm with the democratic rights of human dignity, equality and freedom (The Constitution of the Republic of South Africa, 1996). Under the Bill of Rights, everyone has: "the right to inherent dignity and the right to their dignity being respected" (The Constitution of the Republic of South Africa, Clause 10), "the right to life" (The Constitution of the Republic of South Africa, Clause 11), "the right to freedom and security" (The Constitution of the Republic of South Africa, Clause 12), "no one may be subjected to slavery, servitude or forced labour" (The Constitution of the Republic of South Africa, Clause 13), "the right to fair labour practices" (The Constitution of the Republic of South Africa, Clause 23), "the right to an environment that is not harmful to their health or wellbeing and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures" (The Constitution of the Republic of South Africa, Clause 24).

3.3.1.2 Basic Conditions of Employment Act No 75 Of 1997

The purpose of this act is to establish, enforce and regulate basic conditions of employment by effecting the right to fair labour practices as per Section 23 (1) of the Constitution and the International Labour Organisation (Basic Conditions of Employment Act No. 75 of 1997, Clause 2). The conditions make several mentions of the health and safety of workers in the workplace under the following clauses:

- *Clause 7a – 7b* state that employers must regulate working hours of employees in accordance with any Act governing the occupational health and safety and with due regard to the workers' health and safety.
- *Clause 13.1 and 13.3* stipulate that on the grounds of health and safety, the Minister of Labour may prescribe maximum permitted working hours and night shift for any category of workers.
- *Clause 17.3a (i)* highlights that employers must inform their workers either orally or in writing of any health and safety hazards and enable them to undergo medical examination where a worker is permitted to work between 2300 hours and 0600 hours.

3.3.1.3 Labour Relations Act No. 66 of 1995

The purpose of the Act is to promote economic development, social justice, labour peace and democratisation of the workplace in fulfilment of Section 27 of the Constitution and International Labour Organization recommendation (Labour Relations Act No. 66, Chapter 1). However, the act does not make explicit mention of health and safety although the implication is that health and safety must be considered to promote a peaceful and sustainable workplace for employers and employees (CIDB, 2009).

3.3.1.4 National Building Regulations and Standard Act No. 103 of 1977

The purpose of the Act is to "provide for the promotion of uniformity in the law relating to the erection of buildings in the areas of jurisdiction of local authorities; for the prescribing of building standards; and matters connected therewith" (Building Standards Act, 1977:3). The regulations further make mention of the health and safety of both the public and the workforce. Under Part E, Demolition Works; such work must be carried out in a safe and healthy manner for the convenience of the public. Part E further attests to the 'Safe Guarding of Basements' and prohibits the use of dangerous materials. Part F of the National Building Regulations stipulates that site operations must be carried out in a safe manner protecting members of the public from any dangerous activities on site. Part G addresses general stability requirements related to excavation work and further places emphasis on safety and maintenance when working with excavations. Under Part H of the regulations specify the requirements for working safely in 'Foundations'.

PRIMARY LEGISLATION

3.3.1.2 Compensation for Occupational Injuries and Diseases Act No. 130 Of 1993

The purpose of this act is "to provide for compensation for disablement caused by occupational injuries or diseases sustained or contracted by employees in the cause of their employment, or death resulting in such injuries or diseases, and to provide for matters connected therewith" (COID Act No. 130 of 1993). Under Section 22 and Section 65 of the Act, employees or employee's dependents have the right to compensation as a result of any injuries, disablement, death or occupational diseases in the workplace. Section 38; employers are to give verbal or written notice to the compensation commissioner where an employee has had an accident.

Employers doing business within the Republic of South Africa are obliged to register with the commissioner and proved their detail therewith (Section 80).

Section 89 of the Act titled 'Mandators and contractors', contractors undertaking work as a whole or part of for the mandatory are required to register as employers in respect to their employees as per the provisions of the Act. Mandators with whom contractors fail to register shall be liable for assessment costs relating to their contractor's employees. Department of Labour mandates all contractors to be in possession of an up to date 'COID Letter of Good Standing' as per the OH&S Act No. 85 of 1993, Construction Regulations Clause 5 (1) (j); the Client must "ensure before any work commences on a site that every principal contractor is registered and in good standing with the compensation fund or with a licensed compensation insurer as contemplated in the Compensation for Occupational Injuries and Diseases Act, 1993 (Act No. 130 of 1993)".

3.3.1.3 Occupational Health and Safety Act No. 85 Of 1993

The purpose of this act is "to provide for health and safety of persons at work and the health and safety of persons in connections 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 to the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matter therewith (OH&S Act No. 85 of 1993)." Weil (2001 cited in Windapo, 2013) stated that OH&S Act 85 of 1993 must form part of a plan for building a society that is based on democratic values of human dignity, equality and freedom. Under this Act, a number of regulations were promulgated of which the Construction Regulations introduced in July 2003 specifically impact the construction industry (CIDB, 2009).

3.4 THE CONSTRUCTION REGULATIONS

The Contraction Regulations 2003

The Minister of Labour under section 43 of the OH&S Act 85 of 1993, after consultation with the Advisory Council for Occupational Health and Safety, promulgated the construction regulations (Construction Regulations, 2003). The Construction Regulations were enacted in July 2003 specifically for the construction industry as a result of the previous fragmentation regarding general safety regulations and machinery regulations under OH&S Act No. 85 of 1993 (South African Council for Project and Construction Management Professions

(SACPCMP) Construction Health and Safety Seminar, 2018). Furthermore, Smallwood & Haupt (2005) contend that the regulations were promulgated after alarming rates of accidents, fatalities and disease within the construction industry and the lack of participation by key projects stakeholders such as clients and designers.

The Construction Regulations sort to establish clear lines of responsibility and control for all involved in the construction processes by redistributing responsibility away from the contractor who hitherto owned the main responsibilities (ibid). Furthermore, the regulations include:

- A shift from the traditional prescriptive legislation (deemed-to-comply or command-and-control) to a performance-based approach.
- Compel health and safety management into an obligation during the planning and design of all construction projects.
- Emphasise the identification of workplace hazards and the compilation of a baseline risk assessment to mitigate work risks.
- Consideration of health and safety issues throughout all project phases.
- Introduction of a client appointed health and safety agents to carry out health and safety related tasks on behalf of the client.
- Mandatory compilation of health and safety files, specifications and plans. (CIDB, 2009)

"The Construction Regulations acknowledge the roles of each participant in construction. For example, whereas designers were not previously required to consider H&S issues, they are now required to avoid foreseeable risks as a duty for all construction projects" (CIDB, 2009:10).

The Construction Regulations 2014

The Construction Regulations 2014 were promulgated on 7 February 2014 and came to effect in August 7th 2014 with the legislatures intend to include all project stakeholders. The emphasis was to place legal responsibilities among all key project stakeholders and to ensure that their roles are distinctly defined so they may work in synchrony to improve health and safety in the industry (SACPCMP Construction Health and Safety Seminar, 2018). Hefer (2016) further asserts the regulations underpin the requirements of OH&S Act 85 by addressing key responsibilities for all stakeholders from designers, clients, contractors and subcontractors involved in the construction processes. These regulations impose more stringent health and

safety obligations to all project stakeholders more so by requiring health and safety officers and agents to be registered professionally with SACPCMP (Verwey, 2015).

3.4.1 Impact of Construction Regulations Changes on Workers' Wellbeing

The Construction Regulations are perceived to have had a positive impact especially through the increase of health and safety awareness and increased consideration among project managers and general contractors (CIDB, 2009). Although the impacts of Construction Regulations may not be quantified, it may be concluded that they have had a positive impact on the reduction of accidents (ibid). Moreover, Smallwood & Haupt (2005) assert that the Construction Regulations have had a desired upstream, midstream and downstream impact. However, the authors suggest that despite the perceived contributions made by the Construction Regulations 2003, there is still need for further improvement of the regulations and overall health and safety. Furthermore, Agumba and Haupt (2009, cited in Windapo, 2013) argue that health and safety should not be driven by legislation, but instead must be seen as a value. On the former note, it has been inferred that management skills are essential to the overall realisation of health and safety in the workplace.

To address the challenges identified within the Construction Regulation 2003, the Construction Regulations 2014 was drafted with a mandate to place more stringent rules and accountability to all key project stakeholders. The regulations state that any person failing to comply could face a 12 months' prison sentence or subject to a fine (Verwey, 2015, Construction Regulations, 2014). Additionally, the regulations aim is to close major linguistic loopholes in the old regulations, such as 'you shall' to 'you must' (Verwey, 2015). Prior to their implementation, studies indicated that there had been a staggering increase in the number of accidents despite the old regulations still being in place (ibid).

Tables 3-1 and figures 3-1 were reports supplied by FEM which covers about 20% of the construction companies in South Africa:

Table 3-1 Total accident reports from 2000 till Dec. 2018:

ALL REGIONS YEARS	Number of Employees	Number of Accidents	Number of Fatal Accidents	Number of Permanent Disabilities not resulting in Pensions	Number of Permanent Disabilities resulting in Pensions
2000	110228	7348	68	236	24
2001	108411	6524	75	197	26
2002	125734	6887	72	234	21

2003	143073	7377	83	283	35
2004	164423	8147	66	384	34
2005	187862	8945	76	356	43
2006	218876	9059	70	320	31
2007	255632	10504	72	356	46
2008	282743	10938	67	441	51
2009	288736	10410	73	453	58
2010	277764	9217	100	476	46
2011	282285	8043	51	521	37
2012	311792	8451	76	630	52
2013	323274	8733	94	577	51
2014	340716	8737	66	606	57
2015	331947	8542	67	792	46
2016	362884	8553	77	974	27
2017	353800	8364	82	1166	22
2018	296523	7779	58	1354	6

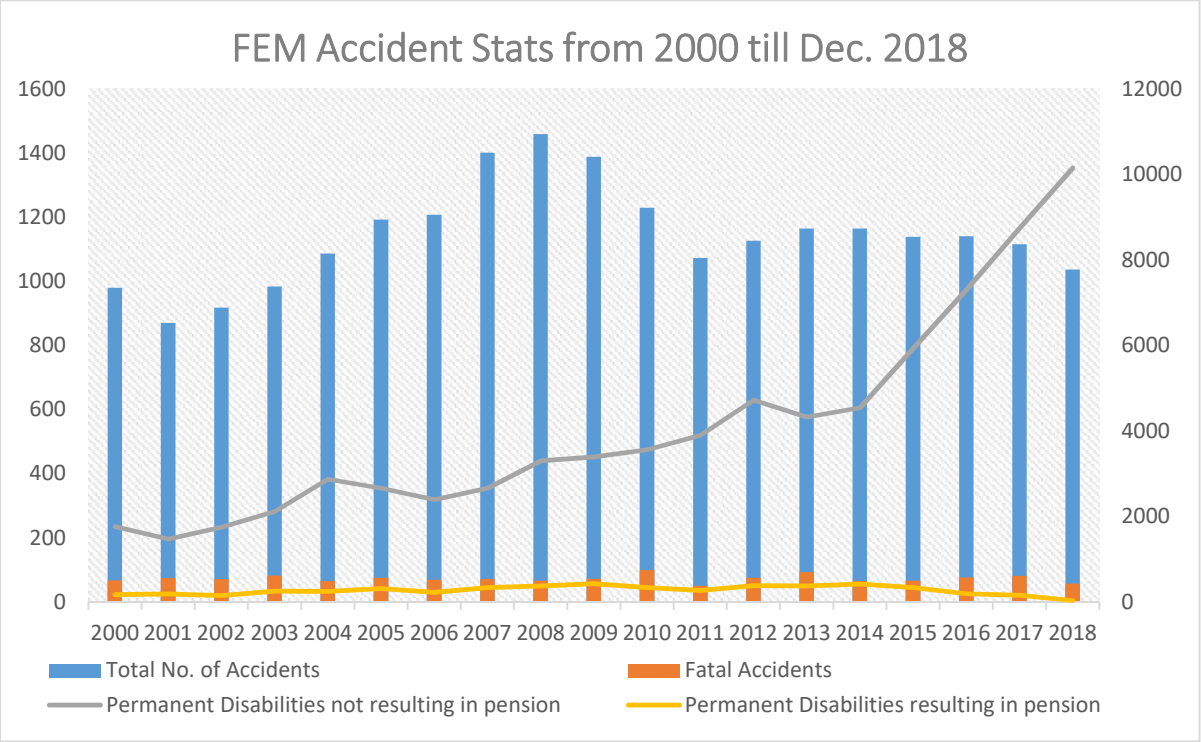

Figure 3-1: FEM Accident Statistics (2000- 2018)

The results in Table 3-1 analysed in Figure 3-1 indicate that there are varying degrees to which total accidents, fatalities, Permanent Disabilities resulting in Pensions occur each year since 2003 until 2014 and post 2014. However, the number of Permanent Disabilities not resulting in Pensions continues to increase despite current amendments to the Construction Regulations. It is still not clear from the results whether legislation alone is enough to reduce accidents and fatalities or whether the challenges lie with enforcement of legislation.

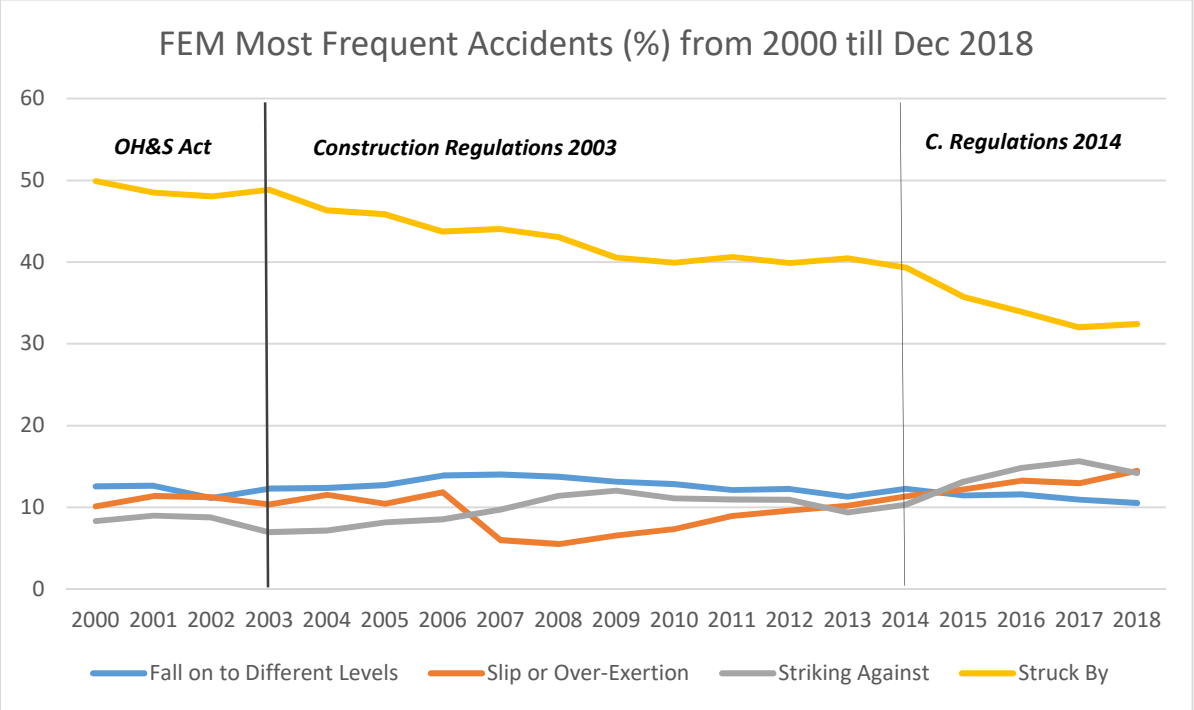

Figure 3-2: Top Four Most Fatal Accidents in SA Construction (excluding motor vehicle accidents): FEMA

Figure 3-2 indicates the top four most frequent accidents (excluding motor vehicle accidents) in the South African construction industry. Although there has been a decrease in 'Struck-by' accidents, there has been an increase in "Slip or Over Exertion and "Struck Against" accidents and little change in accidents caused by "Falls".

Table 3-2 Construction Health and Safety Accidents by Cause (%): FEM

Causes of Accidents	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Accident Type N.E.C.	2,37	0,97	0,51	0,56	0,48	0,66	0,73	0,81	1,57	2,25	2,02	1,50	1,53	1,94	2,70	3,57	1,92	1,43	1,57
Awaiting Information	-	-	-	-	-	-	-	-	-	-	-	-	0,01	-	-	0,02	0,01	0,01	0,01
Caught on, in between	8,49	8,69	7,29	7,98	9,05	9,40	9,56	8,47	7,87	7,59	7,42	6,60	7,48	6,68	6,87	6,59	6,77	6,64	6,76
Contact with Electric Current	0,37	0,23	0,41	0,31	0,15	0,20	0,19	0,39	0,53	0,57	0,51	0,41	0,40	0,44	0,49	0,60	0,65	0,57	0,59
Contact with Temp. Extremes	0,61	0,78	0,96	0,95	0,98	0,96	1,02	0,92	1,29	1,35	1,48	1,32	1,25	1,44	1,36	1,32	1,48	1,83	1,99
Fall on to Different Levels	12,56	12,65	11,15	12,29	12,36	12,72	13,88	14,02	13,72	13,16	12,83	12,12	12,26	11,29	12,28	11,48	11,57	10,96	11,53
Fall on to Same Level	2,72	2,53	2,37	2,93	2,41	2,27	2,56	5,40	5,30	5,59	5,53	4,43	3,67	3,90	3,85	4,05	3,55	3,87	3,91
Inhalation,Absorption,Ingestion	0,90	0,94	1,02	0,94	0,99	1,40	0,89	1,88	1,40	1,17	1,01	0,99	0,78	1,87	1,04	1,25	1,40	2,21	1,57
Motor Vehicle Accident	3,59	4,26	8,15	7,55	7,66	7,53	6,94	8,29	8,32	9,14	10,75	12,02	12,09	12,31	10,30	9,94	10,57	11,75	10,93
Slip or Over-Exertion	10,14	11,37	11,24	10,36	11,54	10,46	11,84	5,98	5,51	6,56	7,36	8,94	9,61	10,21	11,35	12,20	13,26	12,94	14,47
Striking Against	8,32	9,00	8,76	6,97	7,17	8,18	8,54	9,75	11,42	12,04	11,13	10,95	10,91	9,39	10,34	13,14	14,84	15,65	14,20
Struck By	49,92	48,51	48,05	48,88	46,31	45,85	43,75	44,05	43,06	40,57	39,93	40,64	39,91	40,47	39,36	35,76	33,94	32,01	32,42
Unclassified-Not Suff. Data	0,01	0,08	0,12	0,28	0,91	0,36	0,10	0,05	-	0,02	0,03	0,06	0,09	0,07	0,06	0,07	0,02	0,12	0,04

Table 3-2 reports (in %) the total construction health and safety accidents by cause in alphabetical order, from year 2000 up until 2018. From the report, almost all accident by causes have been increases except for ‘Caught on, in between’ and ‘Struck-By’ although there is no significant improvement. In comparison to Table 3-1, Figure 3-1 and Figure 3-2, it may be inferred that there has been an overall increase in the number of accidents by cause.

3.4.1.1 Comparison with other Industries

There are two most important standards for analysing accident statistics namely; Frequency Rate and Severity Rate (COID Accident Stats, 1999). These measures indicate on average how often disabling injuries occur in a particular industry (Accident Frequency Rate) and the seriousness of the time lost during these occurrences (Accident Severity Rate) (CIDB, 2009). The results are obtained through the following calculations (COID, Accident Stats, 1999:6):

The frequency rate is calculated as follows:

$$\frac{\textit{Number of injuries x 1 000 000}}{\textit{Number of man-hours of exposure}}$$

And the severity rate:

$$\frac{\textit{Total Time charges in days x 1 000}}{\textit{Number of man-hours of exposure}}$$

Under Table 3-3 and Table 3-4 below, the Frequency Rate (highlighted in yellow) for construction accidents in 1999 was 4,89 ranking 9th out of 24 industries. The Severity Rate (highlighted in yellow) for the industry was 1,14; the 3rd highest of the 24 industries with Fishing and Transport industry at the top of the list.

The last available study on average working hours was conducted in 1997, (before the introduction of the Construction Regulation) and the results thereof used during a survey in 1998 and 1999 for comparison on accident frequency and severity across South African industries (COID & DoL, 1999).

