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THE IMPACT WHICH ETHICAL DECISION MAKING HAS ON REWORK WITHIN THE CONSTRUCTION INDUSTRY

Craig Barnes

THE IMPACT WHICH ETHICAL DECISION MAKING HAS ON REWORK WITHIN THE CONSTRUCTION INDUSTRY

By

Craig Barnes

A Dissertation Submitted to
The Faculty of Engineering and the Built Environment
University of the Witwatersrand
In fulfillment of the requirement for the degree of
Master of Science in Building

Supervisor: Dr. Elizabeth Heron

July 2017

ABSTRACT

This study examines the lack of application of ethical values by construction project managers towards work activities under their control. At the same time, this study also examines the barriers preventing construction project managers from acting ethically. The non-application of ethical values by the construction project managers is resulting in an increase in the amount of rework during the construction process which is in turn impacting on the timeous completion of construction projects.

Interpretivist and positivist research methodology was applied to this study through a single case study which was tested through a later set of interview questions. The case study took place at the Medupi Power Station construction project and composed of interviews and questionnaires distributed to construction project managers working on the Medupi Power Station site. The further interview questions took place in Johannesburg. The further interviews were undertaken to determine supporting evidence for the previous findings established through the initial data collected in the study.

The findings of the study established that a failure of the construction project manager's ethical values is resulting in an increase in the amount of rework occurring on a construction project which is having a negative impact on the successful timeous completion of these construction projects. The findings from this study further established that although there are current barriers in place to prevent construction project managers from acting unethically, the implementation of an ethical code of conduct would have a positive influence on the amount of rework that is currently occurring during the construction phase of construction projects.

DECLARATION

I declare that this Dissertation is my own unassisted work.

It is submitted in complete fulfillment of the requirements of the degree of Masters of Science in Building, within the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, South Africa.

It has not been submitted before for any degree or examination at any other tertiary institution.



Signed_____

Date: 28 July 2017

DEDICATION

To Vero, Always and Forever.

ACKNOWLEDGEMENTS

I am grateful to the following:

- Dr Elizabeth Heron.
- The interviewees who partook in the case study.
- The respondents to the questionnaire.
- The construction companies for who the interviewees were employed.

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Chapter One: Introduction

1.1 Introductory Background

This study examines the impact of the construction project manager's failure to apply ethical values. This study examines how failing to apply ethical values in the decision making process impacts on non-conformances and rework during the construction process.

The construction industry is often criticized for having poor levels of productivity, along with inferior standards of quality, resulting in the requirement of extensive rework (Love, 2003). Rework is work that requires repair or complete rebuild in order to obtain the detailed standard of quality (Feng, Tommelieni and Booth, 2009). Feng et al. (2009) describes rework as an action required to resolve poor quality standards caused by the occurrence of non-conformances. Love, Edwards and Smith (2005) describe the negative impact that non-conformances have on the construction industry and the ultimate negative impact experienced by the construction project managers. For the purpose of this study, rework is defined as work that is undertaken to correct defective or substandard work. The defective work requires repair or complete rebuild to meet with the detailed and standard of quality required.

Numerous studies have been conducted on the existence and impact of rework within the construction industry (Joseph and Hammarlund, 1999; Hwang, Thomas, Haas and Caldas, 2009 and Simpeh, 2012). Results from these studies have indicated that rework is rife within the construction industry both internationally and from the South African perspective. In addition, the findings from research exploring rework indicates that rework has a negative impact on the construction industry, as well as on the professionals working within the industry.

Simpeh (2012) indicates that rework can be attributed to the impact of the human influence during the construction process. Studies that explore the impact of the human factor on rework focus on the impact of supervision and management.

Construction project managers are primarily employed to ensure that a construction project is completed according to a budget, a time frame as well as the level of quality detailed during the conceptual stage of a project (Vee and Skitmore, 2003).

A construction project manager uses the baseline as detailed by the professional team as a yard stick of measurement to complete the project successfully (Vee and Skitmore, 2003). The completion of successful projects however is far from the reality experienced within the construction industry. Vee and Skitmore (2003) indicate that various non-conformances and quality deviation are becoming evident during the life cycle of a project.

Dhir and Henderson (1999) describe how quality deviations and non-conformances are the sole responsibility of the construction project manager. The construction project manager needs to ensure that all work is performed according to standards and that no shortcuts are taken. The construction project manager should keep the projects best interests at heart at all times (Vee and Skitmore, 2003).

Vee and Skitmore (2003) explain that in order for a construction project to be completed correctly, the construction project manager needs to employ certain systems to allow for the project to be completed without defect. The construction project manager is required to act ethically at all times and to ensure that all system implemented are for the greater benefit of the project.