Table 3-3: Health and Safety Statistics Report

Class	Industry	Number of Workmen	Average Man-hours Worked 1997	Hours of exposure to risk	Number of Accidents	Frequency Rate	Number of Accidents according to the extent of disablement				Frequency Rate		
							Temp.	Perm.	Fatal	Total	Temp.	Perm.	Fatal
1.	Agriculture and Forestry	582 606	45.4	1 322 515 620	4 929	3.73	4 500	358	71	4 929	3.40	0.27	0.05
3.	Fishing	4 648	45.4	10 550 960	222	21.04	190	10	22	222	18.01	0.95	2.09
4.	Mining	89 363	45.4	202 854 010	1 821	8.98	1 560	240	21	1 821	7.69	1.18	0.10
5.	Building and Construction	290 444	45.1	654 951 220	3 203	4.89	2 850	279	74	3 203	4.35	0.43	0.11
6.	Food, Drink and Tobacco	242 758	44.9	544 587 113	3 092	5.68	2 784	280	28	3 092	5.11	0.51	0.05
7.	Textiles	183 482	44.8	410 999 680	1 181	2.87	1 111	69	1	1 181	2.70	0.17	0.00
8.	Wood	131 451	47.8	313 839 263	2 710	8.63	2 452	250	8	2 710	7.81	0.80	0.03
9.	Printing and Paper	63 492	44.7	141 745 890	630	4.44	576	53	1	630	4.06	0.37	0.01
10.	Chemical	174 094	44.1	383 587 113	1 726	4.50	1 512	195	19	1 726	3.94	0.51	0.05
11.	Leather	34 276	44.1	75 492 890	215	2.85	204	10	1	215	2.70	0.13	0.01
12.	Glass, Bricks and Tiles	60 497	40.5	122 506 425	887	7.24	785	93	9	887	6.41	0.76	0.07
13.	Iron and Steel	515 567	46.7	1 202 817 811	7 052	5.86	6 148	848	56	7 052	5.11	0.71	0.05
14.	Diamonds, Asbestos, Bitumen	18 563	48.1	44 644 015	88	1.97	66	20	2	88	1.48	0.45	0.04
15.	Trade and Commerce	781 431	45.4	1 773 848 370	4 171	2.35	3 858	263	50	4 171	2.17	0.15	0.03
16.	Banking, Finance, Insurance	230 806	45.4	523 929 620	280	0.53	262	14	4	280	0.50	0.03	0.01
17.	Transport	333 955	45.4	758 077 850	5 547	7.32	5 153	289	105	5 547	6.80	0.38	0.14
18.	Local Authorities	166 826	45.4	378 695 020	1 921	5.07	1 829	76	16	1 921	4.83	0.20	0.04
19.	Personal Services, Hotels	457 081	45.4	1 037 573 870	2 276	2.19	2 113	106	57	2 276	2.04	0.10	0.05
20.	Entertainment and Sport	35 712	45.4	81 066 240	148	1.83	136	11	1	148	1.68	0.14	0.01
21.	Medical Services	124 835	45.4	283 375 450	353	1.25	335	17	1	353	1.18	0.06	0.00
22.	Professional Services, N.O.S.	157 389	45.4	357 273 030	277	0.78	248	26	3	277	0.69	0.07	0.01
23.	Educational Services	161 195	45.4	365 912 650	753	2.06	722	22	9	753	1.97	0.06	0.02
24.	Charitable, Religious, Political and Trade Organizations	78 876	45.4	179 048 520	354	1.98	339	14	1	354	1.89	0.08	0.01
	TOTAL	4 919 347		11 169 892 630	43 836	3.92	39 733	3 543	560	43 836	3.56	0.32	0.05

Table 3-4, Accident Severity Rate

Class	Industry	Number of Workmen	Hours of exposure to risk	Total Time Loss - Days	Severity Rates	Time Loss According to Extent of Disablement - Days				Severity Rates		
						Temp.	Perm.	Fatal	Total	Temp	Perm	Fatal
1.	Agriculture and Forestry	582 606	1322 515 620	772 859	0.58	116 489	230 370	426 000	772 859	0.09	0.17	0.32
3.	Fishing	4 648	10 550 960	151 258	14.34	7 918	11 340	132 000	151 258	0.75	1.07	12.51
4.	Mining	89 363	202 854 010	336 103	1.66	49 123	160 980	126 000	336 103	0.24	0.79	0.62
5.	Building and Construction	290 444	654 951 220	746 157	1.14	92 427	209 730	444 000	746 157	0.14	0.32	0.68
6.	Food, Drink and Tobacco	242 758	544 587 113	379 837	0.70	59 137	152 700	168 000	379 837	0.11	0.28	0.31
7.	Textiles	183 482	410 999 680	61 819	0.15	19 789	36 030	6 000	61 819	0.05	0.09	0.01
8.	Wood	131 451	313 839 263	249 028	0.79	49 558	151 470	48 000	249 028	0.16	0.48	0.15
9.	Printing and Paper	63 492	141 745 890	49 202	0.35	12 062	31 140	6 000	49 202	0.09	0.22	0.04
10.	Chemical	174 094	383 587 113	258 356	0.67	36 746	107 610	114 000	258 356	0.10	0.28	0.30
11.	Leather	34 276	75 492 890	18 627	0.25	4 017	8 610	6 000	18 627	0.05	0.11	0.08
12.	Glass, Bricks and Tiles	60 497	122 506 425	142 376	1.16	22 616	65 760	54 000	142 376	0.18	0.54	0.44
13.	Iron and Steel	515 567	1202 817 811	924 265	0.77	139 495	448 770	336 000	924 265	0.12	0.37	0.28
14.	Diamonds, Asbestos, Bitumen	18 563	44 644 015	38 994	0.87	2 034	24 960	12 000	38 994	0.05	0.56	0.27
15.	Trade and Commerce	781 431	1773 848 370	568 249	0.32	91 639	176 610	300 000	568 249	0.05	0.10	0.17
16.	Banking, Finance, Insurance	230 806	523 929 620	37 670	0.07	7 250	6 420	24 000	37 670	0.01	0.01	0.05
17.	Transport	333 955	758 077 850	1 008 610	1.33	151 930	226 680	630 000	1 008 610	0.20	0.30	0.83
18.	Local Authorities	166 826	378 695 020	179 664	0.47	36 084	47 580	96 000	179 664	0.10	0.13	0.25
19.	Personal Services, Hotels	457 081	1037 573 870	497 944	0.48	54 934	101 010	342 000	497 944	0.05	0.10	0.33
20.	Entertainment and Sport	35 712	81 066 240	13 578	0.17	4 098	3 480	6 000	13 578	0.05	0.04	0.07
21.	Medical Services	124 835	283 375 450	23 463	0.08	9 003	8 460	6 000	23 463	0.03	0.03	0.02
22.	Professional Services, N.O.S.	157 389	357 273 030	43 437	0.12	8 037	17 400	18 000	43 437	0.02	0.05	0.05
23.	Educational Services	161 195	365 912 650	83 424	0.23	11 184	18 240	54 000	83 424	0.03	0.05	0.15
24.	Charitable, Religious, Political and Trade Organizations	78 876	179 048 520	19 911	0.11	7 191	6 720	6 000	19 911	0.04	0.04	0.03
	TOTAL	4 919 347	11169 892 630	6 604 831	0.59	992 761	2 252 070	3 360 000	6 604 831	0.09	0.20	0.30

3.4.1.2 International Comparisons

ILO (2017) estimated the number of fatal accidents based on their frequency among members of its States, reporting in three economic sectors namely: Agriculture including farming, fishing and forestry; Industry including mining, manufacturing, energy and construction; Services. Statistics were grouped into 7 regions:

- High-Income countries (HIGH)
- Low- and middle-income countries of the African Region (AFRO)
- Low- and middle-income countries of the Americas (AMRO)
- Low- and middle-income countries of the Eastern Mediterranean Region (EMRO)
- Low- and middle-income countries of the European Region (EURO)
- Low- and middle-income countries of the South-East Asia Region (SEARO)
- Low- and middle-income countries of the Western Pacific Region (WPRO) (ILO, 2017:8)

Table 3-5: Fatality of Occupational Injuries, Rate per 100,000 employees

Region	Fatality Rates of each economic sector					
	Agriculture		Industry		Service	
	2010	2014	2010	2014	2010	2014
HIGH	7.8	no change	3.8	no change	1.5	no change
AFRO	18.9	no change	21.1	no change	17.7	no change
AMRO	9.3	8.7 ↓	9.5	11.2 ↑	6.0	5.7 ↓
EMRO	13.0	no change	14.9	no change	12.3	no change
EURO	15.7	17.0 ↑	10.3	13.4 ↑	5.5	3.5 ↓
SEARO	24.0	27.5 ↑	9.7	9.9 ↑	5.1	4.4 ↓
WPRO	24.0	27.5 ↑	9.7	9.9 ↑	5.1	4.4 ↓

Table 3-5, under the "Industry" economic sector, (which construction falls) fatality rates in the low to middle-income countries of the African Region (AFRO) had the highest fatality rate in 2010 and have seen no change in 2014.

3.4.2 Compliance with Recent Construction Regulations to Improve Workers Quality of Life

Othman (2012) identified the causes of non-compliance with health and safety regulations are being attributed to; lack of commitment and awareness by clients and managers, poor leadership by safety officers, lack of enforcement procedures by supervisors especially on the

use of PPE as well as poor choice of Sub-Contractors who are typically appointed without their company policies being scrutinised. Figure 3-3 depicts some of the causes of non-compliance with health and safety regulations:

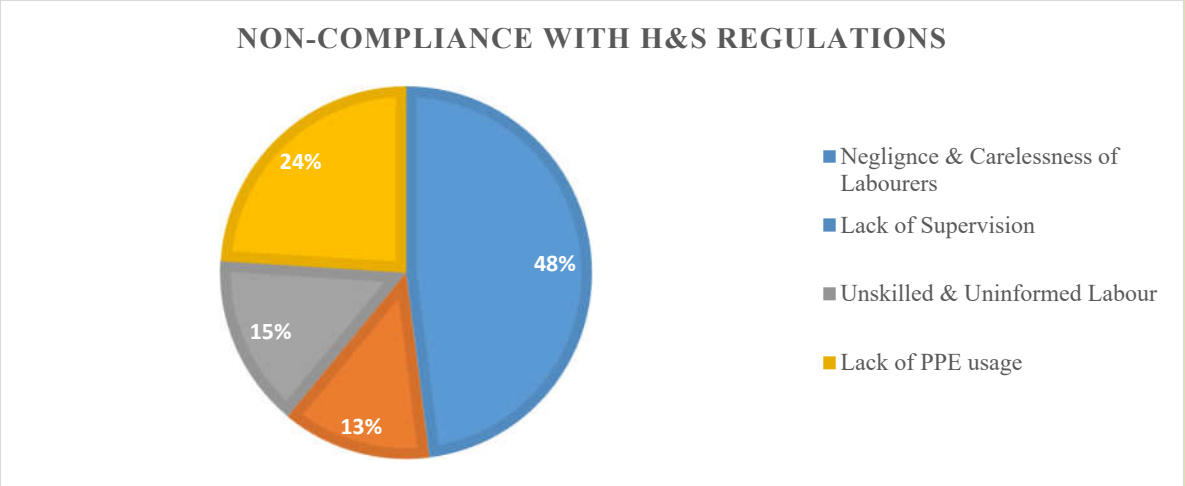

Figure 3-3: Summary of Non-Compliance with H&S Regulations (Othman,2012)

In August 2007, the Department of Labour (DoL) conducted statistics for blitzes to determine the state of health and safety in South Africa, during which 1,415 construction companies were visited (CIDB, 2009). From the reported findings, 52,5% of construction companies were non-compliant with the Occupation Health and Safety Act (OH&S Act) and the Construction Regulations (ibid).

Table 3-6: National Construction Blitz Inspection Report: August 2007

Provinces	Total Work Places Inspected	Number complying	Number non-complying	Improvements	Contraventions	Prohibition
Eastern Cape	136	24	102	0	106	14
Free State	155	271	84	2	77	5
Gauteng: North	57	21	35	8	40	2
Gauteng: South	247	80	167	25	172	163
KwaZulu-Natal	240	126	100	7	100	3
Limpopo	75	7	68	5	57	12
Mpumalanga	237	152	85	9	50	43
North West	56	22	32	5	27	23
Northern Cape	105	19	86	9	71	13
Western Cape	107	37	70	16	315	4
Total	1415	759	829	86	1015	287
%	100	47,5	52,5	6	73	21

Verwey (2015) notes the challenges for applying regulatory changes as ascribed to normal human resistance to change, and furthermore, construction regulation course attendees within companies have difficulties explaining to their managers and CEOs differences within the regulations. Additionally, the author states that most companies are aware of the changes in these regulations but do not have sufficient and concrete knowledge to implement them. Contractors in the small markets also believe construction regulations do not apply to them since they are not involved in heavy construction (ibid). Civin (2014) regards these regulations as overly burdensome to the clients especially with low key projects where clients are expected to prepare a baseline risk assessment and draw up safety specifications for the contractor as these increases the overall costs of a project.

Vermeulen (2015) opines the new regulations will have major ramifications for the construction industry. He further maintains this would be expensive for construction companies. Furthermore, Vermeulen (2015) believes that it is still the contractors' sole responsibility to proactively adhere to the obligations of the regulations despite these changes. He further establishes that the new regulations mainly constitute of the restructuring of the somewhat ambiguous Constructions Regulations 2003 rather than introduce any new ideas and regulations.

Industry insiders identified low levels of compliance with the Occupational Health and Safety Act (OHSA) although there are companies especially large ones that do strive to improve the working conditions of their workers, the community and environment (Steward, 2015). Large construction companies adhere to OHSA due to their industry experience hence have realised the value thereof, and another reason is that 20% of these companies employ 80% of the workforce, therefore are prone to investigations due to their size (ibid). It is furthermore believed that large companies are slowly realising the significance of complying with OHSA and the notion that safety costs money is gradually being replaced with a mantra that lack of safety costs money.

3.4.3 Contractors attitude and perception towards the Construction Regulations

The identification of gaps within the 2003 version of the Construction Regulations led to the revision of these regulations in South Africa (Matete, Fidelis & Emuze, 2016). Under the new regulations, several clauses require contractors to comply with minimum safety standards to improve health and safety on site (Civin, 2014). Although contractors are obligated to apply for permit-to-work as a strategy to enforce commitment, the level of readiness of the

Department of Public Works is still not clear (Matete et al., 2016). Contractors perceive these new regulations as an additional burden giving rise to unnecessary costs (such as the appointment of a competent H&S Agent from contractors' point of view), and as a result, contractors tend not to comply fully with the requirements of these regulations (ibid). Furthermore, contractors are not compelled by clients to notify Department of Labour before the commencement of work (ibid). The following tables were adopted from a study conducted by Matete, Emuze & Smallwood in 2016 concerning contractors' perceptions towards Construction Regulations 2014:

Table 3-7: Contractors' Perception in Relation to the Construction Regulations

Statement	MS	Rank
The Construction Regulations should promote H&S compliance in the industry	4.63	1
Industry role players are relatively familiar with the Construction Regulations (2003)	4.17	2
Compliance with the Construction Regulations (2014) requires specific competencies	3.89	3
The Construction Regulations (2014) realised notable revisions and requirements	3.77	4
Industry role players are relatively familiar with the Construction Regulations (2014)	3.75	5
Permit-to-work system to be enforced by DoL in Au gust 2015 is based on the Construction Regulations (2014)	3.63	6
Industry role players are relatively familiar with the Construction Regulations (2014	2.93	7

Matete, Emuze & Smallwood (2016) pointed that based on the responses in Table 3-7, it can be concluded that the respondents are relatively familiar with the Construction Regulations 2014; however, the regulations have a far-reaching implication for implementation. Leshoedi (2016), highlights that the regulations are not improving health and safety in all project phases and that it should be mandatory for all construction companies to become fully compliant on the clients' database and "not on paper only".

3.5 IMPROVING THE WELLBEING AND SUSTAINABILITY

According to the ILO, "Workplace Wellbeing relates to all aspects of working life, from the quality and safety of the physical environment, to how workers feel about their work, their working environment, the climate at work and work organization." Historically, occupational health and safety legislation in the workplace was implemented during the industrial revolution as a direct response to advocacy by labour movements protesting against harsh working

conditions and minimum wages (Global Wellness Institute, 2016). Also, the industrial revolutions valued capital over labour encouraging 'dehumanisation'(ibid). According to the Global Wellness Institute (2016:9) "more than 90% of the global workforce is not covered by wellness programs, and most workers face much larger problems than those addressed by typical employer-sponsored workplace wellness programs". Figure 3.8 indicates the percentages of employed workers who have access to workplace wellness programs or services. The percentage for Africa are 1%

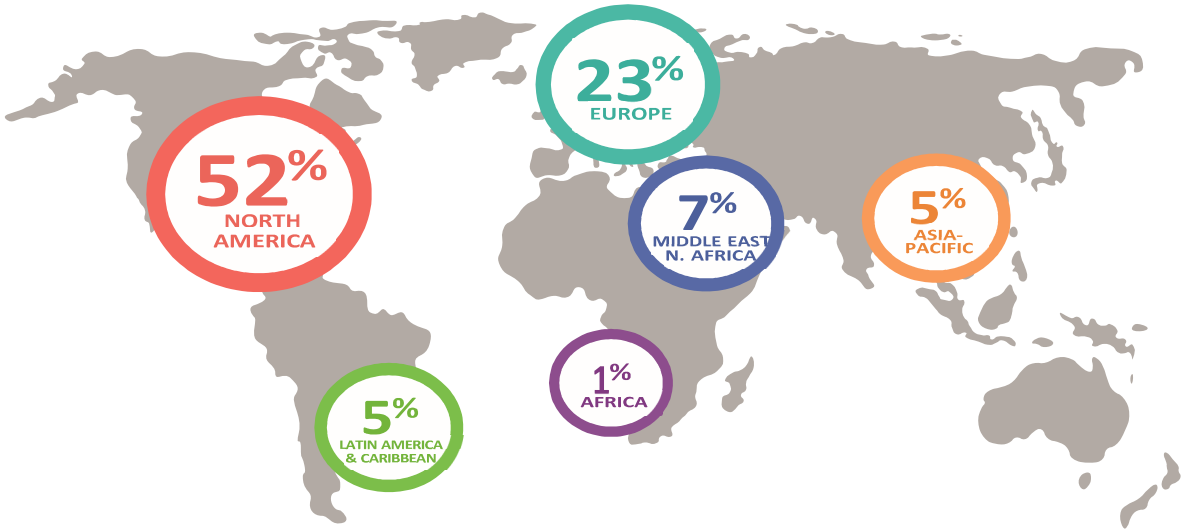

Figure 3-4: Estimates by the Global Wellness Institute

The health and well-being of construction workers are often overlooked and usually discussions on this topic place more emphasis is on safety and prevention (Fry, 2017). Orvitz (2018) adds that it is astounding how rarely health and wellness are discussed despite the construction industries reliance on healthy, capable and physically fit workers. If employees are mentally fit and in good health, they are less likely to injure themselves (ibid). Starting health and wellness programs have the ability to sustain the workforce for many more years (Fry, 2017). It is imperative that contractors ensure their employees' health and wellbeing as some construction workers coin the believe; "too tough to worry about it" when it comes to safety (Ibid). Sieberhagen (2008) contends that it might be necessary to use legislation to ensure that the safety, health and wellness of workers are taken seriously (Sieberhagen, 2008).

"Workplace wellness programs are popular in sedentary jobs that require much less physical exertion" (Orvitz, 2018:1). Windapo (2013) identifies that sites of projects designed for manufacturing adhere fully to the requirements of health and safety legislation due to the involvement of heavy machinery and commitment by line manager as opposed to site manned by uncommitted managers. Compliance with health and safety legislation requires a

combination of both building site type and site managers' attitude (ibid). South Africa is not lacking in terms of occupational health and safety legislation, however occupational health and safety should not be driven solely by legislation but must be regarded more as a value (CIDB, 2009; Agumba & Haupt, 2009). According to Fryer (1997 cited in Jacob, 2010), the construction industry requires more than just legislation to make it safer; it requires an attitude change towards safety.

The intent of the Construction Regulations is useful in creating general requirements for health and safety in all involved in the construction work; however, various practical problems have been pointed out (Markham, 2005 cited in Jacobs 2010). Sieberhagen (2008) argues that occupational health and safety aspects are covered at large within the OH&S Act; however, there is a lack of legislation regarding employees wellbeing. Furthermore, psychological stressors at work have often been overlooked in the past as were traditionally considered unimportant and even taboo; if considered were often treated as an individual case (Wynne & Rafferty, 1999 cited in Sieberhagen, 2008).

3.6 CHAPTER SUMMARY

There a several laws governing the South African construction industry with the Constitution of South Africa being the supreme law. The most significant legislative act in construction is the OH&S Act 85 of 1993 under which the Construction Regulations were promulgated in 2003 under Section 43 of the act specifically for the construction industry. The Construction Regulation 2003 were perceived to have an impact in raising health and safety awareness among industry stakeholders and are believed to have had a positive impact on accident reduction although this claim may not be quantified. In addition to the Construction Regulations 2003, the 2014 version was drafted and came to effect in August 2014. The promulgation of the regulations sort to address the ambiguity of the old regulations and to close major linguistic loopholes. However, the main purpose of the more stringent regulations is to ensure compliance, enforce accountability and full commitment of all key project stakeholders. All in all, it is not clear whether contractors apply all aspects of the regulations to improve the wellbeing of construction workers.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION

This chapter discusses the research methodology followed to achieve the aim and objectives of this study and to respond to the hypothesis. To avoid confusion on some of the terminologies, it is imperative to clearly define the key concepts; research methodology and research design. To achieve this objective, the compound words are broken down into *research, methodology* and *design.*

4.1.1 Research

Creswell (2002:3) defines research as "a process of steps used to collect and analyse information to increase our understanding of a topic or issue". Leedy & Ormrod (2005:4), further describe research as "the systematic process of collecting and analysing information (data) to increase our understanding of the phenomenon with which we are concerned or interested". According to Neutens & Rubinson (2002), research seeks to answer the question '*why'* through the application of scientific methods which enable the researcher to answer a myriad of questions to find the best answer. Therefore, it may be inferred that research follows a planned activity aimed at finding new facts and information about a phenomenon through a series of research processes; identification of a certain problem or particular field of interest and establishing that into a research problem, collecting data, analysing data and finally reporting the research findings (UP-Repository, 2016).

4.1.2 Research Methodology

The research methodology or research strategy may be defined as the general process a researcher implements to carry-out the research study (Leedy & Ormrod, 2001). According to Kothari (2004), research methodology is the systematic way of solving the research problem and may be understood as a scientific way of studying research. Research methodology involves the analysis of assumptions, principles and techniques in a particular approach to inquiry (Schwardt, 2007). Furthermore, in a research study, the researcher adopts various steps in studying the research problems as well as explaining the logic behind them. It is important that the researcher knows the methodology over and above the research methods or techniques (ibid). Moreover, research methodology focuses on the overall approach to the research

processes and the types of instruments and procedures to be used (Mouton, 2001). Research methodology refers to the approach adopted when collecting and analysing data (Vosloo, 2014).

4.1.3 Research Design

According to Leedy & Ormrod (2001), a research design is a plan for the study providing an overall framework for collecting data. It is viewed as "the functional plan in which certain research methods and procedures are linked together to acquire a reliable and valid body of data for empirically grounded analyses, conclusions and theory formulation" (Vosloo, 2014:316). According to Welman et al. (2005), a research design is a general plan, according to which the participants of a proposed research are chosen, as well as the means of data collection or generation.

Table 4-1: Differences between research design and research methodology (Adapted from Mouton, 1996:56)

Research Design	Research Methodology
Focuses on the end product: What kind of study is being planned and what kind of result are expected?	Focuses on the research process and the kind of tools and procedures to be used.
Point of departure = Research problem or question.	Pont of departure = Specific tasks (data collection or sampling) at hand.
Focuses on the logic of research: What kind of evidence is required to address the research question adequately?	Focuses on the individual (not linear) steps in the research process and the most "objective" (unbiased) procedures to be employed.

4.2 RESEARCH PROCESS

A research process is defined as the scientific activities engaged in a study to produce knowledge (Nachmias & Nachmias, 1981 cited in Zulu, 2019).

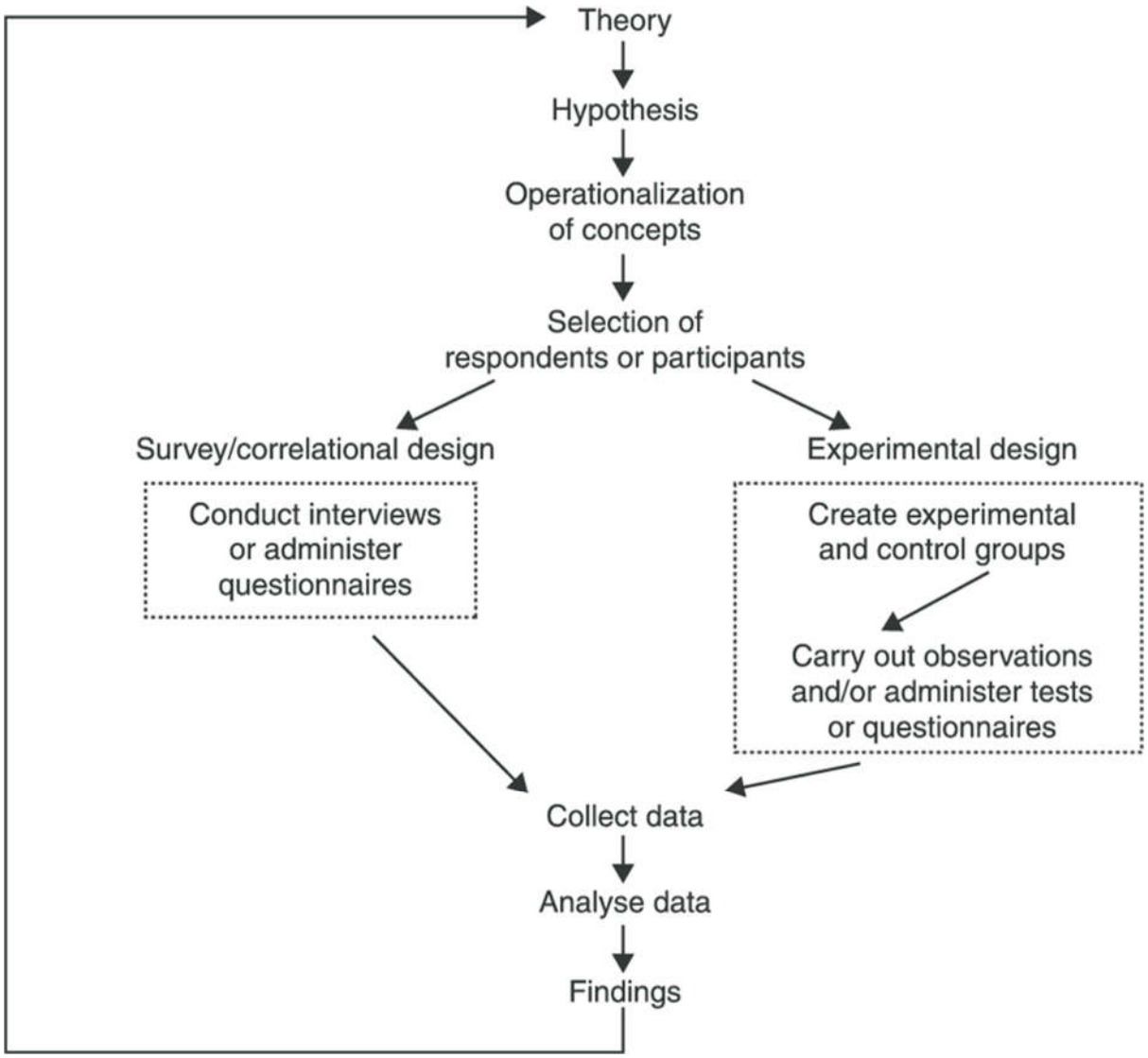

Figure 4-1: The research process (adapted from Bryman and Cramer, 2005)

4.3 RESEARCH APPROACH

Research approaches can either be deductive, inductive or abductive and the relevance of hypotheses to the study determines which approach may be used.

4.3.1 Deductive Approach

Deductive research approach also known as deductive reasoning emanates from developing a hypothesis based on existing theory or known phenomenon, reasoning from the general truth and then designing a research strategy to test the hypothesis (Wilson, 2010; Pelissier, 2008; Dudovsky, 2016). Gulati (2009) further adds that if a causal relationship seems to be implied by a particular theory, it might be true in many instances and a deductive design could test to

see if this relationship did obtain a more general circumstance. According to Dudovsky (2016), deductive research studies follow the approach under figure 4-2:

Figure 4-2: Deductive research process (Dudovsky, 2016)

However, deductive reasoning suffers from a lack of clarity in terms of how to select theory to be tested by formulating hypotheses (Dudovsky, 2016).

4.3.2 Inductive Approach

Inductive research approach, also known as inductive reasoning involves the search for patterns from observations to develop explanations and theories from a series of hypotheses informed by the trends observed during the study (Bernard, 2011). This is a bottom-up research approach which begins with observations and ends with the development of a theory (Goddard & Melville, 2004). Figure 4.3 illustrates the processes involved in the inductive approach:

Figure 4-3: Inductive research process (Dudovsky, 2016)

The drawback on this approach is that there is "no amount of empirical data will necessarily enable theory-building" (Saunders, Lewis & Thornhill, 2012).

4.3.3 Abductive Approach

Abductive research approach or reasoning is used to address the weaknesses suffered by the traditional approaches; deductive and inductive research approaches by adopting a pragmatic perspective to these approaches (Dudovsky, 2016). During the abductive approach, the research process begins with 'surprising facts' or 'puzzles' and the research process is devoted to their explanation (Bernard, 2011). The 'surprising facts' or 'puzzles' may appear when a

researcher encounters an empirical phenomenon that cannot be explained by the existing range of theories (ibid).

The research approach adopted for this study was the ‘deductive research approach' because the research tests hypotheses and does not generate them. Furthermore, the period for conducting the study was short.

4.4 RESEARCH DESIGN

There are two basic research designs namely qualitative research design and quantitative research design.

4.4.1 Qualitative Research Design

According to Strauss & Corbin (1990:11), "qualitative research means any research that produces findings not arrived at by statistical procedures or other means of quantification. It can refer to research about persons' lives, lived experiences, behaviours, emotions, and feelings as well as about organisational functioning, social movements, cultural phenomena, and interactions between nations." Flick (2014:542) further claimed that “Qualitative research is concerned with the analysis of subjective or social issues, events, or practices by collecting non-standardised data and analysing texts and images instead of numbers and statistics. This type of research is aimed at discovering the underlying motives and desires, using in-depth interviews to achieve its purpose (Kothari, 2014).

Leedy and Ormrod (2001) contended that the description of qualitative research is less structured because it formulates and builds new theories. Qualitative research builds its premises on inductive reasoning, rather than deductive reasoning and its observational elements that pose questions that the researcher attempts to explain (Williams, 2007). Qualitative research studies may be conducted using the following five approaches; Case studies, grounded theory, ethnography, content analysis, and phenomenology (Creswell, 2003).

A *case study* is an in-depth analysis of a program, event, activity, process or individuals, carried out over a defined period of time (Leedy & Ormrod, 2001; Creswell, 2003). According to Grinnell (1981:302) a case study ‘is characterized by a very flexible and open-ended technique of data collection and analysis”.

Grounded theory develops a general theory of inquiry about a phenomena of interest (Trochim, 2006). Core theoretical concepts are derived as the researcher gathers data from generative questions to develop a refined or grounded observations (ibid).

Ethnography is a method of enquiry where the researcher studies cultural patterns such as language, behaviour or actions of a specific population in a natural setting over a prolonged period of time (Trochim, 2006). Data collection is often involving 'participant observation' as part of field research (Creswell, 2003; Trochim, 2006).

Content analysis is defined as "a detailed and systematic examination of the contents of a particular body of materials for the purpose of identifying patterns, themes, or biases" (Leedy & Ormrod, 2001:155). This method of inquiry reviews forms of human communication such as newspapers, books and films to identify themes, bias and patterns (ibid).

Phenomenology is a method of inquiry based on the participants' subjective view about the phenomena (Trochim, 2006). The researcher seeks to gain understanding of participants' world view or their lived experiences of the phenomena being studied (ibid).

4.4.2 Quantitative Research Design

Quantitative research design is design aimed at testing theories, finding facts, predicting variables using experimental or survey strategies with questionnaires, structured interviews or structured observations to demonstrate the relationship between variables (Van der Merwe, 1996; Saunders et al., 2012). Quantitative research design is mostly associated with deductive research approach (Saunder et al., 2012). "Quantitative researchers seek explanations and predictions that will generate to other persons and places. The intent is to establish, confirm, or validate relationships and to develop generalisations that contribute to the theory" (Leedy & Ormrod, 2001:102).

Leedy & Ormrod (2001), content that research itself is independent of the researcher and as a result, data is used to measure reality to create meaning objectively. The research design uses quantitative methods from natural sciences such as numeric or statistical analysis to ensure objectivity, generalizability and reliability (Creswell, 2003; Weinreich, 2009). Quantitative research is short-term and may be used when trying to measure a trend based on a large randomly selected population (Carr, 1994). Moreover, "quantitative research methods are designed to produce statistically reliable data that tells us how many people do or think

something" (UKaid, 2016:4). There are four main types of quantitative research designs, namely; survey, correlational, quasi-experimental and experimental (ibid).

Survey methodology uses interviews, questionnaires and sampling polls to collect data from a randomly sampled population in order to obtain accurate findings (Klazema, 2014). Surveys may be conducted on specific group or used to compare across groups (ibid).

In a *correlational method,* the researcher uses statistical correlation to examine differences between variables or study groups (Leedy & Ormrod, 2001). Validity and reliability are important components which affect the correlation coefficient (ibid)

Quasi-experimental also known as causal-comparative research seeks to examine the cause-effect (Klazema, 2014). Rather than seeking to identify statistical relationships between variables, this approach identifies how the independent variable is affected by different dependent variables (ibid).

Experimental research is specifically focused on proving the hypothesis or several hypotheses (Klazema, 2014). This method of design is based of gathering precise empirical data to explain some phenomena (ibid). Experimental research seeks to determine the cause-effect relationship of a phenomenon (Creswell, 2003).

The research design adopted for this study was a quantitative research design given the deductive research approach to examine variables in the study using statistical analyses. Furthermore, quantitative research design achieved the objectives of the study which was to test the hypothesis while qualitative research design would not achieve this objective. Moreover, the duration of this study was minimal with cost constraints.

4.5 RESEARCH STRATEGY

There are various strategies for conducting social science research studies that include surveys, case studies, experimental, quasi-experimental, archival research, ethnography, action research, grounded theory and narrative inquiry (Saunders et al., 2012; Leedy & Ormrod, 2010). Given the nature of the study, the survey methodology was adopted for sampling data from respondents that represent the population.

4.5.1 Survey

Survey methodology is a systematic technique of gathering data from a sample population to construct statistics about the attributes of the larger population of which the sample population are members (Groves et al., 2009). Surveys may be designed to investigate the cause-effect relationship of some social phenomenon (Moser & Calton, 1977). Surveys provide a statistical description of trends, attitudes, or opinions of a sample population to establish the general truth about the overall population (Creswell, 2004). Survey methodology includes cross-sectional and longitudinal studies using questionnaires or structured interviews for data collection (ibid). The primary purpose for conducting surveys is to obtain information about the phenomena being studied (Moser & Calton, 1977). Because surveys are conducted on a sample, they are subject to survey error or statistical error as the results obtained may deviate from the desired outcome to the population studied (Groves et al., 2009).

4.6 DATA COLLECTION METHODS

There are two types of data, secondary data and primary data.

4.6.1 Secondary Data Collection

Secondary data refers to data collected and analysed by other users, and the sources may be from published or unpublished data, newspapers, books, journals, magazines or academic reports (Kothari, 2004).

The use of secondary data through the review of relevant literature was significant in the analysis of recent construction health and safety legislative framework changes and their impact on the quality of life of construction workers. The literature review process aimed at identifying whether there have been any impacts on workers wellbeing since the recent construction health and safety legislation changes and whether contractors are committed to improving the quality of life for construction workers.

4.6.2 Primary Data Collection

Primary data refers to raw data or the type of information directly from first-hand sources through surveys, observations, interviews and experimentation and this source of data is not subjected to any manipulation (Kothari, 2004; Creswell, 2009). Primary data collection method adopted for this study was a questionnaire survey method.

4.6.2.1 Questionnaire

A questionnaire is an organised set of questions typed out in a particular order for gaining information related to the research problem (Kothari, 2014). The questionnaire is mailed to respondents who are expected to read and understand the questions and write down their responses in the spaces provided without the assistance of the interviewer (ibid). Questionnaires are regarded as the heart of data collection in survey research (Kothari, 2014). Questionnaires make use of instruments that simplify response such as checklists and rating scales also known as Likert scales (Leedy & Ormrod, 2001). These instruments list behaviours, characteristics or other attributes the researcher aims to identify from the respondents (ibid).

4.6.2.2 Questionnaire Design

According to May (2001), the three traditional methods of conducting surveys are self-completion or mail questionnaires, telephone surveys and scheduled interview surveys. This study was conducted using mailed or self-completion questionnaires. The following are the advantages of this method:

- The method is low cost even when conducted over a large population.
- It is free from bias as there is no involvement of the interviewer.
- Respondents have adequate time to give sound responses.
- Respondents who are not easily reachable may be readily contacted via mail.
- The results may be higher reliability given the selection of a larger sample size.

Disadvantages:

- The response rate for this method is very low.
- It is only useful where respondents are cooperative and educated on the subject matter.
- Control over questionnaires may be lost once they are sent out.
- It may be difficult to amend the questionnaires once sent due to their inflexible structure.
- There is the possibility of vague replies or omission of responses altogether to certain questions and interpretation of omissions is difficult.
- It is not easy to identify whether willing respondents are representatives of the desired outcome.
- The method is likely to be slow. (Kothari, 2014)

Questionnaires may be grouped into three categories, close-ended questions, open-ended question or a mixture of both (Bryman, 2001). Close-ended questions are used to gather factual information and often guide the respondent to give a specific response such as yes or no (May, 2001). This type of questions easier and quicker for the respondents although may suffer spontaneity and expressiveness of the participants' response (Bryman, 2001). Bryman (2001) further suggest the use of open-ended questions to mitigate the problems suffered by close-ended questions by allowing free-form answers.

The design of the questionnaires determines the effectiveness of the response (Kothari, 2014). Questionnaires must be designed such that they are easy to interpret, simple conveying one thought at the time and concrete, aligned with the respondents' way of thinking (ibid). Furthermore, Kothari (2014) notes that opening question should arouse the interest of the respondent and the researcher must avoid opening questions that put too much strain on the respondents' memory or intellect, questions of a personal nature and questions relating to personal wealth.

Questionnaires were distributed via email to Construction Companies in the Kwa-Zulu Natal Province in South Africa. Attached with the emailed questionnaires was a letter explaining the purpose of conducting the research, respondents' role, their anonymity and the time spend on questionnaires. Follow-up emails were conducted as a reminder and to increase response.

4.7 SAMPLING

Sampling is the collection of data from a portion of the population, and the selected population is called a sample (Zulu, 2019). The sample should be large enough to represent the overall characteristics of the general population (ibid). The first step in conducting a survey is to identify the target population and making inferences to distinct populations using sample statistics (Moser & Kalton, 1977; Groves et al., 2009). Sampling techniques are classified into probability sampling and non-probability sampling techniques (Groves et al., 2009).

4.7.1 Probability Sampling

Probability sampling is any method of sampling that uses random *selection techniques to create a sample (Trochim, 2006).* For a random selection method, the researcher must establish a process that assures that the different units in the sample population have equal probabilities of being chosen (ibid). there are various random sampling methods:

- *Simple Random Sampling:* this is the simplest method of sampling where the researcher, prepares a sample frame (master list) and randomly selects a sample population to be studied from the sample frame giving each member of the population equal chance of being selected (Trochim, 2006). This method, however, may not be effective in representing subgroups within a population.
- *Stratified Random Sampling:* this method of sampling also known as quota or proportional random sampling is used where the researcher wishes to divide the population into homogeneous subgroups to attain better representation of the entire population (ibid).
- *Systematic Random Sampling*: here the researcher selects samples based on a system of intervals in a numbered population (Trochim, 2006; Kothari, 2014). This method may be employed to improve the results obtained from systematic random sampling (Kothari, 2014).
- *Cluster (Area) Random Sampling:* this method of sampling is used where the size of the population is too large or interspersed within a large geographic area making it hard to use simple random sampling (Trochim, 2006).

4.7.2 Non-Probability Sampling

Non-Probability Sampling methods do not use any random sampling techniques, and such are based on the researchers' judgement or convenience sampling (Trochim, 2006). Such methods may be divided into two main categories;

- *Accidental, Haphazard or Convenience Sampling:* in this technique, the researcher uses a sample that is conveniently accessible to conduct a study (Bryman, 2001). Bryman (2001) further notes, the researcher can administer the questionnaires with a chance of almost getting all of them back. Although the findings may be interesting, it is impossible to generalise the findings (ibid).
- *Purposive Sampling:* here the researcher samples with a clear purpose in mind, such as having a distinct group of people in mind when conducting a study (Trochim, 2006). Trochim (2006) identified the sub-categories of purposive sampling as; Modal Instance Sampling, Quota Sampling, Heterogeneity Sampling and Snowball Sampling.

4.7.3 Sample Selection Bias

According to Groves et al., (2000:56) sampling bias "…arises when some members of the sampling frame are given no chance (or reduced chance) of selection". Based on the sample design, there is a systematic failure to identify some elements to achieve proper randomisation in the survey statistics (ibid).

Table 4-2 below illustrates the sampling design and procedure for the study:

Table 4-2, Sampling Design and Procedures

Sampling Design/ Procedures	**Contractors**
Target Population	Managers (for the purpose of sampling, managers represent contractors because of their involvement the in running construction companies) and Construction Workers (labourers) working for Contractors registered with the Master Builders Association KZN
Sampling Technique	Convenience Sampling Technique
Sample Size	80 Managers 40 Construction Workers
Sampling Process	Email questionnaires

4.8 DATA ANALYSIS

Data Analysis is the process of systematically organising data for analysis, describing data and testing hypothesis and models (Trochim, 2006). There are two methods of data analysis, descriptive statistics and inferential statistics. Descriptive statistics involves the description of the basic features of data in a study by logically simplifying large amounts of data and is the basis of every quantitative research (ibid). Furthermore, descriptive statistics summaries data about a sample and measures as well as graphically. With Inferential statistics, the researcher reaches conclusions that extend beyond the immediate data alone to infers from the sample data what the population might think (ibid).

This study adopted the descriptive statistics method to analyse data and further interpreted using inferential statistics. The results obtained were captured using IBM SPSS version 25.

4.9 RELIABILITY AND VALIDITY

According to Trochim (2006), reliability is the repeatability or constancy of the quality of measure in a research study. Joppe (2001) defines reliability as the extent to which results of a study remain constant over time and are an accurate representation of the sample population being studies. Validity is the extent to which the measurement of a study measure what they are intended to measure (Hozack, 2015). For the result to be valid, they must also be reliable. However, reliable results may not necessarily be reliable (ibid). There are four measures of validity; face validity, construct validity, content validity and predictive validity.

This study employed content validity which measures the extent to which the individual items in a test are relevant to the content they are being tested (Hozack, 2015). To improve the quality of this study, a pilot study was conducted and questionnaires sent to respondents who were purposively sampled to check for ambiguities, bias, consistency, comprehensibility, content, response time, ease of response and any weaknesses. To test for reliability, the study used the Cronbach's alpha coefficient which is the most widely used measure for internal consistency. The Cronbach alpha coefficient is based on numbers from 0 to 1, and the closer the score is to one, the more reliable the results. All scale factors with a coefficient above 0.70 were regarded as reliable.

4.10 ETHICAL CONSIDERATIONS

To conform to the ethical framework of the university in conducting social research, participants were asked for permission to allow the researcher to conduct the study. Once permission was granted, participants were informed about the study. Even with the participant’s consent in the survey, participation was voluntary, and the participants guaranteed complete confidentiality. The treatment of their responses and the information collected is used for academic purposes only.