Studies conducted within the construction industry which focus on the impact of ethical decision making by construction project managers indicate that poor ethical decision making is rife within the construction industry (Parson, 2005; Vee and Skitmore, 2003 and Samuels, Haupt and Shakantu, 2006).

Non-conformances and rework needs to be prevented within the construction industry (Kubal, 1994). Various construction companies both internationally and within South Africa have implemented quality standards and quality systems to assist in the minimizing of non-conformances during the construction phase of a project (Rowlinson and Walker, 1995) . The construction industry unlike the manufacturing industry is far more complex and non-standard which results in manufacturing quality systems being impractical and inefficient when used in construction. For example, construction projects are performed in different areas throughout the world where environmental and external factors might contribute to the resultant quality of a project (Rowlinson and Walker, 1995).

Various organisations within the global construction industry have adapted the ISO 9000 quality system to assist in the reduction of non-conformances and rework (Rowlinson and Walker, 1995).

1.2 Problem Statement

Within the construction industry, rework is an obstruction to the successful completion of construction projects. While various factors contribute to rework it is argued that poor ethical decisions made by the construction project managers are contributing to the rework taking place on construction projects. (Feng et al., 2009). Furthermore, there are currently no guidelines detailing preventative measures to restrict Construction project managers from making unethical decisions during the construction process of a construction project.

- **Sub Problem 1**

  Within the construction industry, rework is an obstruction in the successful timeous completion of construction projects.
- **Sub Problem 2**

  Rework could be as a result of poor ethical decision making by construction project managers operating within the construction industry.
- **Sub Problem 3**

  There are currently no guidelines within the South African construction industry detailing preventative measures to restrict construction project managers from making unethical decisions during the construction process of a construction project.

1.3 Research Question

The following research questions are posed in this study.

- Does rework exist and if so, what impact does it have on the successful completion of construction projects within the context of the South African construction industry?
- Is poor ethical decision making during the construction phase of a project, by the construction project manager contributing to and resulting in the occurrence of rework?
- What preventative measures are in place to prevent construction project managers from acting unethically during the construction of a project?

1.4 Hypothesis

Rework is preventing the successful completion of construction projects. Rework is being perpetuated by construction project managers making unethical decisions during the construction process. Currently, there are no restrictions in place from preventing a construction project manager from making unethical decisions during the construction process.

1.5 Objectives

The research objectives of this study are:

- Establish the existence of rework and its impact on the successful completion of projects within the context of the South African construction industry.
- Determine the correlation between rework and poor ethical decision making by the construction project manager.
- Ascertain the possibility of a professional code of conduct having an impact on a construction project manager's ethical decision making process.
- Explore possible quality control methods that could be implemented to prevent the occurrence of rework within the construction industry.

1.6 Limitations

This study was limited to data gathered from site managers, site engineers and contracts managers working on the construction of the Medupi Power Station project in the Limpopo province in South Africa as well as data collected from Construction Managers working on construction sites in the city of Johannesburg, South Africa.

External factors such as time and funding limited the study given that the time and funding available for the research extended from September 2010 to December 2012. The researcher undertook a hiatus between January 2012 and December 2013 due to personal and professional commitments. The research recommenced in January 2014.

1.7 Research Methodology

This research consists of two distinct phases. The first phase incorporated a literature review on rework, ethics and ethics in construction as well as quality and quality systems within the international construction industry. A literature review was conducted in these fields to

determine previous research knowledge as well as to establish the gaps within the researched areas.

The second phase incorporated the undertaking of data collection at the Medupi Power Station Project for the duration of one month. Methods for data collection included a survey questionnaire as well as interviews. Five companies were identified and selected and professionals within the organizations were selected for interviews and participation in a questionnaire. All five companies were commissioned to perform work as part of the Medupi Power Station construction project. A further set of interviews were conducted on construction project managers within Johannesburg during 2016. The additional interviews were conducted to further reinforce the findings drawn from the interviews and questionnaire from the case study and to confirm that the findings from the case study were not isolated to the Medupi Power Station project.

1.8 Structure of Dissertation

This dissertation is presented in the following structure:

Chapter One

The principles and motivation for this study are presented here. Chapter One is the introductory chapter to the study and comprises of the introductory background, the problem statement, research question, hypothesis, objectives, limitations and research methodology.

Chapter Two

Chapter Two presents the literature review of the study. The literature review examines and presents literature regarding ethics and ethical behaviour demonstrated by construction project managers. Moreover, the review presents the literature that explores the impact of ethical behaviour on the occurrence of non-conformances and rework during a construction project. In addition, the chapter presents the philosophy of quality and quality systems that exist within the construction industry.

Chapter Three

Chapter Three presents the methodology applied in this study and the process of data collection adopted.

Chapter Four

Chapter Four presents the analysis and findings of the data collected.