4.11 CHAPTER SUMMARY

This chapter highlights the overall research methodology and design for the study. The research process followed a breakdown from the research approach, research design, research strategy adopted, data collection methods and sampling techniques employed. The research questionnaires were discussed, triangulation, validity and reliability of results were also discussed as well as the ethical considerations.

CHAPTER 5

DATA ANALYSIS AND DISCUSSION OF FINDINGS

5.1 INTRODUCTION

This chapter presents the analysis of the data collected and discusses the findings. Data were analysed using IBM Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics was adopted for the data analysis and further interpreted using inferential statistics. Tables were used to present data and key findings.

5.2 RESPONSE RATE

Data were collected over three months, from June to August 2019. Table 5-1 shows the response rate based on the final sample of 120 participants:

Table 5-1: Response Rate

Construction Companies:	Sample:	No. of responses:	% response rate:
Managers	80	64	80%
Construction Workers	40	30	75%
TOTAL	**120**	**94**	**78.3%**

The sample was selected using convenience sampling, and the respondents were sampled based on proximity and familiarity. This form of sampling maximised the response rate as the study was conducted over a short period. Some respondents were referrals recommended by other participants – a variant of snowballing sampling technique. Self-administered questionnaires with a series of close-ended questions were emailed and in some instances, hand-distributed to the respondents. To improve the response rate of the study, follow-up emails and telephone calls were conducted every few days. There were, however, some challenges experienced in obtaining the desired responses from the construction workers. To overcome the challenges, meetings were scheduled on different construction sites, and the questionnaires were hand-distributed to construction workers and further translated into Zulu to improve the workers understanding of the questions.

5.3 CONTRACTOR PROFILE

This study was conducted in the Kwa-Zulu Natal (KZN) Province of South Africa (SA). The Contractors sampled were registered with the Master Builders Association (MBA) KZN, with a Construction Industry Development Board (CIDB) grading between 2 and 9. From Table 5-

2, it is evident that the majority of the companies from the findings were registered in either Grade 9 (29.70%) or Grade 7 (23.40%).

Table 5-2: Company Profile

Company CIDB Grading (N=64)			
		Frequency	Percent
	Grade 2	5	7.80
	Grade 5	5	7.80
	Grade 6	10	15.60
	Grade 7	15	23.40
	Grade 8	10	15.60
	Grade 9	19	29.70
	Total (N)	64	100.00

5.3.1 Profile of the Managers

Participants in the study were personnel occupying management positions, as representatives of their respective construction companies. Management personnel were sampled based on their involvement in the running of the company and their involvement in tendering. The profile of managers is shown in Table 5-3.

Table 5-3: Managers Profile

Years of Experience and Age of Respondents (N= 64)			
	Median	Minimum	Maximum
Years of work experience in current position	6.50	2.00	20.00
Age	35.00	22.00	55.00
Built Environment Employment Discipline (N=64)			
	Frequency	Percent	
Architect	1	1.60%	
Construction Manager	11	17.20%	
Health & Safety Manager	19	29.70%	
Project Manager	3	4.70%	
Quantity Surveyor	14	21.90%	
Civil Engineering	15	23.40%	
Structural Engineering	1	1.60%	
Total	64	100.00	
Type of education (N=64)			
	Frequency	Percent	
Technical/Vocational	21	32.80%	
University Degree	43	67.20%	

	Total	64	100.00

The results in Table 5-3 indicated that the median age of the respondents was 35 years ranging from 22 years minimum to 55 years' maximum. The median years of experience were 6.5 years ranging from a minimum of 2 years to a maximum of 20 years. The median years of experience suggested that managers were knowledgeable in most aspects of the construction industry. Most respondents were Health and Safety Managers/Officer (29.70%) followed by Civil Engineers (23.40%) and Quantity Surveyors (21.90%). The respondents had either obtained a technical/vocational or university education. Furthermore, 32.80% of the respondents had obtained their qualifications from technical/vocational schools, and the other respondents obtained their qualifications from universities, 67.20%.

5.3.2 Profile of the Construction Workers

Construction workers who were involved in the physical execution of activities on-site were requested to indicate their knowledge and how they perceived the impact of legislation on their wellbeing. Furthermore, construction workers were surveyed to validate the responses from the managers. Table 5-4 indicates the profile of construction workers.

Table 5-4: Construction Workers Profile

Number of years of Experience and Age (N=30)			
	Median	Minimum	Maximum
Number of years of Experience	6.00	3.00	26.00
Age of Employee	33.50	26.00	43.00
Current Position of Employment (N=30)			
	Frequency	Percent	
Labourer	8	26.70	
Operator	4	13.30	
Artisan	18	60.00	
Total	30	100.00	
Highest Formal Education (N=30)			
	Frequency	Percent	
Junior High School	10	33.30	
Matric (OLevel)	9	30.00	
Technical/Vocational	11	36.70	
Total	30	100.00	

The median age of the construction workers was 33.50 years ranging from 26.00 years to 43.00 years, and the median years of experience were 6.00 years with a minimum of 3.00 years and

a maximum of 21.00 years. Most workers (60%) were employed as artisans with different trades skills. Moreover, 33.30% of the construction workers had obtained junior high school certificate while 30.00% obtained their Matric/OLevel and 36.70% had technical/vocational training qualifications.

5.3.3 Data Interpretation:

Table 5-5 presents the data range interpretation based on the 5-point and 3-point Likert scales used in the study. The group interval coefficient value for the 5-point Likert scale was calculated as (5) /3 = 1.67 and the 3-point Likert scale calculated as (3-1) /3 = 0.67. The range interpretations for the 5-point Likert scale were used in Tables 5-7 to Table 5-16. The range of interpretations for the 3-point Likert scale was used for Table 5-8.

For further ease of interpretation, the mean values for the 5-point Likert scale were interpreted as; high, medium and low. The mean values for the 3-point Likert scale were interpreted as high, medium and low.

Table 5-5: Data Interpretation Ranges

Range	**5-Point Likert Scale**			
	Knowledge Scale	Frequency Scale	Agreement Scale	Ease of interpretation
5.00 - 3.34	Excellent	Always	Strongly Agree	High (H)
	Good	Often	Agree	
3.33 – 1.68	Average	Sometimes	Neutral/Unsure	Medium (M)
≤1.67	Fair	Seldom	Disagree	Low (L)
	Poor	Never	Strongly Disagree	
Range	**3-Point Likert Scale**			
	Importance Scale			
2.33 – 3.00	Major Impact			High (H)
1.66 – 2.33	Some Impact			Medium (M)
1.00 – 1.65	No/minimal Impact			Low (L)

5.4 RELIABILITY

Cronbach's Alpha reliability test was used to determine the reliability and internal consistency of the scales that had been used to analyse compliance and impact of legislative changes on construction workers wellbeing. The reliability test was done for each construct, as indicated in Table 5.6. The Cronbach's Alpha coefficients between $0.70 \leq \alpha \geq 0.80$ are 'acceptable' while

between $0.80 \leq \alpha \geq 0.90$ are considered 'good' and coefficients $0.9 \leq \alpha$ are 'excellent' (Tavakol & Dennick, 2011). Therefore, the internal consistency of the various scales was deemed acceptable for further interpretation:

Table 5-6: Summary of Reliability Statistics

Construct	Management		Construction workers	
	Cronbach's Alpha	Reliability	Cronbach's Alpha	Reliability
Knowledge of Construction Health and Safety Legislation	0.838	Good	0.806	Good
Impact of compliance on construction workers wellbeing	0.913	Excellent	0.700	Acceptable
Compliance with requirements of legislation when compiling a competitive bid	0.876	Good	N/A	N/A
Level of Compliance with the Construction Regulations on site	0.746	Acceptable	0.856	Good
Management Commitment	0.813	Good	0.828	Good
Health and Safety Policies	0.864	Good	0.880	Good
Workers Involvement/Engagement	0.840	Good	0.926	Excellent
Workers Wellbeing	0.761	Acceptable	0.708	Acceptable
Onsite Facilities	0.767	Acceptable	0.757	Acceptable

Reliability was acceptable across all the scales used, and further analysis of the results was conducted.

5.4.1 Knowledge of Construction Health and Safety Legislation

Table 5-7 presents 5-knowledge based statements where respondents had to rate their knowledge of existing health and safety legislation affecting the construction industry using a 5-point Likert scale where 1=Poor, 2=Fair, 3=Average, 4=Good and 5=Excellent.

Table 5-7: Knowledge of H&S Legislation

Statement	Management				Construction Workers			
	Mean	SD	Intr.	Rank	Mean	SD	Intr.	Rank
Knowledge of OH&S Act 85 of 1993	3.77	1.16	H	1	3.35	1.43	H	2
Knowledge of Construction Regulations 2014	3.50	1.17	H	2	3.48	0.96	H	1
Knowledge of Construction Regulations 2003	3.38	1.21	H	3	3.16	1.27	M	4

Knowledge of COID Act 130 of 1993	3.27	1.17	M	4	3.23	1.18	M	3
Knowledge of the SA Constitution	3.05	1.10	M	5	3.16	1.27	M	4

Management

The results in Table 5-7 indicated that the respondents were most knowledgeable about the Occupational Health and Safety Act 85 of 1993. Knowledge of the Construction Regulations 2014 and 2003 was ranked second and third, respectively. It is also evident that the respondents had high knowledge of the three statements (means range between 3.77 and 3.38) and a medium knowledge of two statements (means range between 3.27 and 3.05). Although management seemed knowledgeable about the relevant health and safety legislation, it is expected that management must become more knowledgeable on the subject than what the findings suggested. Therefore, there is a need for managers to gain more knowledge of health and safety legislation.

Construction Workers

In Table 5-7, the construction workers' knowledge of the Construction Regulations 2014 and knowledge of OH&S Act 85 of 1993 were ranked high and considered good (mean values were 3.48 and 3.35). However, knowledge was medium for the three statements COID Act 130 of 1993; the Construction Regulations 2003; and the SA Constitution (means range between 3.23 and 3.16). From the findings, it may be inferred that although construction workers were somewhat knowledgeable in some aspects of legislation, there is a need for more knowledge of construction health and safety legislation.

5.4.2 Impact of Compliance with Construction Regulations on Worker Wellbeing

The respondents were presented with 5-questions on the extent to which complying with the provisions for the construction health and safety legislation affected construction workers' health and wellbeing. A 3-point Likert scale was used where 1=No Impact, 2=Some Impact and 3=Major Impact. The findings are shown in Table 5-8.

Table 5-8: Impact of Compliance with H&S Legislative Framework on Workers Wellbeing

Legislation	Management				Construction Workers			
	Mean	SD	Intr.	Rank	Mean	SD	Intr.	Rank
COID Act 130 of 1993	2.63	0.65	H	1	2.20	0.81	M	2
OH&S Act 85 of 1993	2.63	0.60	H	2	2.57	0.50	H	1
Construction Regulations 2014	2.52	0.64	H	3	2.10	0.61	M	3
SA Constitution	2.48	0.73	H	4	1.97	0.49	M	4
Construction Regulations 2003	2.47	0.69	H	5	2.10	0.61	M	3

Management

The findings in Table 5-8 indicated that the managers perceived the COID Act 130 of 1993 and OH&S Act 85 of 1993 to have the highest impact on improving workers wellbeing (both means = 2.63). Also, managers perceived all legislation to have a ‘high’ impact on improving construction workers’ health and wellbeing on site (means range between 2.63 and 2.47). The less than excellent mean values from the findings suggest that that managers do not entirely perceive that legislation has full impact on improving workers wellbeing.

Construction Workers

The results in Table 5-8 suggested that construction workers regarded OH&S Act 85 of 1993 to have a high impact with a mean = 2.57. On the other hand, they perceived other legislation to have ‘medium’ impact on improving their health and wellbeing (means range between 2.20 to 1.97). The lack of sufficient knowledge of legislation among workers could, however, have an impact on the medium rankings.

5.4.3 Compliance with Legislative Requirements During Tender Stage

Managers were presented with 5-questions to rank how often they complied with the requirements of the health and safety legislative framework when compiling competitive bids for work. The questions were based on a 5-point Likert scale where 1=never, 2=seldom, 3=sometimes, 4=often and 5=always. The findings are shown in Table 5-9.

Table 5-9: Compliance with Legislation when Compiling Competitive Bids

Management				
Legislation	Mean	SD	Intr.	Rank
OH&S Act 85 of 1993	4.13	1.15	H	1
Construction Regulations 2014	4.13	1.06	H	2
COID Act 130 of 1993	3.92	1.25	H	3
Construction Regulations 2003	3.58	1.39	H	4
SA Constitution	3.36	1.49	H	5

Based on the responses in Table 5-9, the requirements of the OH&S Act 85 of 1993 and the Construction Regulations 2014 were rank high and were considered the most when compiling competitive bids (mean=4.13). There was also a high consideration for all other health and safety legislation, COID Act 130; the Construction Regulations 2003; and the SA Constitution when compiling competitive bids (means range between 3.92 and 3.36). It may be concluded that construction firms ‘often' considered complying with the requirements of health and safety legislation although it is expected that they must always comply.

5.4.4 Compliance and Impact of Construction Legislation Changes

The respondents were requested to indicate their level of compliance and impact of construction legislative changes on the wellbeing of workers using a 5-point Likert scale where 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree. Table 5-10 presents data on compliance and impact of construction legislation changes (the Construction Regulations). The table was divided into *Section A - Compliance* and *Section B – Impact:*

Table 5-10: Level of Compliance and Impact of the Construction Regulations Onsite

Statements	Management				Construction Workers			
	Mean	SD	Intr.	Rank	Mean	SD	Intr.	Rank
Section A: Compliance								
Each project has a project-specific H&S plan in accordance with the requirements of the Construction Regulations 2014	4.28	0.83	H	1	3.40	1.61	H	3
Construction Regulations 2014 establish a general awareness of the H&S of construction workers	3.89	0.63	H	2	3.53	1.31	H	2
Department of Labour often ensures that contractors are fully compliant with the requirements of the Construction Regulations 2014	3.64	1.37	H	3	3.80	1.16	H	1
Contractors comply with Construction Regulations 2014 only because it is mandatory	3.58	1.17	H	4	2.43	0.97	M	6
Contractors register with COID to avoid civil claims and lawsuits	3.56	1.08	H	5	3.37	1.03	H	4
Differences between Construction Regulations 2003 and Construction Regulations 2014	3.53	0.76	H	6	3.30	1.02	M	5
Section B: Impact								
Lack of adequate health and safety provision negatively impact other project parameters	4.14	0.79	H	1	4.00	1.02	H	1
Infringement of the construction regulations poses a threat to workers wellbeing and sustainability in the construction industry	4.13	1.08	H	2	3.87	1.38	H	3
The application of amended Construction Regulations 2014 have a positive impact on the	4.05	.79	H	3	3.30	1.09	M	6

overall quality of construction labourers'								
The application of Construction Regulations 2003 have a positive impact on the overall health and wellbeing construction labourers'	3.92	1.01	H	4	2.80	1.16	M	8
Construction Regulations clearly define legal parameters on how to improve workplace H&S for workers	3.89	.76	H	5	3.90	1.12	H	2
Contractors are fully committed to improving the health and safety of construction workers through Construction Regulations 2014	3.79	.86	H	6	3.77	.94	H	4
Contractors are applying all aspects of Construction Regulations to improve the health and wellbeing of construction workers'	3.73	.91	H	7	2.60	1.35	M	10
Contraction Regulations 2014 are perceived to have a positive impact on the reduction of construction workers fatalities	3.73	.88	H	8	3.03	1.63	M	7
Contractors register with COID because they care about labourers wellbeing	3.42	.92	H	9	3.57	1.19	H	5
The impacts of construction regulations 2014 have not been determined to date	3.16	.87	M	10	2.80	.76	M	9

Management

Section A: From Table 5-10, it is evident that most projects had a project-specific health and safety plan; (mean=4.28). Although there was a high level of compliance, the Construction Regulations 2014 explicitly states that the contractor ‘must' ensure a copy of the health and safety plan for each project and this suggests that contractors still do not fully comply with this requirement. Managers had high levels of agreement that the Construction Regulations set legal parameters and also establish a general awareness of workers wellbeing (mean=3.89). This finding was consistent with the literature that the Construction Regulations were perceived to have had an impact, although it might not have been quantified (CIDB, 2009). Managers also had high levels of agreement that the Department of Labour (DoL) ensured that contractors were fully compliant (mean=3.64); however, the mean did not reflect that DoL actually ‘ensures full compliance’.

There was a high level of agreement that contractors complied with the regulations because it was mandatory (mean=3.58) and also complied with COID Act 130 of 1993 as one of the requirements in the Construction Regulations to avoid civil claims (mean=3.56). There is evidence from the literature that contractors are more concerned about bottom-line and profit maximisation than investing in what will make work easier, safer and improve workers' quality of life (Rust & Koen, 2011; Haupt, 2019). Management further had high levels of agreement that contractors registered with COID because they cared about construction workers (mean=3.42). However, the mean value (3.42) suggested that contractors registered with COID to avoid civil claims. There was a medium level of agreement that the Construction Regulations 2014 have had any impact to date (mean=3.16) even though there was a high level of agreement that their application could have a positive impact on improving workers wellbeing. This finding suggests there is a need for more compliance.

Section B: Managers expressed high levels of agreement that lack of adequate health and safety provisions negatively affected other project parameters (mean=4.14). It could also be argued that respondents believed that health and safety was not entirely significant. Managers also had high agreement levels that infringement of the regulations negatively affected workers wellbeing and sustainability (mean=4.13). The mean value suggested that not all respondents agreed that compliance has had a positive impact on workers` wellbeing and sustainability. Furthermore, there was a high level of agreement that the application of the Construction Regulations 2014 and 2003 has had a positive impact on workers’ wellbeing (mean=4.05 and

3.92, respectively). The contractors were committed to improving workers wellbeing with the application of the Construction Regulations 2014 (mean=3.79), noted by the high level of agreement. However, it could be argued that contractors were not fully committed to improving workers wellbeing by applying all aspects of the Construction Regulations as full commitment would have resulted in full agreement with the statement. The Construction Regulations were perceived to have had a positive impact (mean=3.73) on reduction of accidents, however, the mean suggests contractors were not applying all aspects of the construction regulations based on their level knowledge of the legislation observed in Table 5-7.

Construction Workers

Section A: The construction workers had high levels of agreement that DoL ensured contractors' full compliance; that construction regulations established general awareness of the health and safety of construction workers; whether there were project-specific health and safety plans; and whether contractors complied with COID Act 130 of 1993 (means ranged between 3.80 to 3.37). However, there was a medium level of agreement whether there were any differences between the construction regulations 2003 and 2014; and also on whether contractors complied with the regulations only because it was mandatory (mean= 3.30 and 2.43, respectively).

Section B: Majority of the construction workers had high levels of agreement that lack of adequate health and safety negatively affected other project parameters (mean=4.00). They further conveyed a high level of agreement that the regulations clearly defined legal parameters on how to improve health and safety, and how infringement of the regulations has detrimental effects on wellbeing (mean=3.90 and 3.87). Furthermore, the workers had high levels of agreement that contractors were fully committed to improving their wellbeing and also registered with COID because they cared about their wellbeing (mean = 3.77 and 3.57). The construction workers gave a medium level of agreement on whether the regulations have had any positive impact on accident reduction; and whether contractors applied all aspects of the construction regulations to improve their wellbeing (means were 2.80 and 2.60). It was evident from the findings that contractors were not fully committed to improving construction workers wellbeing on site.

Both management and construction workers similarly conceded that the lack of adequate health and safety provisions had a negative impact on other project parameters. The respondents had further agreed that the regulations set clear legal parameters on improving workers' health and

safety and that contractors were fully committed to improving workers wellbeing. However, the responses from both management and construction workers did not suggest that contractors were fully commitment to improving the health and safety of construction workers through the application of the construction regulations 2014. Ensuring full commitment would have been reflected by excellent response and not merely a good response as indicated by the mean value. The respondents shared the same views on DoL's involvement in ensuring full compliance with the regulations; contractors commitment to improving workers wellbeing; registration with COID, and also that the construction regulations established a general awareness on safety.

5.4.5 Management Commitment

The respondents were requested to indicate their level of agreement on management commitment and attitudes towards the Construction Regulations 2014, based on a 5-point Likert scale where 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree. Under Table 5-11, the participants were presented with 11-statements on management commitment to health and safety legislation and their attitudes towards the Construction Regulations 2014.

Table 5-11: Management Commitment

Statements	Management				Construction Workers			
	Mean	SD	Intr.	Rank	Mean	SD	Intr.	Rank
All workers possess medical certificates of fitness	4.36	1.10	H	1	4.23	1.22	H	2
The firm employs trained H&S staff on site	4.34	0.93	H	2	4.47	0.82	H	1
H&S inspections are done regularly and at least daily	4.13	0.89	H	3	3.47	1.28	H	6
All workers medical certificates of fitness are valid	3.98	1.39	H	4	3.40	1.77	H	7
The head office management ensures compliance with construction regulations 2014 to improve workers quality of life	3.92	.86	H	5	4.13	1.07	H	3
The head office management are intolerant of poor construction H&S	3.91	1.08	H	6	3.40	1.30	H	8
The head office management insists on the elimination of	3.86	0.75	H	7	4.00	0.83	H	4

hazards by complying with construction regulations								
The construction workers' wellbeing is important to the head office management	3.72	1.19	H	8	3.00	1.58	M	10
The firm penalises workers for poor H&S practices on site	3.55	1.11	H	9	3.80	1.67	H	5
Management consults with the health and safety committee, representative union or representative group of employees, on the monitoring and reviewing of the risk assessments of a specific site	3.45	1.05	H	10	3.33	1.18	M	9
Workers are rewarded for good H&S practices on site	2.72	1.00	M	11	2.57	1.48	M	11

Management

Table 5-11 indicated a high level of agreement that all workers had medical certificates of fitness; firms employed competent health and safety staff as stipulated in the construction regulations, and firms conducted health and safety inspections at least once daily (means ranged from 4.36 to 4.13). Although workers' possessed medical certificates, there was a reduction in the mean value for the validity of medical certificates even though the response rate was still high (mean=3.98). There was also a high level of agreement that head office ensures commitment with the regulations; were intolerant of poor health and safety practices, and insisted on hazard elimination (means range between 3.92 to 3.86).

Although there was a high level of agreement that construction workers wellbeing was important to management, the statement was not the highest-ranking as would have been expected (mean=3.72). This is suggestive that management merely complies because it is a requirement by law but do not fully commit to health and safety practices such as promoting workers wellbeing. It was also found that workers were penalised for poor health and safety practices (mean=3.55). Although still high ranking, there was a lower level of agreement concerning the consultation of health and safety committees; representative unions or representative group of employees, on the monitoring and reviewing of the site-specific risk assessments (mean=3.45). There was a medium level of response for construction workers being rewarded for good health and safety practices on-site (mean=2.72) over and above the

finding that they were penalised for poor health and safety practices. There is a need for more management commitment to improve workers wellbeing.

Construction Workers

The data in Table 5-11 suggested that the construction workers had a high level of agreement that firms employed trained health and safety staff and had medical certificates of fitness (means range between 4.47 and 4.23). There was also a high level of agreement that head office management ensured compliance with the regulations; insisted on hazards elimination and further agreed that they were penalised for poor health and safety practices (means ranged between 4.13 and 3.80). Furthermore, there was a high level of agreement about daily health and safety inspections, even though inspections were not carried out sufficiently (mean=3.47). Workers had valid medical certificates and head office management was intolerant of poor health and safety (both means were 3.40), as indicated by the high agreement level though still far less than satisfactory. There, however, was a medium response whether management consulted with the health and safety committees; representative unions or representative group of employees, on the monitoring and reviewing of the site-specific risk assessments (mean=3.33). Workers also gave a medium response whether management cared for their wellbeing (mean=3.00) and disagreed that they were rewarded for good health and safety practices on site (mean=2.57). From these findings, it is suggestive that construction workers' health and safety are still not prioritised.

It could be argued from the findings in Table 5-11 that construction workers, who are physically on-site, did not view inspections as sufficient enough. Further similarities indicated that workers possessed medical certificates of fitness, although they were not all valid. Also, construction workers level of agreement was very low compared to that of management. There seemed to be a lack of communication between what the managers reported and what the workers reported, which further suggested a lack of commitment by management. Workers were not consulted in reviewing site-specific risk assessments and of significance was the fact that workers were almost unsure whether head office management cared about their wellbeing. Construction workers were punished for poor health and safety practices and were not rewarded for good health and safety practices. This is suggestive that construction companies still use a reactive approach rather than a proactive approach when dealing with health and safety issues.

5.4.6 Health and Safety Policies

The respondents were presented with 10-statements to rate their level of agreement on health and safety policies. The rate of the measure was a 5-point Likert agreement scale (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree). Table 5-12 shows the findings:

Table 5-12: Health and Safety Policies

Statements	Management				Construction Workers			
	Mean	SD	Intr.	Rank	Mean	SD	Intr.	Rank
All workers undergo orientation/induction before they are allowed to start work on site	4.42	0.77	H	1	4.07	1.23	H	3
More H&S education and training is needed	4.27	0.99	H	2	4.13	1.14	H	2
Workers are encouraged to report unsafe and unhealthy behaviour and working conditions	4.20	0.91	H	3	3.83	1.58	H	6
Workers are trained in the proper care and use of PPE according to the requirements of construction regulations	4.16	1.01	H	4	4.80	0.41	H	1
Health and Safety policies are written and in place	4.09	0.83	H	5	3.93	1.46	H	5
We have regular H&S meetings	3.88	1.05	H	6	3.30	1.32	M	9
Construction accidents are caused by workers non-compliance with construction regulations	3.79	0.86	H	7	3.60	1.10	H	7
Construction regulations 2014 requirements on safe work procedures are discussed at H&S meetings	3.79	1.17	H	8	3.97	1.52	H	4
All workers are kept informed of the provisions of the H&S plan	3.77	1.15	H	9	3.33	.93	M	8
Worker have training/workshops in relation to construction regulations	3.64	1.21	H	10	3.27	1.39	M	10

Management

It is apparent from the high levels of agreement in Table 5-12 that workers underwent induction before they were allowed to work on-site (mean=4.42) despite the need for more health and safety education and training (mean=4.27). It was also found that workers were encouraged to report unsafe and unhealthy working conditions and were trained in the proper use of PPE (means ranged between 4.20 and 4.16). Managers had a high agreement level that health and safety policies were written and in place; that health and safety meetings were conducted regularly and also, that accidents were caused by construction workers non-compliance with the regulations, even though safe work procedures were discussed in meetings (means ranged between 4.09 and 3.79). The extent to which the requirements for safe work procedures were discussed in meetings is unclear as the managers had strongly agreed that there is a need for more health and safety training and education. Additionally, it could be that both management and workers lack sufficient knowledge of legislation. Management also had a high level of agreement that workers were informed about the provisions for health and safety plan and had training concerning the construction regulations though the agreement level was lower (mean = 3.77 and 3.64). It is evident that workers level of training on the construction regulations is not sufficient and this was in line with their level of knowledge. Furthermore, this could be the reason why management conceded that accidents are a result of workers' non-compliance. More education and training are required.

Construction Workers

The findings in Table 5-12 suggested that workers had a high level of agreement about receiving adequate training on the proper use of PPE (mean=4.80) and that more training and education were necessary even though workers were inducted before they were allowed to start working on sites (means were 4.13 and 4.07). The construction workers also had high levels of agreement that the requirements for safe work procedures were discussed in meetings; health and safety policies were written on-site; workers were encouraged to report unsafe work practices; and that accidents were caused by workers' non-compliance with the regulations (means ranged between 3.97 and 3.60). There was, however, a medium level of agreement that workers were kept informed about the health and safety plan; regular health and safety meetings were held, and whether workers were trained on the construction regulations (means ranged between 3.33 and 3.27). The finding that workers were unsure about the construction

regulations furthers suggests that non-compliance could be a factor although it is the responsibility of the employer to inform workers about the expectations in the workplace.

5.4.7 Workers Involvement/Engagement

Table 5-13 sought to explore workers' involvement/engagement in health and safety-related matters on construction sites. The respondents were asked to rate their level of agreement based on a 5-point Likert scale (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree).

Table 5-13: Workers Involvement/Engagement

Statements	Management				Construction Workers			
	Mean	SD	Intr.	Rank	Mean	SD	Intr.	Rank
Workers are responsible for the H&S of their fellow workers	4.44	0.56	H	1	4.20	1.49	H	2
Workers have the right to refuse to work in unsafe conditions	4.38	1.20	H	2	4.17	1.42	H	4
Workers are responsible for their H&S	4.25	0.94	H	3	4.03	1.22	H	5
Most workers on-site view H&S as important	3.78	0.92	H	4	4.53	0.69	H	1
Workers regularly report unsafe and unhealthy behaviour and working conditions	3.75	0.91	H	5	3.93	1.14	H	6
Workers are involved with H&S inspections	3.53	1.07	H	6	4.17	0.91	H	3
Workers are consulted when the H&S plan is compiled	3.00	1.27	M	7	3.33	1.57	M	7
Workers participated in the formulation of the H&S policy	2.97	1.19	M	8	3.00	1.49	M	8

Management

There was a high level of agreement that workers were responsible for the health and safety of their colleagues; their health and safety, and that workers have the right to refuse work in unsafe conditions (means ranged between 4.44 and 4.25). From the managers' responses, most workers regarded on-site health and safety to be of high importance (mean=3.78) and regularly reported unsafe behaviour and working conditions (mean=3.78 and 3.75). There was high workers' involvement in health and safety inspections though the level of involvement was not enough (mean=3.53). Management gave a medium response to whether workers were consulted in the compilation of health and safety plans and the formulation of health and safety policies (means were 3.00 and 2.97). The findings suggested that workers were not fully involved in all work-related health and safety matters. According to management, workers still did fully realise the importance of health and safety. However, it could be argued that managers must ensure that workers realise the importance of health and safety, and management must also eliminate the blame culture.

Construction Workers

The high level of agreement suggested health and safety on site was very important (mean=4.53) among the construction workers. The respondents also had a high level of agreement that they were responsible for other workers' health and safety; their health and safety; their involvement in health and safety inspections; that they had the right to refuse unsafe working conditions; and reported unhealthy behaviour and unsafe working condition on site (means ranged between 4.20 and 3.93). Construction workers gave a medium level of agreement on whether they were consulted in the compilation of health and safety plans; and participation in the formulation of health and safety policies (mean=3.33 and 3.00). From the findings, it may be inferred that workers were not too involved, if at all involved, in the planning and formulation of health and safety documentation. There is a need for more collaboration between workers and management to improve health and safety standards.

5.4.8 Workers Wellbeing

Table 5-14 indicates workers' wellbeing in the workplace. Respondents were presented with 4-statements on workers' wellbeing and asked to rate their level of agreement based on a 5-point Likert scale (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree).

Table 5-14: Workers Wellbeing

Statements	Management				Construction Workers			
	Mean	SD	Intr.	Rank	Mean	SD	Intr.	Rank
Workers worry about their job security	4.00	0.99	H	1	4.50	0.73	H	1
Workers are often stressed about work activities	3.31	0.97	M	2	3.57	1.04	H	3
Construction legislation and regulations in South Africa addresses workers psychological matters either directly or indirectly in the workplace	3.05	0.79	M	3	3.40	1.38	H	4
Construction workers wellbeing and quality of life are often overlooked on-site	2.84	1.35	M	4	3.90	0.84	H	2

Management

The results, in Table 5-14, indicated that there was a high level of agreement that workers worry about their job security (mean=4.00). However, there was a medium response among managers, whether workers were stressed about job activities, (mean=3.31). There was also a medium response on whether the legislative framework for construction in South Africa addressed workers' psychological welfare either directly or indirectly at the workplace (mean=3.05), and also whether construction workers' wellbeing and quality of life were often overlooked on-site (mean=2.84). This finding could further implicate managements' lack of support to construction workers wellbeing.

Construction Workers

The construction workers had a high level of agreement that they worried about job security; conceded that workers wellbeing and quality of life were often overlooked on-site; and that they were often stressed about work activities (means ranged between 4.50 and 3.57). It was, however, noted that the respondents ranked 'least high', the statement that the construction legislation and regulations in South Africa address workers' psychological matters either directly or indirectly in the workplace (mean=3.40), suggesting that legislation could be improved to address all issues relating to employees wellbeing.

5.4.9 Onsite Facilities for Construction Workers

Data presented in Table 5-15 was based on 2-statements about onsite facilities for construction workers based on a 5-point Likert scale where 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree:

Table 5-15: Onsite Facilities for Construction Workers

Statements	Management				Construction Workers			
	Mean	SD	Intr.	Rank	Mean	SD	Intr.	Rank
There are provisions for bathroom facilities on site	4.14	1.08	H	1	2.83	1.46	M	2
There are washing facilities for workers on site (for hands, PPE)	3.75	1.28	H	2	3.40	1.54	H	1

Management

The findings in Table 5-15 indicated a high level of agreement that there were provisions for bathroom facilities on-site and washing facilities for workers on-site (mean = 4.14 and 3.75). The provisions were, however, insufficient considering the requirements of the construction regulations. It could also be argued that workers were not adequately taken care of, as the respondents did not strongly agree on either of the statements.

Construction Workers

Workers had a high level of agreement that there were provisions for bathroom facilities (mean=3.40) but gave a medium response about provisions for construction workers' washing facilities on-site (mean=2.83). The responses suggested that workers were not adequately taken care of on-site, and this raises concern on whether construction companies care about the wellbeing of construction workers.

5.4.10 Analysis of composite means of various constructs

Table 5-16: Summary of Composite Mean Values

Management					**Construction Workers**			
	Mean	SD	Inter.	Rank	Mean	SD	Inter.	Rank
Impact of Legislation on Wellbeing	2.54	0.57	H	1	2.19	0.41	M	5

Health and Safety Policies	4.00	0.68	H	2	3.83	0.87	H	3
Onsite Facilities	3.95	1.07	H	3	3.12	1.35	M	8
Compliance When Tendering	3.82	1.05	H	4	N/A	N/A	N/A	N/A
Management Commitment	3.81	0.62	H	5	3.62	0.80	H	4
Level of Compliance with onsite	3.78	0.43	H	6	3.33	0.67	M	6
Workers Involvement	3.76	0.71	H	7	3.94	1.03	H	1
Knowledge of Legislation	3.39	0.91	H	8	3.26	0.90	M	7
Workers Wellbeing	3.23	0.79	M	9	3.84	0.71	H	2

The finding presented in Table 5-16 indicated the composite means of various constructs used in the study. A comparison of the composite means between management and construction workers was done to identify differences in responses. Furthermore, an independent t-test was done (Table 5-17) to determine the statistical significance of the composite means between managers and workers (Table 5-16). Independent t-test is used to determine whether two sample means, which are assumed to come from two different groups, are statistically significant (Burnham, 2015; Field, 2017). The p-value is used to determine whether there is any statistical significance between the two means (Barnham, 2015). When $p \leq 0.05$, there is a statistically significant difference between the means of the two groups, and where $p > 0.05$, there is no statistical significance between the means of the two groups (ibid). A statistical significance between the means suggests that either management or the construction workers had a higher agreement level of the measured construct. When using an independent t-test, the first step is to test the assumption of homogeneity. Levene's test (f-test) is used to test the assumptions of the homogeneity for equal variances (Pagano, 2004). Where there is no statistical significance between the means ($p > 0.05$), the assumption is not violated and 'equal variance is assumed'; meaning that the first line is used to interpret the results. However, where there is a statistical significance, the assumption is violated ($p \leq 0.05$) suggesting that equal variance is not assumed and the second line of interpretation is used.

Table 5-17: Independent Samples T-Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Impact of Legislation on Wellbeing	Equal variances assumed	4.815	.031	3.053	92	.003	.357	.117	.125	.589
	Equal variances not assumed			3.429	76.393	.001	.357	.104	.150	.564
Health and Safety Policies	Equal variances assumed	2.359	.128	1.046	92	.298	.172	.164	-.154	.497
	Equal variances not assumed			.956	46.080	.344	.172	.179	-.190	.533
Onsite Facilities	Equal variances assumed	3.198	.077	3.214	92	.002	.829	.258	.317	1.341
	Equal variances not assumed			2.956	46.715	.005	.829	.280	.265	1.393
Management Commitment	Equal variances assumed	4.430	.038	1.281	92	.203	.194	.152	-.107	.495
	Equal variances not assumed			1.170	46.001	.248	.194	.166	-.140	.529
Level of Compliance with onsite	Equal variances assumed	16.840	.000	3.806	92	.000	.438	.115	.210	.667
	Equal variances not assumed			3.269	40.717	.002	.438	.134	.167	.709
Workers Involvement	Equal variances assumed	12.021	.001	-.964	92	.337	-.176	.182	-.538	.186
	Equal variances not assumed			-.845	42.271	.403	-.176	.208	-.596	.244
Knowledge of Legislation	Equal variances assumed	.106	.746	.651	92	.516	.131	.201	-.268	.529
	Equal variances not assumed			.652	57.016	.517	.131	.200	-.270	.532
Workers Wellbeing	Equal variances assumed	.613	.436	-3.583	92	.001	-.610	.170	-.949	-.272
	Equal variances not assumed			-3.747	63.655	.000	-.610	.163	-.936	-.285

- **Impact of Legislation on Wellbeing**

When comparing the results from Tables 5-16 and 5-17, management perceived legislation to have had a high impact on wellbeing (mean=2.54, SD=.57), while workers perceived legislation to have had a medium impact on improving their health and wellbeing (mean=2.19, SD=.41). The difference was statistically significant between the means (t (76.39) = 3.429, p=.001) suggesting that management had a higher level of agreement than the construction workers on whether knowledge of health and safety legislation has an impact on workers wellbeing. However, based on the responses, both management and workers did not entirely perceive legislation as the only contributing factor to workers' wellbeing and health as this would have resulted in total agreement with the statements on wellbeing. Furthermore, this could have also been affected by the respondents' level of knowledge of construction health and safety legislation which ranked 8th out of the nine constructs. CIDB (2009); Agumba & Haupt (2009); Fryer (1997) and Jacob (2010) attest that occupational health and safety should not be driven solely by compliance with legislation but required a change of attitude. Therefore, occupational health and safety should be regarded as a value and a means to improve the quality of the working environment and life of construction workers (Agumba & Haupt, 2009).

- **Health and Safety Policies**

Comparatively, there was a high level of agreement among managers (mean=4.00, SD=.68) and construction workers (mean=3.83, SD=.87) regarding health and safety policies on-site. There was no statistical significance between the means t (92) =1.05, p=.298; suggesting that both management and construction workers overall shared the same views on the availability of Health and Safety Policies on site. Overall, the requirements for health and safety policies on site were still not satisfactory. In most instances (Table 5-12), it seemed as though construction workers were excluded in the administration of health and safety and only involved in the execution and implementation aspects.

- **Onsite Facilities**

In comparison, there was a statistically significant difference between management (mean=3.95, SD=1.07) and the construction workers (mean=3.12, SD=1.35) regarding the availability of onsite facilities, t (92) = 3.214, p=.002; suggesting that management had a high level of agreement while the construction workers had a medium level of agreement. Onsite facilities were provided by management for use by construction workers. This difference means that management thinks they were providing adequately for onsite facilities while the workers

felt that the onsite facilities provided by management were not sufficient. Furthermore, the mean values suggested that site facilities were not sufficient for construction workers.

- **Compliance When Tendering (Management only)**

The findings in Table 5-16 show that, despite the high level of agreement, management did not always consider legislation when compiling competitive bids even though it was mandatory to comply by law (mean=3.82, SD=1.05). This could also suggest that contractors only considered health and safety when they were forced to comply. It is possible that compliance was subject to the level of the knowledge of management and the requirements of legislation (Hefer, 2016). Additionally, this could further suggest that the view that the low price culture in highly competitive tendering compromised health and safety requirements (Murie, 2007). Of concern was that the overarching legislation in South Africa, namely the Constitution, and its provisions seemed to be least considered. It is recognized that the Constitution entrenched the basic rights of every South African and therefore should receive utmost consideration. This issue needs further attention.

- **Management Commitment**

In comparison, the high composite means suggested that there was no statistically significant difference between the means for management (mean=3.62, SD=.62) and construction workers (mean=3.81, SD=.80); t (46) = 1.170, p=.248. The findings suggested that both respondents shared similar views regarding management commitment to improving workers wellbeing. However, based on the lower mean values, it is evident that full commitment is still not engendered.

- **Level of Compliance Onsite**

Although management expressed a high level of agreement that contractors applied all aspects of the construction regulations to improve workers wellbeing, the construction workers expressed a lower medium level of agreement (mean=3.78, SD=.43 and mean=3.33, SD=.67, respectively). There was a statistically significant difference between the two groups means, t (40.72) = 3.269, $p<0.002$; suggesting that management and workers did not statistically share the same view on the level of compliance with legislation onsite. However, the construction regulations were perceived to have had a positive impact on increasing awareness, although both parties highly agreed that their impact on accident reduction had not been realised to date. This was in line with the literature findings that, “Although it cannot be quantified, it can be inferred that the Construction Regulations have had a positive impact on reducing H&S

accidents" (CIDB, 2009:11). Rust & Koen (2011) purported that regulations and legislation are key in directing and controlling activity; improving the responsibility of business owners and health and safety. The less than excellent mean values suggested that the impact of the Construction Regulations 2014 have not been fully realised. It may be inferred that the low level of compliance negatively affects the impact of the construction regulations and workers' wellbeing.

- **Workers Involvement**

Overall, both management (mean=3.76, SD=.71) and the construction workers (mean=3.94, SD=1.03) highly agreed that workers were involved in workplace health and safety-related matters. However, their differences between the means were not statistically significant, t (42.27) = -.845, p=.403; suggesting both groups shared the same views. There is still a need for more workers' involvement and management to encourage workers' involvement despite similarities in mean scores in key areas of health and safety.

- **Knowledge of Legislation**

Comparatively, managements' knowledge was high (mean=3.39, SD=.91), while the construction workers had medium knowledge (mean=3.26, SD=.90) about the relevant construction health and safety legislation. There was no statistically significant difference between the means, t (92) = .651, p=.516; suggesting that both managers and workers had the same level of knowledge of construction health and safety legislation. From Table 5-16, of significance was the fact that knowledge of legislation was the second-lowest ranking construct for both management and construction workers. Ideally, both respondents were expected to be very knowledgeable (especially management) about legislation and not merely high or medium knowledge. It may be inferred that both management and construction workers' possessed knowledge about the relevant health and safety legislation even though this knowledge was less than satisfactory; therefore, there is a need for more education and training. A study conducted by Matete, Emuze & Smallwood (2016) on the Construction Regulations reported similar findings.

- **Workers Wellbeing**

In comparison, managers (mean=3.23, SD=.79) and workers (mean=3.84, SD=.71) did not share the same views on construction workers wellbeing on site. There was a statistically significant difference between the means, t (92) = -3.853, p=0.001; suggesting that workers tended to be more worried about their wellbeing on-site than managers. From the findings, management seemed to give less attention to the construction workers wellbeing. Literature findings suggested that management within a company must be responsible for the wellbeing of workers (James, 2011). Furthermore, workers (Table 5-15) reported that they are often stressed about work activities, although management seemed not to concede to the statement. The two groups did, however, share the same views on whether the construction legislation and regulations in South Africa address workers' psychological matters either directly or indirectly in the workplace. The Construction Regulations 2003 were useful in creating general requirements for health and safety in all involved in the construction work; however, various practical problems had been pointed out (e.g. Markham, 2005 cited in Jacobs 2010) and the same could be suggested for the Construction Regulations 2014. Sieberhagen (2008) further argued that occupational health and safety aspects were covered at large within the OH&S Act. Yet, there is a lack of legislation regarding employees' wellbeing especially concerning psychological stressors in the workplace.

5.5 SPEARMAN'S CORRELATION TEST FOR INDEPENDENT VARIABLES

Spearman's rank-order correlation (rho/rs) is used to measure the strength and direction of association/relationship between ordinal or continuous variables (Field, 2017). To determine the strength of association between the constructs, individual variables were computed under each construct to determine the composite variables. Constructs in Table 5-16 were measured based on responses from both management and the construction workers. The interpretation of the strength of association was determined, as indicated in Table 5-18:

Table 5-18: Strength of Association (Adapted from Cohen, 1988)

Coefficient Value	Strength of Association
0.1<r>0.3	Small Correlation
0.3<r>0.5	Medium/moderate Correlation
r>0.5	Large/strong correlation

5.5.1 Table 5-19 indicate Spearman's' Correlation Coefficients for the variables measured and their statistical significance based on management and construction workers' responses:

Table 5-19: Spearman's Correlations, Management (N=64)

	Knowledge of Legislation	Impact of Legislation on Wellbeing	Compliance When Tendering	Level of Compliance on site	Management Commitment	H&S Policies	Workers Involvement	Workers Wellbeing	Onsite Facilities
Knowledge of Legislation	1.000	.127	.022	.359**	.177	.217	-.030	.256*	.146
	.	.316	.864	.004	.162	.084	.814	.041	.248
Impact of Legislation on Wellbeing	.127	1.000	.197	.289*	.423**	.122	.087	.047	.269*
	.316	.	.119	.020	.000	.338	.494	.713	.031
Compliance When Tendering	.022	.197	1.000	.017	.322**	.275*	.132	-.353**	.252*
	.864	.119	.	.893	.010	.028	.300	.004	.045
Level of Compliance with onsite	.359**	.289*	.017	1.000	.443**	.567**	.489**	-.082	.340**
	.004	.020	.893	.	.000	.000	.000	.520	.006
Management Commitment	.177	.423**	.322**	.443**	1.000	.704**	.455**	-.457**	.345**
	.162	.000	.010	.000	.	.000	.000	.000	.005
Health and Safety Policies	.217	.122	.275*	.567**	.704**	1.000	.599**	-.223	.160
	.084	.338	.028	.000	.000	.	.000	.076	.207
Workers Involvement	-.030	.087	.132	.489**	.455**	.599**	1.000	-.242	.080
	.814	.494	.300	.000	.000	.000	.	.054	.531
Workers Wellbeing	.256*	.047	-.353**	-.082	-.457**	-.223	-.242	1.000	-.382**
	.041	.713	.004	.520	.000	.076	.054	.	.002
Onsite Facilities	.146	.269*	.252*	.340**	.345**	.160	.080	-.382**	1.000
	.248	.031	.045	.006	.005	.207	.531	.002	.

Construction Workers (N=30)								
	Knowledge of Legislation	Impact of Legislation on Wellbeing	Level of Compliance on site	Management Commitment	H&S Policies	Workers Involvement	Workers Wellbeing	Onsite Facilities
Knowledge of Legislation	1.000	.205	.277	.152	.190	-.123	.296	.118
	.	.276	.139	.421	.315	.518	.112	.536
Impact of Legislation on Wellbeing	.205	1.000	.636**	.558**	.604**	.229	-.015	.373*
	.276	.	.000	.001	.000	.223	.938	.043
Level of Compliance on site	.277	.636**	1.000	.880**	.918**	.606**	.227	-.019
	.139	.000	.	.000	.000	.000	.228	.920
Management Commitment	.152	.558**	.880**	1.000	.861**	.646**	.024	-.051
	.421	.001	.000	.	.000	.000	.898	.791
H&S Policies	.190	.604**	.918**	.861**	1.000	.671**	.073	-.021
	.315	.000	.000	.000	.	.000	.700	.910
Workers Involvement	-.123	.229	.606**	.646**	.671**	1.000	-.146	-.198
	.518	.223	.000	.000	.000	.	.442	.295
Workers Wellbeing	.296	-.015	.227	.024	.073	-.146	1.000	.428*
	.112	.938	.228	.898	.700	.442	.	.018
Onsite Facilities	.118	.373*	-.019	-.051	-.021	-.198	.428*	1.000
	.536	.043	.920	.791	.910	.295	.018	.
**. Correlation is significant at the 0.01 level (2-tailed).								
*. Correlation is significant at the 0.05 level (2-tailed).								

5.5.1.1 Interpretation of the results in Table 5-19

Table 5-19 indicated an association between the two variables (X and Y) using Spearman's correlation (rho). The bivariate correlation analysis expresses the strength and direction between two ordinal variables (Akonglu, 2018). The correlation values (rho) range from -1 and +1 where a negative correlation expresses a negative relationship between the variables; when one variable (X – independent variable) increases, the other variable (Y - dependent variable) decrease (Field, 2017; Akonglu, 2018). A positive correlation indicates that there is a positive relationship between the two variables, and when the other variable (X - the independent variable) increases, the other value (Y – dependent variable) decreases (ibid). A Spearman correlation of zero indicates that there is no tendency for Y to either increase or decrease when X increases. The strength of association ranges from small to strong correlation, as indicated in Table 5.19. A correlation coefficient of zero indicates that no relationship exists between the variables. When X and Y are perfectly monotonically related, the Spearman correlation coefficient becomes 1. Moreover, the Spearman correlation does not assume that the variables are normally distributed. Spearman's correlation is based on three assumptions:

- There must be a monotonic relationship between the variables;
- The variables must be measured on an ordinal or continuous scale and
- The variables must present a paired observation. (Field, 2017)

In addition to the correlation coefficient, Table 5-19 reported the statistical significance of the relationship between the variables. The level of statistical significance (p-value) denoted as "Sig. (2-tailed)" in Table 5-19 indicates the probability that the strength of association may occur by chance (Akonglu, 2018). When the p-value is less than 5% ($p<0.05$), this means that the variables are significant (Pallant, 2005). A Spearman rank-order correlation was run to assess the relationship between the constructs of the study (Table 5-19) and the results are reported as follows:

- **Knowledge of the Construction Legislation**

Management

There was a statistical significance with a moderate positive correlation between Knowledge of Construction Legislation and the Level of Compliance on-site (r=.359, p=.004) suggesting that if knowledge of legislation increased, the level of compliance on-site would also increase commensurately. Furthermore, the correlation between Knowledge of Construction Legislation and Workers Wellbeing was positive (small positive) and statistically significant (r=.256,

p=.041). The findings suggest that when the Knowledge of Construction Legislation increased, Workers Wellbeing also improved although slightly.

Construction Workers

There was no statistically significant correlation between Knowledge of Construction Legislation and other constructs. However, there was a small positive correlation between the constructs suggesting that an increase in knowledge of legislation increased all the other constructs except for Workers Involvement. Workers Involvement had a negative correlation with Knowledge of Legislation, implying that when Knowledge increased, Workers Involvement decreased. This finding could suggest that perhaps it is in the best interest of construction companies to keep workers from knowing too much about legislation as it could lead to less exploitation which is not in the best interest of contractors, especially when it comes to profit maximisation. On the other hand, it might be an indication that if workers know their rights, contractors would restrict their involvement in health and safety matters on-site to protect their interests.

- **Impact of Legislation on Wellbeing**

Management

The findings in Table 5-19 showed that there was a statistically significant, small positive correlation between the Impacts of Legislation on Wellbeing and Level of Compliance on-site (r=.289, p=.020). This finding suggested that as the Level of Compliance on-site increased, there would be a small increase in the Impact of Legislation on Workers Wellbeing. The findings further suggested the same for the Impact of Legislation on Wellbeing and Onsite facilities (r=.269, p=.031); when Onsite Facilities increased, the Impact of Legislation on Wellbeing also increased. The correlation between Management Commitment and Impact of Legislation on Wellbeing was also positive and statistically significant (r= .423, p<0.000) suggesting that as Management Commitment increased, the Impact of Legislation on Wellbeing also increased. The strength of association was moderately significant between the two constructs.

Construction Workers

There was a statistically significant, strong positive correlation between the Impacts of Legislation on Wellbeing and the constructs of Level of Compliance on-site (r=.636, p<.000); Management Commitment (r=.558, p=.001) and H&S Policies (r=.604, p=0.001). The findings

suggested that the Impact of Legislation increased as Level of Compliance on-site; Management Commitment and H&S Policies increased. On-site Facilities were significantly related with the Impact of Legislation on Wellbeing suggesting that as the Impact of Legislation on Wellbeing increased, On-site Facilities moderately increased (r=.373, p=.043).

- **Compliance When Tendering**

Management

Compliance with legislation when tendering was statistically significant with small to moderate positive correlations with the following constructs Management Commitment (r=.322, p=.010); H&S Policies (r=.275, p=.028); and Onsite Facilities (r=.275, p=.045). The findings suggested that as Compliance with Legislation when tendering increased, the other three constructs also increased: Management Commitment; H&S Policies and Onsite Facilities. There was also a statistical significance with a moderate negative correlation between Compliance when tendering and Workers Wellbeing (r = -.353, p=.004). However, the negative correlation suggested that as Compliance when Tendering increased, Workers Wellbeing decreased. This might be indicative that management allowed a budget that was not too large to improve the wellbeing of construction workers and perhaps complied only because it was mandatory or for profit maximisation.

- **Level of Compliance with onsite H&S**

Management

The correlations of Level of Compliance with on-site H&S were statistically significant, with moderate to strong positive correlation with On-site Facilities (r=.340, p=.006); Management Commitment (r=.443, p<.000); Workers Involvement (r=.489, p<.000) and H&S Policies (r=.567, p<0.000). The findings suggested that as the level of compliance on-site increased, the four constructs improved, namely On-site Facilities; Management Commitment; Workers Involvement and H&S Policies.

Construction Workers

There was a statistical significance with a strong positive correlation between the Level of Compliance on Site and the constructs; Management Commitment (r=.880, p<.000); H&S Policies (r=.918, p<.000) and Workers Involvement (r=.606, p<0.000). The findings suggested that as the Level of Compliance on Site increased, Management Commitment; H&S Policies and Workers Involvement were strongly improved.

- **Management Commitment**

Management

Management Commitment was significantly correlated with Workers Wellbeing (r = -.457, p<0.000). The negative correlation suggested that as Management Commitment increased, there was a moderate but negative decrease in Workers Wellbeing. There could have also been other factors that influenced the negative relationship between the constructs, although a positive correlation between the two constructs would have been expected. There was also a statistical significance with positive moderate to strong correlation between Management Commitment and the following: Onsite Facilities (r=.345, p=0.005); Workers Involvement (r=.455, p<0.000) and H&S Policies (r=.704, p<0.000) suggesting that as Management Commitment increased, Onsite Facilities and Workers Involvement moderately improved while H&S Policies significantly improved.

Construction Workers

There was a strong positive correlation with statistical significance between Management Commitment with H&S Policies (r=.861, p<.000) and Workers Involvement (r =.646, p<0.05). The findings suggested that as Management Commitment increased, both H&S Policies and Workers Involvement improved considerably.

- **Health and Safety Policies**

Management

The correlation between Health and Safety Policies and Worker Involvement was statistically significant, suggesting that as H&S Policies increased, Workers' Involvement also increased (r=.599, p<0.000). The findings indicated a strong positive correlation between H&S Policies and Workers' Involvement.

Construction Workers

The correlation between H&S Policies and Workers Involvement was positive and statistically significant (r=.671, p<0.000). The strong correlation suggested that an increase in H&S Policies on-site increased Workers Involvement.

- **Workers Wellbeing and Onsite Facilities**

Management

There was a statistical significance between Worker Wellbeing and Onsite Facilities (r = -.382, p=0.002). The findings indicated that there was a negative relationship between Workers Wellbeing and Onsite Facilities, suggesting that as Workers Wellbeing Increased, Onsite Facilities moderately decreased. Ideally, a positive correlation would have been expected, however, this might be an indication that because of the healthy and good state of workers, management did not see the need to improve onsite facilities. Further, workers may also not be demanding better onsite facilities.

Construction Workers

There was a statistically significant medium positive correlation between Workers Wellbeing and Onsite Facilities (r=.428, p=0.018). This finding suggests that as Onsite Facilities are increased, this results in improved Workers Wellbeing.

CHAPTER SUMMARY

This chapter analysed the findings obtained from the questionnaire survey to draw valid conclusions on the recent construction health and safety legislation changes and their impacts on construction workers quality of life. The questions were interpreted on IBM Statistical Package for Social Sciences (SPSS) v25 using frequencies and descriptive analysis. Cronbach's alpha was used to measure the internal consistency of the constructs, and the coefficients were considered acceptable with a range from *0.700 to 0.926*. The research findings were further compared to the literature review. Spearman's correlation test was used to determine the strength of association between variables directly linked with the studies hypotheses.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter summarises the key findings and conclusion of the study. In this section, the hypotheses of the study will also be tested. The chapter also provides recommendations for future studies relating to the research objectives. The study analysed the recent construction health and safety legislation changes, namely the Construction Regulations 2014 and their impact on construction workers' quality of life. The Construction Regulations were first introduced in July 2003 under the OH&S Act 85 of 1993. Further revisions were made to the Construction Regulations 2003 to address and engender strict adherence of key project stakeholders. The new regulations were promulgated on February, 7th 2014 and were named the Construction Regulations 2014. Furthermore, the aim was to close major linguistic loopholes of the somewhat ambiguous Construction Regulations 2003. Several studies have been conducted on the impacts of Construction Regulations 2003. Although a few studies have been conducted on the Construction Regulations 2014, none has been conducted to study the relationship between their impacts on construction workers' quality of life and well-being.

6.2 PROBLEM STATEMENT

The impact of the Construction Regulations 2014 on workers` performance, although formulated to challenge the status quo, have not yet been determined to date. Little to no coherence between compliance and impacts of legislation is observed as contractors comply with the regulations to satisfy the requirements of the Department of Labour or Department of Public Works. Furthermore, contractors comply for profit maximisation and to avoid penalties or to have their activities stopped. Compliance goes beyond checking boxes and PPE.

6.3 THE HYPOTHESES OF THE STUDY

The hypotheses to be tested are:

- Management's commitment to legislation changes improves construction workers well-being.
- The impacts of recent construction health and safety legislation changes on workers well-being have not been realised to date.

- Contractors comply with health and safety legislation for profit maximisation and only because it is mandatory.
- Contractors do not apply all aspects of the construction legislation to improve construction workers well-being.

6.4 OBJECTIVES OF THE STUDY

The main objectives of the study to be achieved are:

- To identify whether management's commitment to construction health and safety legislation changes improves construction workers well-being.
- To identify whether the impacts of recent construction health and safety legislation changes on improving construction workers well-being have been realised to date.
- To identify whether contractors comply with health and safety legislation for profit maximisation and only because it is mandatory.
- To identify whether contractors apply all aspects of the construction legislation to improve construction workers well-being.

6.5 HYPOTHESES TESTING

6.5.1 Hypothesis One:

- *Management's commitment to legislation changes improves construction workers well-being.*

From the findings of the study, it was found that management and construction workers perceived all construction health and safety legislation to have a high to medium impact on improving the health and well-being of workers. The respondents further agreed that infringement of the regulations negatively affects workers well-being and their sustainability in the industry. This finding was supported by Rust & Koen (2011), who stated that regulations and legislation are key in directing and controlling activity, improving the responsibility of business owners and health and safety. To achieve its objective, good legislation should be supported by effective, sensible and accountable enforcement (Ibid).

Based on the findings of the study and literature, management's commitment to legislation changes improves construction workers well-being. Therefore, the hypothesis that

management's commitment to legislation changes improves construction workers well-being cannot be rejected.

6.5.2 Hypothesis Two

- *The impacts of recent construction health and safety legislation changes on workers well-being have not been realised to date.*

From the findings of the study, management and construction workers agreed that the construction regulations are perceived to have had a positive impact. However, the impacts have not been realised or measured to date. CIDB (2009) indicated that, although the impacts of Construction Regulations may not be quantified, it may be inferred that they have had a positive impact on the reduction of accidents. However, based on FEMA (2018), the accidents statistics report indicated that the number of 'Permanent Disabilities not resulting in Pensions' continued to increase despite current amendments to the construction regulations. It is still not clear from the results whether legislation alone is enough to reduce accidents and fatalities or whether the challenges lie with the enforcement of legislation. Sieberhagen (2008) further argues that occupational health and safety aspects are covered at large within the OH&S Act; however, there is a lack of legislation regarding employees well-being.

Based on the findings of the study, the hypothesis that 'the impacts of recent construction health and safety legislation changes on workers well-being have not been realised to date' cannot be rejected.

6.5.3 Hypothesis Three

- *Contractors comply with health and safety legislation for profit maximisation and only because it is mandatory.*

The respondents from the study agreed that they complied with the regulations because it is mandatory and also with COID Act 130 of 1993 as one of the requirements in the construction regulations, to avoid civil claims. The findings of the study were in line with Agoro et al. (2016) that health and safety of construction workers have been a cause for concern for decades and justifiably so since construction workers are considered invaluable to construction processes. The construction regulations require mandatory compilation of health and safety files, specifications and plans (CIDB, 2009). However, this does not speak to the well-being of construction workers as compliance is only done because it is mandatory and not because contractors care about the well-being of workers on site.

Based on the findings of the study the hypothesis that contractors comply with health and safety legislation for profit maximisation and only because it is mandatory cannot be rejected.

6.5.4 Hypothesis Four

- *Contractors do not apply all aspects of the construction legislation to improve construction workers well-being.*

From the findings of the study, there is evidence that more health and safety education and training is necessary. Furthermore, the respondents agreed that contractors are fully committed to improving workers well-being with the application of the construction regulations. However, it could also be argued that contractors are not fully committed to improving workers well-being by applying 'all aspects' of the Construction Regulations as full commitment would result in respondents' strongly agreeing' with the statement. The construction industry has less than 50% rate of compliance with health and safety requirements with unacceptably high rates of incidents as a result of poor workmanship and lack of proper supervision on-site (CIDB, 2016). Verwey (2015), states that most companies are aware of the changes in these regulations but do not have sufficient and concrete knowledge to implement them. Contractors in the small markets also believe construction regulations do not apply to them since they are not involved in heavy construction (ibid). Contractors perceive the new regulations as an additional burden giving rise to unnecessary costs, and as a result, contractors tend not to comply fully with the requirements of these regulations (Matete et al., 2016). The health and well-being of construction workers are often overlooked and usually discussions on this topic place more emphasis is on safety and prevention (Fry, 2017).

It is evident from the findings study that the 'contractors do not apply all aspects of the construction legislation to improve construction workers well-being'. Therefore, this hypothesis cannot be rejected.

6.6 RECOMMENDATIONS

Based on the findings of the study, the following is recommended:

- Management commitment to legislation improves the wellbeing of the construction workers. However, workers' mental health must be given more attention. The Construction Regulations could explicitly address psychological health which is often treated as taboo and given less attention in the work place. Wellness programs could be adopted and

explicitly designed for construction workers well-being. Such could benefit the overall workforce and alleviate stress and improve workers' performance.

- Where workers are to be trained and educated on construction health and safety legislation, management must empower workers to be the key personnel advocating policy on sites instead of relying on them. This in turn could assist management and legislatures in making better informed decisions since workers are physically involved in the execution of activities on-site.
- Health and safety legislation has a positive impact on improving construction workers' wellbeing even though the impacts have may not be identified. Health and Safety technologies such as Robotics, AR/VR, Smart PPE or Smart Sensors could be adopted for the industry to assist construction workers and to monitor compliance on construction sites. Moreover, health and safety legislation must be revised to include the use of health and safety technologies and accommodate innovation in health and safety.

6.6.1 Recommendations for future research

- The study was conducted in one province, and a future study could be to conduct the same study in all South African provinces to validate the findings.
- The findings of the study focused only on the Constitution, OH&S Act 85 of 1993, COID Act 130 of 1993, CR 2003 and CR 2014. Future research could be conducted on additional legislation such as the Basic Conditions of Employment Act 75 of 1997, the Labour Relations Act 66 of 1995, the National Building Regulations and Standards Act 103 of 1977.
- Since the study was to analyse the impacts of the construction legislation changes, future research could be conducted on behaviour, attitudes and perceptions of contractors towards construction health and safety legislation in South Africa.
- The study focused on limited aspects of wellbeing. Future studies could be conducted to place emphasis on distinct aspects of wellbeing.

6.7 CONCLUSION

From the findings of the study, it may be concluded that there was an average knowledge of construction health and safety legislation. However, the expectation would have been that both management and construction workers within construction companies possessed more knowledge in order to improve their level of compliance and improve construction workers wellbeing. Furthermore, it was perceived that legislation has an impact on improving workers

wellbeing, though the findings further suggested there could be other reasons that impact workers wellbeing based on the less than excellent agreement levels. The findings also suggested that, health and safety policies were made available on site, even though, they were not sufficient. There is need for management to engender full commitment in order to be fully compliant by involving workers in health and safety matters, and ensuring sufficient site facilities.

Further analysis from the Spearman's correlation suggested that the level of compliance with the Construction Regulations 2014 on-site, could significantly improve relative to more knowledge of the construction health and safety legislation; management commitment; workers involved in health and safety issues on site, and availability of health and safety policies on-site for workers to comply with necessary legislative requirements. Moreover, compliance with the construction regulations improves construction workers wellbeing on site and increase provisions for workers site facilities. From the findings, it may be inferred that there was fragmentation between management within construction companies and the construction workers. There is need for more education on health and safety legislation and integration among management and workers in order for contractors to realise the benefits of legislation and to engender full commitment towards implementation and compliance.

REFERENCES

Agumba, J. and Haupt, T. (2012). Identification of health and safety performance improvement indicators for small and medium construction enterprises: A delphi consensus study. [online] Available at: https://www.researchgate.net/publication/287745042_Identification_of_health_and_safety_performance_improvement_indicators_for_small_and_medium_construction_enterprises_A_delphi_consensus_study [Accessed 19 Sep. 2018].

Akoglu H. (2018). User's guide to correlation coefficients. Turkish journal of emergency medicine, 18(3), 91–93. doi: 10.1016/j.tjem.2018.08.001

Anon, (2018). [online] Available at: https://onlinesafety.co.za/construction-regulation-2014-impact/ [Accessed 3 Aug. 2018].

Asanka, W. and Ranasinghe, M. (2015). STUDY ON THE IMPACT OF ACCIDENTS ON CONSTRUCTION PROJECTS. [online] Available at: http://www.civil.mrt.ac.lk/conference/ICSECM_2015/volume_4/Extract/SECM-15-088.pdf [Accessed 17 Jul. 2018].

Association of Municipal Electricity Utilities. (2018). *Construction Regulations 2014*. [online] Available at: http://ameu.co.za/LibraryReports/eJournal/TabId/3011/ArtMID/5216/ArticleID/9701/Construction-Regulations-2014.aspx [Accessed 3 Aug. 2018].

Barnham, C. (2015) Quantitative and qualitative research: perceptual foundations, *International Journal of Market Research,* vol. 57, no. 6, pp. 837.

Bernard, H.R. (2011) "Research Methods in Anthropology" 5th edition, AltaMira Press,

Berry L.L., Mirabito, A.M., and Baun, W.B. (2010, December). What's the hard return on employee wellness programs? Harvard Business Review, 88(12), 104-112. https://hbr.org/2010/12/whats-the-hard-return-on-employee-wellness-programs.

Bester, D. (2016). Building Industry Accidents - Skills On Site. [online] Skills On Site. Available at: https://skillsonsite.co.za/?p=2521 [Accessed 18 Aug. 2018].

Bizcommunity.com. (2018). *FEM releases accident stats for construction industry*. [online] Available at: http://www.bizcommunity.com/Article/196/494/141766.html [Accessed 3 Aug. 2018].

Bizcommunity.com. (2018). *Impact of new OHS Act Construction Regulations*. [online] Available at: http://www.bizcommunity.com/Article/196/360/121602.html [Accessed 3 Aug. 2018].

BOMEL Limited (2001). Improving health and safety in construction. [online] BOMEL Consortium. Available at: http://www.hse.gov.uk/research/crr_pdf/2001/crr01387.pdf [Accessed 29 Aug. 2018].

Bryman, A. (2001) Social Research Methods. Oxford University Press, Oxford.

Bryman, A. and Cramer, D. (2005) *Quantitative data analysis with spss 12 and 13 : a guide for social scientists*. London: Routledge.

Buehler, M., Werna, E. and Brown, M. (2017). More than 2 million people die at work each year. Here's how to prevent it. [online] World Economic Forum. Available at: https://www.weforum.org/agenda/2017/03/workplace-death-health-safety-ilo-fluor/ [Accessed 21 Jul. 2018].

BusinessDictionary.com. (2019). *What is a regulation? definition and meaning*. [online] Available at: http://www.businessdictionary.com/definition/regulation.html [Accessed 14 Jan. 2019].

Carr LT (1994) "The Strengths and Weaknesses of Quantitative and Qualitative Research: What Method for Nursing?," *Journal of advanced nursing*, 20(4), pp. 716–21.

CIDB (2004). ANNUAL REPORT. [online] Available at: http://www.cidb.org.za/publications/Documents/Annual%20Report%202004-2005.pdf [Accessed 21 Aug. 2018].

CIDB (2014). ANNUAL REPORT. [online] Available at: https://nationalgovernment.co.za/entity_annual/605/2015-construction-industry-development-board-(cidb)-annual-report.pdf [Accessed 21 Aug. 2018].

CIDB (2015). LABOUR AND WORK CONDITIONS IN THE SOUTH AFRICAN CONSTRUCTION INDUSTRY; STATUS AND RECOMMENDATIONS. [online] Available at: http://www.cidb.org.za/publications/Documents/Labour%20and%20Work%20Conditions%20in%20the%20South%20African%20Construction%20Industry;%20Status%20and%20Recommendations.pdf [Accessed 21 Aug. 2018].

CIDB (2016). ANNUAL REPORT. [online] Available at: http://www.cidb.org.za/publications/Documents/Annual%20Report%202016-2017.pdf [Accessed 21 Aug. 2018].

CIOB (2016). TACKLING MODERN SLAVERY IN CONSTRUCTION SUPPLY CHAIN. BUILDING A FAIRER SYSTEM. [online] CIOB. Available at: https://www.antislaverycommissioner.co.uk/media/1071/ciob_modern_day_slavery_web.pdf [Accessed 18 Aug. 2018].

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Collinsdictionary.com. (2019). *Framework definition and meaning | Collins English Dictionary*. [online] Available at: https://www.collinsdictionary.com/dictionary/english/framework [Accessed 9 Jan. 2019].

Compensation Commissioner. (2008). Report on the 1999 Statistics. Pretoria. http://www.labour.gov.za

Constructionexec.com. (2019). *Increase Employee Wellness in Construction*. [online] Available at: http://constructionexec.com/article/increase-employee-wellness-in-construction [Accessed 1 Feb. 2019].

Construction Regulations 2003.43.

Construction Regulations 2014.43.

Corrs.com.au. (2018). *How the recent amendments to Building and Construction Industry Legislation and Code will affect you » Corrs Chambers Westgarth*. [online] Available at: http://www.corrs.com.au/publications/corrs-in-brief/how-the-recent-amendments-to-building-and-construction-industry-legislation-and-code-will-affect-you/ [Accessed 3 Aug. 2018].

Creswell, J. (2002). Educational research: Planning, conducting, and evaluating quantitative and qualitative research. Upper Saddle River, NJ: Merrill Prentice Hall. 7.

Creswell, J. (2003). Research design: Qualitative, quantitative and mixed methods approaches (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Davies, V. and Tomasin, K. (1996). Construction safety handbook. London: Telford.

Deacon, C. (2018). *WORLD DAY FOR SAFETY AND HEALTH AT WORK: 28 APRIL 2017: Construction H&S | Health and Safety and the South African Entrepreneur*. [online] Cd-a.co.za. Available at: http://www.cd-a.co.za/News/entryid/298/world-day-for-safety-and-health-at-work-28-april-2017-construction-hs [Accessed 3 Aug. 2018].

De Jager (2000). *What is legislation?* [online] lawgovpol.com. Available at: http://lawgovpol.com/what-is-legislation/ [Accessed 1 Mar. 2019].

Department of Justice (1996). *The Constitution of The Republic of South Africa*. Department of Justice.

Department of Labour (1997). BASIC CONDITIONS OF EMPLOYMENT ACT 75 OF 1997. DEPARTMENT OF LABOUR.

DEPARTMENT OF LABOUR (1995). LABOUR RELATIONS ACT 66 OF 1995. DEPARTMENT OF LABOUR.

Dudovskiy, J. (2016). *John Dudovskiy*. [online] Goodreads.com. Available at: https://www.goodreads.com/author/show/16848138.John_Dudovskiy [Accessed 20 Mar. 2019].

Eaves, S., Gyi, D. and Gibb, A. (2015). Facilitating Healthy Ageing in Construction: Stakeholder Views. Procedia Manufacturing, 3, pp.4681-4688.

Egan, J. (1998). Rethinking Construction. Construction Task Force. [online] Department of Trade and Industry. Available at: http://constructingexcellence.org.uk/wp-content/uploads/2014/10/rethinking_construction_report.pdf [Accessed 21 Aug. 2018].

Encyclopedia Britannica. (2019). *legislation | Definition, Types, & Examples*. [online] Available at: https://www.britannica.com/topic/legislation-politics [Accessed 1 Mar. 2019].

Engineeringnews.co.za. (2018). *Engineering News - New construction regulations challenging for industry*. [online] Available at: http://www.engineeringnews.co.za/print-version/new-construction-regulations-challenging-for-industry-2015-05-22 [Accessed 3 Aug. 2018].

Eppenberger, M. and Haupt, T. (2009). Construction worker injuries and costs – a comparative study of older and younger workers. [online] Available at: http://file:///C:/Users/Dillon/Downloads/Construction%20worker%20injuries%20and%20costs%20%EF%BF%BD%20a%20comparative%20study%20of%20older%20and%20younger%20workers%20(1).pdf [Accessed 17 Sep. 2018].

Field, A. (2017) *Discovering statistics using IBM SPSS statistics, 5th edition.* SAGE Publications, London. ISBN 9781526419521

Flick, U. (2014) *An introduction to qualitative research*. Edition 5 edn. Los Angeles: Sage.

Fry, G. (2017). *Bring Health and Wellness to Your Construction Business*. [online] Viewpoint Surveyor. Available at: https://blog.viewpoint.com/health-and-wellness-in-construction-2/ [Accessed 2 Feb. 2019].

Gidado, K. and Woods, H. (2008). Project complexity in Construction. Construction Management and Economics. [online] Available at: https://core.ac.uk/download/pdf/9552740.pdf.

Global Wellness Institude (2019). [online] Available at: https://globalwellnessinstitute.org/press-room/press-releases/global-wellness-institute-releases-report-and-survey-on-the-future-of-wellness-at-work/ [Accessed 10 Sep. 2018].

Goetsch, D. (2013). *Construction Safety & Health*. 2nd ed. Pearson.

Goddard, W. & Melville, S. (2004) "Research Methodology: An Introduction" 2nd edition, Blackwell Publishing

Government of Canada. A guide to the Making of Federal Acts and Regulations. Ottawa (ON): Government of Canada, Department of Justice; 1995:15.

Gov.za. (2018). *Labour on injuries and fatalities in SA construction sector | South African Government*. [online] Available at: https://www.gov.za/speeches/sa-construction-sector-9-mar-2017-0000 [Accessed 3 Aug. 2018].

Greve, N. (2018). *Amendments to construction health and safety laws put onus on client, contractor*. [online] Engineering News. Available at:

http://www.engineeringnews.co.za/article/amendments-to-construction-health-and-safety-laws-put-onus-on-client-contractor-2014-04-10 [Accessed 3 Aug. 2018].

Grinnell, Richard Jr (ed.), (1981), Social Work Research and Evaluation, Itasca, IL, F.E. Peacock.

Groves, R. (2009). *Survey methodology*. 2nd ed. Oxford: Wiley-Blackwell.

Gulati, PM, (2009), Research Management: Fundamental and Applied Research, Global India Publications, p.42

Harinarain, N. and Haupt, T. (2014). THE VULNERABILITY OF THE CONSTRUCTION INDUSTRY TO HIV AND AIDS.

Hefer, E. (2016). The Impact of the Construction Health and Safety Regulatory Framework on Construction Costs.

Henryshields.co.za. (2018). Construction accidents in South Africa – Henry Shields. [online] Available at: http://www.henryshields.co.za/construction-accidents-in-south-africa/ [Accessed 17 Jul. 2018].

Hozack, N. (2015). *Reliability and Validity*. [video] Available at: https://www.youtube.com/watch?v=tMERBdjs8Dw [Accessed 25 Mar. 2019].

International Labour Organisation (2011). Construction OS&H Safe & healthy working environment. ILO.

International Labour Organisation (2013). ILO CONSTRUCTION OS&H The Health of Workers in Selected Sectors of the Urban Economy: ILO.

INTERNATIONAL LABOUR ORGANISATION (2001). The Construction Industry in the Twenty-First Century: Its Image, Employment Prospects and Skill Requirements. ILO.

INTERNATIONAL LABOUR ORGANISATION (2008). ILO Construction OH & S 2008. ILO.

INTERNATIONAL LABOUR ORGANISATION (2017). Global estimates of modern slavery: forced labour and forced marriage. ILO.

Ilo.org. (2018). *Construction: a hazardous work*. [online] Available at: http://www.ilo.org/safework/areasofwork/hazardous-work/WCMS_356576/lang--en/index.htm [Accessed 3 Aug. 2018].

Jacobs, E. (2010). Health and Safety in South African construction: Status Quo. *ASOCSA*, 5, pp.446-447.

James, P. (2011). "The well-being of workers in the construction industry: a model for employment assistance". [online] Available at: http://etd.cput.ac.za/bitstream/handle/20.500.11838/1746/well%20being%20of%20workers%

20in%20the%20construction%20industry.pdf?sequence=1&isAllowed=y [Accessed 18 Sep. 2018].

Joppe, M. (2000). The Research Process. Retrieved March 25, 2019, from https://www.uoguelph.ca/hftm/research-process

Kazema, A. (2014). Types Of Quantitative Research for Students and Researchers. [online] Bog.udemy.com. Available at: https://blog.udemy.com/types-of-quantitative-research/ [ccessed 4 Apr. 2018].

Kothari, C. R. (2004), Research Methodology: Methods and Techniques, (Second Edition), New Age International Publishers.

Labourguide.co.za. (2018). *Draft Amendments to the Construction Regulations*. [online] Available at: https://www.labourguide.co.za/health-and-safety/288-draft-amendments-to-the-construction-regulations [Accessed 3 Aug. 2018].

Labour.gov.za. (2018). 2018 — Department of Labour. [online] Available at: http://www.labour.gov.za/DOL/media-desk/media-statements/2018 [Accessed 19 Sep. 2018].

Laney, J. C. (1982). Site safety: Construction Press [GOOGLE SCHOLAR].

Lee, S. (2018). University of Michigan Says Wearable Sensors Can Improve Construction Safety and Profitability. [online] For Construction Pros. Available at: https://www.forconstructionpros.com/business/construction-safety/news/21018866/university-of-michigan-says-wearable-sensors-can-improve-construction-safety-and-productivity [Accessed 19 Oct. 2018].

Leedy, P. & Ormrod, J. (2001). Practical research: Planning and design (7th ed.). Upper Saddle River, NJ: Merrill Prentice Hall. Thousand Oaks: SAGE Publications

Leedy, P. D. and Ormrod, J. E. (2005) *Practical research: planning and design*. 8Th ed. / edn. Upper Saddle River, N.J.: Prentice Hall.

Leedy, P. D. and Ormrod, J. E. (2010) *Practical research: planning and design*. 9th edn. Upper Saddle River, NJ: Merrill.

Li, Rita Yi Man & Ping Lung Ng, Daniel. (2018). Wearable Robotics, Industrial Robots and Construction Worker's Safety and Health. 31-36. 10.1007/978-3-319-60384-1_4.

Matete, R., Smallwood, J. and Emuze, F. (2016). EXPLORING PERCEIVED IMPLEMENTATION ISSUES OF THE PERMIT-TO WORK REQUIREMENT OF THE CONSTRUCTION REGULATIONS IN SOUTH AFRICA. *Journal of Construction: Association of Schools of Construction in Southern Africa*, 9(2), pp.14:23.

Matlala S (1999). Prioritising health promotion and employee wellness. People Dyn., 17(6): 22-25.

May, T. (2001) *Social research: issues, methods and process*. 3rd edn. Buckingham UK: Open University Press.

McKinsey Global Institute, (2017). Reinventing Construction. Capital Projects and Infrastructure. [online] McKinsey and Company. Available at: <https://www.mckinsey.com/~/media/McKinsey/Industries/Capital%20Projects%20and%20Infrastructure/Our%20Insights/Reinventing%20construction%20through%20a%20productivity%20revolution/MGI-Reinventing-Construction-In-Brief.ashx>.

Mkenda, B. and Aikaeli, J., 2015. Informal Construction Employment, Earnings and Activities: A Boon or Bane for Tanzania?. SSRN Electronic Journal,.

Moser, C. and Kalton, G. (1977). *SURVEY METHODS IN SOCIAL INVESTIGATION*. 2nd ed. LONDON: HEINEMANN EDUCAT. BOOKS.

Mouton, J. (1996). Understanding social research. Pretoria: ‚JL van Schaik. Mouton, J. 2001. How to succeed in your Master's and Doctoral studies. Pretoria: JL van Schaik.

Murie, F. (2007). Building Safety—An International Perspective. *International Journal of Occupational and Environmental Health*, 13(1), pp.5-11.

Naidoo, R. (2018). *New construction regulations guideline has pros and cons | Infrastructure news*. [online] Infrastructurene.ws. Available at: http://www.infrastructurene.ws/2017/07/25/new-construction-regulations-guideline-has-pros-and-cons/ [Accessed 3 Aug. 2018].

Neutens, J. and Rubinson, L. (2002). *Research techniques for the health sciences*. San Francisco: B. Cummings.

Nieuwenkamp, R. (2016). The Global Construction Sector Needs a Big Push on Corporate Responsibility. [online] OECD Insights Debate the Issues. Available at: http://oecdinsights.org/2016/08/22/global-construction-sector-corporate-responsibility/ [Accessed 12 Aug. 2018].

Occupation Health and Safety Act No 85 of 1993.85.

Okorie, V. and AIGBAVBOA, C. (2016). THE ECONOMIC AND SOCIAL IMPACTS OF SITE ACCIDENTS ON THE SMALL AND MEDIUM SIZED CONSTRUCTION COMPANIES IN NIGERI. [online] Available at: https://ujcontent.uj.ac.za/vital/access/services/Download/uj:21604/SOURCE1 [Accessed 16 Aug. 2018].

Okoro, C., Mudonda, I. and Agumba, J. (2016). Assessing Safety Performance of Construction Workers in Gauteng, South Africa. ASOCSA. [online] Available at: https://ujcontent.uj.ac.za/vital/access/services/Download/uj:22482/SOURCE1 [Accessed 19 Aug. 2018].

Orvitz, K. (2018). *Increase Employee Wellness in Construction*. [online] Constructionexec.com. Available at: http://constructionexec.com/article/increase-employee-wellness-in-construction [Accessed 12 Jan. 2019].

Osha.gov. (1970). *Occupational Safety and Health Act of 1970*. [online] Available at: https://www.osha.gov/Publications/OSH-ACT-reprint-3-09-04.pdf [Accessed 2 Mar. 2019].

Osha.gov. (2015). OSHA Outreach Training Program - Construction Industry | Occupational Safety and Health Administration. [online] Available at: https://www.osha.gov/dte/outreach/construction/focus_four/ [Accessed 19 Oct. 2018].

Oshri, M. (2010). [online] Umpir.ump.edu.my. Available at: http://umpir.ump.edu.my/2589/1/MOHD_ILLAHI_BIN_MOHD_ASHRI.PDF [Accessed 21 Sep. 2018].

Othman, A. (2012). A study of the causes and effects of contractors' non-compliance with the health and safety regulations in the South African construction industry. Architectural Engineering and Design Management, 8(3), pp.180-191.

Pagano, R. R. (2004). Understanding Statistics in the Behavioural Sciences (7 th ed.). Belmont, CA: Thomson/Wadsworth.

Pallant, J. (2005) SPSS Survival Guide: A Step by Step Guide to Data Analysis Using SPSS for Windows. 3rd Edition, Open University Press, New York.

Pelissier, R. (2008) “Business Research Made Easy” Juta & Co.,

Pillay, K. (2014). The Cost of Construction Accidents.

Rabeau, A. (1998). *Regulatory Frameworks Royal Commission on Worker’s Compensation in British Columbia*. [online] Available at: http://www.qp.gov.bc.ca/rcwc/research/intersol-frameworks.pdf [Accessed 2 Feb. 2019].

Raymond, P. (2016). Smart PPE and Wearable Tech is Coming. [online] Paramount Safety Products. Available at: http://blog.prochoice.com.au/personal-protective-equipment/smart-ppe-wearable-tech/ [Accessed 19 Oct. 2018].

Reference. (2019). *What Is the Importance of Legislation?* [online] Available at: https://www.reference.com/government-politics/importance-legislation-28cea6731f25cf [Accessed 16 Jan. 2019].

Republic of South Africa. 1977. National Building Regulations and Building Standards Act No.103 of 1977. Pretoria.

Republic of South Africa. (1996). Constitution of the Republic of South Africa No. 108 of 1996. Pretoria. Available at http://www.acts.co.za/constitution_of_/index.html [Accessed 1 June 2018]

Rust, F.C. and Koen, R. (2011) Positioning Technology Development in the SA Construction Industry: A Technology Foresight Study. Journal of the SA Institution of Civil Engineering, 53, 2-8.

Sabuilder.co.za. (2018). *FEM Safety Awards 2016 – South African Builder*. [online] Available at: http://www.sabuilder.co.za/2016/10/24/fem-safety-awards-2016/ [Accessed 3 Aug. 2018].

Saica.co.za. (1993). *Compensation for Occupational Injuries and Diseases Act, No 130 of 1993*. [online] Available at: https://www.saica.co.za/Portals/0/Technical/LegalAndGovernance/Amended%20Act%20%20Compensation.pdf [Accessed 2 Jan. 2019].

Saiosh.co.za. (2018). *Construction Regulations 2014 Implementation Phase - Saiosh*. [online] Available at: https://www.saiosh.co.za/news/240901/Construction-Regulations-2014-Implementation-Phase.htm [Accessed 3 Aug. 2018].

Saunders, M., Lewis, P. & Thornhill, A. (2012) "Research Methods for Business Students" 6th edition, Pearson Education Limited

Saiosh.co.za. (2018). Construction Regulations 2014 Implementation Phase - Saiosh. [online] Available at: https://www.saiosh.co.za/news/240901/Construction-Regulations-2014-Implementation-Phase.htm [Accessed 3 Aug. 2018].

Schwab, K. (2013). Making the Right Investment: Employee Health and the Power of Metrics. The Workplace Wellness Alliance. [online] World Economic Forum. Available at: http://www3.weforum.org/docs/WEF_HE_WorkplaceWellnessAlliance_Report_2013.pdf [Accessed 20 Oct. 2018].

SCHWANDT, T. A. (2007). The Sage Dictionary of Qualitative Inquiry (Third ed.), Thousand Oaks, California: sage Publication, Inc

Sieberhage, C. (2008). *EMPLOYEE HEALTH AND WELLNESS PRACTICES IN SOUTH AFRICA*. Ph.D. North West University.

Skills Portal. (2014). Construction regulations to improve safety. [online] Available at: https://www.skillsportal.co.za/content/construction-regulations-improve-safety [Accessed 3 Aug. 2018].

Smallwood, J. (2005). [online] Arcom.ac.uk. Available at: http://www.arcom.ac.uk/-docs/proceedings/ar2005-1097-1106_Smallwood.pdf [Accessed 3 Aug. 2018].

Smallwood, J. (2000). A study of the relationship between occupational health and safety, labour productivity and quality in the South African construction industry. Unpublished PhD thesis. University of Port Elizabeth.

Smallwood, J. and Haupt, T. (2007). Impact of the South African Construction Regulations on construction health and safety. Journal of Engineering, Design and Technology, 5(1), pp.23-34.

Smallwood, J., Haupt, T. and Shakantu, W. (2009). *Construction Health & Safety in South Africa Status & Recommendations*. [online] Available at: http://www.cidb.org.za/publications/Documents/Construction%20Health%20and%20Safety%20in%20South%20Africa.pdf [Accessed 3 Aug. 2018].

Statssa.gov.za. (2018). [online] Available at: http://www.statssa.gov.za/publications/P0211/P02114thQuarter2017.pdf [Accessed 3 Aug. 2018].

Statssa.gov.za. (2018). [online] Available at: http://www.statssa.gov.za/publications/P0441/P04411stQuarter2018.pdf [Accessed 3 Aug. 2018].

Stewart, D. (2018). *New health and safety legislation to impact on construction industry*. [online] Engineering News. Available at: http://www.engineeringnews.co.za/article/new-health-and-safety-legislation-to-impact-on-construction-industry-2015-01-22 [Accessed 3 Aug. 2018].

Strauss, A., & Corbin, J. M. (1990). Basics of qualitative research: Grounded theory procedures and techniques. Thousand Oaks, CA, US: Sage Publications, Inc.

Summerhayes, S. (2002). *CDM regulations procedures manual*. 2nd ed. Oxford: Blackwell.

The Blueprint Survey Team (2016). South African Construction Industry Survey. Summary of Results 2016 – Second Survey. The Blueprint Survey Team.

Trochim, W. M. (2006) The Research Methods Knowledge Base, 2nd Edition. Internet WWW page, at URL: <http://www.socialresearchmethods.net/kb/> (version current as of October 20, 2006).

UKaid (2016). *Quantitative Research.pdf | Survey Methodology | Quantitative Research*. [online] Scribd. Available at: https://www.scribd.com/document/355892443/Quantitative-Research-pdf [Accessed 22 Mar. 2019].

UP Repository (2016). *Research Design and Methodology*. [Document] https://repository.up.ac.za/bitstream/handle/2263/28216/04chapter4-1.pdf?sequence=5&isAllowed=y, Pretoria.

US Bureau of Labor and Statistics (2002). National Census of Fatal Occupational Injuries in 2002. United States Department of Labor, p.2.

Van der Merwe, P. (1996). The Research Process: Problem Statement and research design. In Garbers, J.G. (Ed.). Effective Research in the Human Sciences. Pretoria: Van Schaik

Vosloo, J. (2014). *A sport management programme for educator training in accordance with the diverse needs of South African schools*. Ph.D. North-West University, Potchefstroom Campus.

Webcache.googleusercontent.com. (2018). *BUSINESS PERSPECTIVE OF CONSTRUCTION HEALTH AND SAFETY IN SOUTH AFRICA BUSINESS PERSPECTIVE OF CONSTRUCTION HEALTH AND SAFETY IN*. [online] Available at: http://webcache.googleusercontent.com/search?q=cache:http://www.labour.gov.za/DOL/downloads/documents/useful-documents/occupational-health-and-safety/mbsa.pdf [Accessed 3 Aug. 2018].

Weinreich, N.K. (2009). Integrating Quantitative and Qualitative Methods in Social Marketing Research. http://www.social-marketing.com.

Wells, J., 2007. Informality in the construction sector in developing countries. Construction Management and Economics, 25(1), pp.87-93.

Wells, J, Hawkins, J. (2010). Promoting Construction Health and Safety through Procurement: A briefing note for developing countries. Engineers against Poverty. Institute of Civil Engineers.

Welman, C., Kruger, F., & Mitchell, B. (2005). Research Methodology. (3rd ed.). Oxford: Oxford University Press.

Wiego.org. (2014). Construction Workers in the Informal Economy | WIEGO. [online] Available at: http://www.wiego.org/informal-economy/occupational-groups/construction-workers [Accessed 21 Oct. 2018].

Williams, C. (2007) Research Methods. Journal of Business & Economic Research, 5, 65-72.

Wilson, J. (2010) "Essentials of Business Research: A Guide to Doing Your Research Project" SAGE Publications

Windapo, A. and Cattell, K. (2011). Research Report. Mapping the Path to Becoming a Grade 9 Contractor. [online] Available at: http://www.cidb.org.za/publications/Documents/ind_reps_Research_Report_Mapping_Path_to_Grade_9.pdf [Accessed 21 Aug. 2018]

Windapo, A. 2013. Relationship between Degree of Risk, Cost and Level of Compliance to Occupational Health and Safety Regulations in Construction, Australasian Journal of Construction Economics and Building, 13 (2), 67-82

Zhou, W., Whyte, J. and Sacks, R. (2011). Construction safety and digital design: A review. *Automation In Construction*, 22, pp.102-111.

Zulu, E. (2019). *Curriculum Development for an Inquiry Approach to Construction Education*. Ph.D. University of KwaZulu-Natal.

APPENDICES
APPENDIX A – ETHICAL CLEARANCE

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

19 September 2019

Mr Mohlomi Terah Raliile (208081520)
School of Engineering
Howard College Campus

Dear Mr Raliile,

Protocol reference number : HSS/0394/019M
Project title: Analysis of recent Construction Health and Safety Legislation changes their impact on Performance Improvement

Approval Notification – Expedited Application

With regards to your response received on 29 July 2019 to our letter of 15 July 2019, 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 1 year 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 Rosemary Sibanda (Chair)

/ms

cc Supervisor: Professor Theo C Haupt
cc Academic Leader Research: Professor Akshay Kumar Saha
cc School Administrator: Ms N Dlamini

Humanities & Social Sciences Research Ethics Committee
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Website: www.ukzn.ac.za

APPENDIX B – INFORMED CONSENT

Information Sheet and Consent to Participate in Research

Date: 12/04/2019

To whom it may concern

I, _____ (your name), from _____ (company name) allow _____ (my name) to conduct a questionnaire survey at our Company as a requirement to fulfil his research study for MSc Construction Management at UKZN titled: Analysis of Recent Construction Health and Safety Legislation and their Impact on Workers Wellbeing.

I understand that my participation in this study is entirely voluntary and that I may withdraw at any time without affecting any of the benefits that I usually am entitled to.

_____ _____

Signature of Participant Date

APPENDIX C – MANAGEMENT QUESTIONNAIRES

The following is an example of the instrument which were used to conduct the questionnaire surveys from the managers and construction workers.

University of KwaZulu-Natal
School of Engineering
Department of Construction Studies
Howard College Campus
Durban 4041
South Africa

Dear Sir/Madam,

RE: PARTICIPATION IN A SURVEY

You are invited to participate in a research survey titled **"Analysis of recent construction health and safety legislation changes and their impact on construction workers' wellbeing"** in South Africa.
The survey takes about 15 minutes to complete. All information obtained from participants will be kept strictly confidential and will be only used for research purposes.

Responding to the questionnaire is voluntary and you are guaranteed complete confidentiality in the treatment of your responses. All information will be used for research purposes only. Please check the box below to indicate that; a), you have read the above information b), and you voluntarily agree to participate.

☐ I Agree. **If you do not agree**, please do not fill in the questionnaire.

Thanking you in advance,

Please complete the survey and return to:

Mr Mohlomi Raliile
MSc Scholar
Phone: +2731 260 1183 (Office)
Mobile: +2773 621 0442
E-mail: mohlomiraliile@gmail.com

QUESTIONNAIRES:

Analysis of Recent Construction Health and Safety Legislation Changes and Their Impact on Workers Wellbeing

SECTION A:

Instructions and Directions: Please use a cross (X) or a tick (√) to select the category for your answer below:

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

_____

1.2 How many temporary employees on average are employed in your organisation?

_____

1.3 How many years have you been working in your current position_____?

1.4 Please indicate your age: _____

1.5 Please indicate your position in your organization

Discipline	
Architect	
Construction Manager	
Health and Safety Manager	
Project Manager	
Quantity Surveyor	
Civil Engineer	
Structural Engineer	
Other (please specify)	

1.6 What percentage of your work is sourced as follows?

Type of client	**%**
Public Sector	
Private Sector	
Total (100%)	

1.5 What is the CIDB grading of your organization?

Grade	**Please tick correct CIDB grading**
2	
3	
4	
5	
6	
7	
8	
9	
No Grading	

SECTION B – Knowledge of Construction Health and Safety Legislative Framework

2.1 Rate your knowledge of the following: (1 = Poor, 2 = Fair, 3 = Average, 4 = Good and 5 = Excellent)

Legislation	1	2	3	4	5
The Constitution of the Republic of South Africa					
Occupational Health & Safety Act 85 of 1993					
Construction Regulations 2003					
Construction Regulations 2014					
Compensation for Injuries & Diseases Act 130 of 1993					

2.2 To what extent does complying with the provisions of the following impact the overall health and wellbeing of the labourers (1 = No impact, 2 = Some impact, 3 = major impact)?

Legislation	1	2	3
The Constitution of the Republic of South Africa			
Occupational Health & Safety Act 85 of 1993			
Construction Regulations 2003			
Construction Regulations 2014			
Compensation for Injuries & Diseases Act 130 of 1993			

2.3 How frequently do you consider the compliance requirements of the following when compiling a competitive bid (1= never; 2= seldom; 3=sometimes; 4= often; and 5=always)?

Legislation	1	2	3	4	5
The Constitution of the Republic of South Africa					
Occupational Health & Safety Act 85 of 1993					
Construction Regulations 2003					
Construction Regulations 2014					
Compensation for Injuries & Diseases Act 130 of 1993					

2.4 Compliance and impacts of Construction Legislative Changes (Construction Regulations 2014)

Please consider the following statements and rate your answer (1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly Agree)

	1	2	3	4	5
Compliance with the Construction Regulations					
The application of **Construction Regulations 2003** have a positive impact on the overall health and wellbeing construction laborers'					
The application of *amended* **Construction Regulations 2014** have a positive impact on the overall quality of construction laborers'					
There is a major difference between **Construction Regulations 2003** and **Construction Regulations 2014**					
Contractors are applying all aspects of Construction Regulations to improve the health and wellbeing of construction laborers'					
Contractors are fully committed to improving the health and safety of construction laborers through Construction Regulations 2014					
Contractors comply with Construction Regulations 2014 only because its mandatory					
Construction Regulations 2014 establish a general awareness of the H&S of construction workers					
Lack of adequate health and safety provision negatively impact other project parameters					
Department of Lab our often ensures that contractors are fully compliant with the requirements of the Construction Regulations 2014					
Infringement of the construction regulations poses a threat to workers wellbeing and sustainability in the construction industry					
Contractors register with COID to avoid civil claims and/or law suits					
Contractors register with COID because they care about laborers wellbeing					
Contraction Regulations 2014 are perceived to have a positive impact on reduction of construction workers fatalities					
The impacts of construction regulations 2014 have not been determine to date					
Construction Regulations clearly define legal parameters on how to improve workplace H&S for workers					
Each project has a project-specific H&S plan in accordance with the requirements of the Construction Regulations 2014					

Section C – Practices and attitudes towards Construction Legislative changes (Construction Regulations 2014)

3. Please consider the following statements and rate your answer (1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly Agree)

	1	2	3	4	5
Management Commitment					
The construction workers' wellbeing is important to the head office management					
Implementation of Construction Regulations improve workers' performance and quality of life					
The head office management ensures compliance with Construction Regulations 2014 to improve workers quality of life					
The head office management are intolerant of poor construction H&S					
All workers possess medical certificates of fitness					
All workers' medical certificates of fitness are valid					
Workers are rewarded for good H&S practices on site					
Workers are penalised for poor H&S practices on site					
The head office management insists on the elimination of hazards by complying with Construction Regulations					
The firm employs trained H&S staff on site					
There is a general lack of proper supervision on construction sites					
H&S inspections are done regularly and at least daily					
Management consults with the health and safety committee, representative union or representative group of employees, on the monitoring and reviewing of the risk assessments of a specific site					
Health and Safety Policies					
Health and Safety policies are written and in place					
Regular H&S meetings are held					
Workers are encouraged to report unsafe and unhealthy behavior and working conditions					
Construction Regulations 2014 requirements on safe work procedures are discussed at H&S meetings					
All workers are kept informed of the provisions of the H&S plan					
Workers have training/workshops in relation to the Construction Regulations					
All workers undergo orientation/induction before they are allowed to start work on site					
Workers are trained in the proper care and use of PPE according the requirements of Construction Regulations					
More H&S education and training is needed					
Construction accidents are caused by workers' non-compliance with Construction regulations					
Worker's Involvement/Engagement					
Workers have the right to refuse to work in unsafe conditions					
Workers are responsible for their own H&S					
Workers are responsible for the H&S of their fellow workers					
Most workers on site view H&S as important					
Workers are involved with H&S inspections					
Workers are consulted when the H&S plan is compiled					

Workers participated in the formulation of the H&S policy					
Workers regularly report unsafe and unhealthy behavior and working conditions					
Workers Wellbeing					
The firm is only concerned with getting the job done as quickly as possible					
Construction workers' wellbeing and quality of life are often overlooked on site					
The firm complies with prescribed working hours as per legislation					
Workers worry about their job security					
Construction legislation and regulations in South Africa address workers' psychological matters either directly or indirectly in the workplace					
Workers are often stressed about work activities					
On Site Facilities					
There are provisions for bathroom facilities on site					
There are washing facilities for workers on site (for hands, PPE)					

APPENDIX D – CONSTRUCTION WORKERS QUESTIONNAIRES

University of KwaZulu-Natal
School of Engineering
Department of Construction Studies
Howard College Campus
Durban 4041
South Africa

Dear Sir/Madam,

RE: PARTICIPATION IN A SURVEY

You are invited to participate in a research survey titled **"Analysis of recent construction health and safety legislation changes and their impact on construction workers' wellbeing"** in South Africa.
The survey takes about 15 minutes to complete. All information obtained from participants will be kept strictly confidential and will be only used for research purposes.

Responding to the questionnaire is voluntary and you are guaranteed complete confidentiality in the treatment of your responses. All information will be used for research purposes only. Please check the box below to indicate that; a), you have read the above information b), and you voluntarily agree to participate.

☐ I Agree. **If you do not agree**, please do not fill in the questionnaire.

Thanking you in advance,

Please complete the survey and return to:

Mr Mohlomi Raliile
MSc Scholar
Phone: +2731 260 1183 (Office)
Mobile: +2773 621 0442
E-mail: mohlomiraliile@gmail.com

QUESTIONNAIRES: CONSTRUCTION WORKERS

Analysis of Recent Construction Health and Safety Legislation Changes and Their Impact on Workers Wellbeing

SECTION A:

Instructions and Directions: Please use a cross (X) or a tick (√) to select the category for your answer below:

1.7 How many years have you been working in your current position_____?

1.8 Please indicate your age: _____

1.9 Please indicate your position

Laborer	
Operator	
Artisan	
Other (please indicate)	

1.10 Please indicate your highest formal qualification

Primary education	
Junior High School	
Matric (O'level)	
Technical/Vocational	
University degree	
No formal qualification	

1.6 Please indicate your gender:

Male	
Female	

SECTION B – Knowledge of Construction Health and Safety Legislative Framework

2.1 Rate your knowledge of the following: (1 = Poor, 2 = Fair, 3 = Average, 4 = Good and 5 = Excellent)

Legislation	1	2	3	4	5
The Constitution of the Republic of South Africa					
Occupational Health & Safety Act 85 of 1993					
Construction Regulations 2003					
Construction Regulations 2014					
Compensation for Injuries & Diseases Act 130 of 1993					

2.2 To what extent does complying with the requirements of the following impact your overall health and wellbeing on site (1 = No impact, 2 = Some impact, 3 = major impact)?

Legislation	1	2	3
The Constitution of the Republic of South Africa			
Occupational Health & Safety Act 85 of 1993			
Construction Regulations 2003			
Construction Regulations 2014			
Compensation for Injuries & Diseases Act 130 of 1993			

2.3 Compliance and impacts of Construction Legislative Changes (Construction Regulations 2014)

Please consider the following statements and rate your answer (1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly Agree)

	1	2	3	4	5
Compliance with the Construction Regulations					
The application of **Construction Regulations 2003** have a positive impact on the overall health and wellbeing construction laborers'					
The application of *amended* **Construction Regulations 2014** have a positive impact on the overall quality of construction laborers'					
There is a major difference between **Construction Regulations 2003** and **Construction Regulations 2014**					
Contractors are applying all aspects of Construction Regulations to improve the health and wellbeing of construction laborers'					
Contractors are fully committed to improving the health and safety of construction laborers through Construction Regulations 2014					
Contractors comply with Construction Regulations 2014 only because its mandatory					
Construction Regulations 2014 establish a general awareness of the H&S of construction workers					
Lack of adequate health and safety provision negatively impact other project parameters					
Department of Labour often ensures that contractors are fully compliant with the requirements of the Construction Regulations 2014					
Infringement of the construction regulations poses a threat to workers wellbeing and sustainability in the construction industry					
Contractors register with COID to avoid civil claims and/or law suits					

Contractors register with COID because they care about laborers wellbeing					
Contraction Regulations 2014 are perceived to have a positive impact on reduction of construction workers fatalities					
The impacts of construction regulations 2014 have not been determine to date					
Construction Regulations clearly define legal parameters on how to improve workplace H&S for workers					
Each project has a project-specific H&S plan in accordance with the requirements of the Construction Regulations 2014					

Section C – Practices and attitudes towards Construction Legislative changes (Construction Regulations 2014)

3. Please consider the following statements and rate your answer (1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly Agree)

	1	2	3	4	5
Management Commitment					
The construction workers' wellbeing is important to the head office management					
Implementation of Construction Regulations improve workers' performance and quality of life					
The head office management ensures compliance with Construction Regulations 2014 to improve workers quality of life					
The head office management are intolerant of poor construction H&S					
All workers possess medical certificates of fitness					
All workers' medical certificates of fitness are valid					
Workers are rewarded for good H&S practices on site					
Workers are penalized for poor H&S practices on site					
The head office management insists on the elimination of hazards by complying with Construction Regulations					
The firm employs trained H&S staff on site					
There is a general lack of proper supervision on construction sites					
H&S inspections are done regularly and at least daily					
Management consults with the health and safety committee, representative union or representative group of employees, on the monitoring and reviewing of the risk assessments of a specific site					
Health and Safety Policies					
Health and Safety policies are written and in place					
Regular H&S meetings are held					
Workers are encouraged to report unsafe and unhealthy behavior and working conditions					
Construction Regulations 2014 requirements on safe work procedures are discussed at H&S meetings					
All workers are kept informed of the provisions of the H&S plan					
Workers have training/workshops in relation to the Construction Regulations					
All workers undergo orientation/induction before they are allowed to start work on site					

Workers are trained in the proper care and use of PPE according the requirements of Construction Regulations					
More H&S education and training is needed					
Construction accidents are caused by workers' non-compliance with Construction regulations					
Worker's Involvement/Engagement					
Workers have the right to refuse to work in unsafe conditions					
Workers are responsible for their own H&S					
Workers are responsible for the H&S of their fellow workers					
Most workers on site view H&S as important					
Workers are involved with H&S inspections					
Workers are consulted when the H&S plan is compiled					
Workers participated in the formulation of the H&S policy					
Workers regularly report unsafe and unhealthy behavior and working conditions					
Workers Wellbeing					
The firm is only concerned with getting the job done as quickly as possible					
Construction workers' wellbeing and quality of life are often overlooked on site					
Workers worry about their job security					
Construction legislation and regulations in South Africa address workers' psychological matters either directly or indirectly in the workplace					
Workers are often stressed about work activities					
On Site Facilities					
There are provisions for bathroom facilities on site					
There are washing facilities for workers on site (for hands, PPE)					