Chapter Five

Chapter Five draws and presents conclusions from the findings of the study and offers recommendations.

1.9 Significance of the Study

Academic literature relating to the impact a construction project manager's ethical decisions have on rework is limited. Although various studies have researched the impact of poor ethical decision making in the construction industry, little is understood about the impact that ethical decisions are having on non-conformances and rework. The intention of this study is to enhance the pool of knowledge in relation to ethical decisions and rework. Additionally, this study also attempts to add knowledge to the understanding of the prevention of unethical decision making by the construction project manager.

This study is therefore significant in the following ways:

- This study contributes to reducing the gap that exists in current literature on rework caused by a construction project manager's poor ethical decisions.
- This study adds literature to the gap that currently exists on the preventative measures that can be taken to prevent a construction project manager from acting unethically.

Figure 1.1 presents the structural mapping adopted in this study.

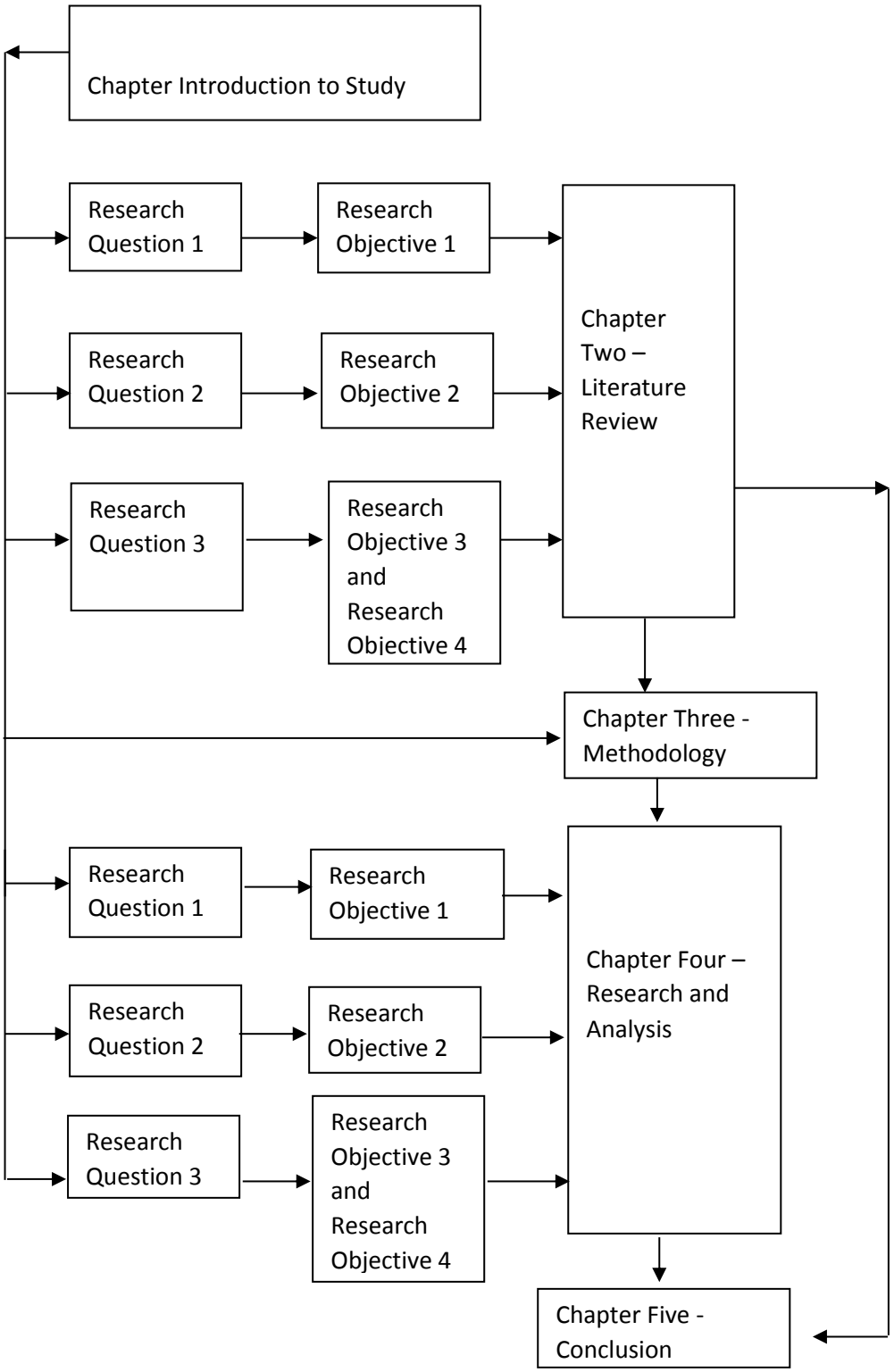

Figure 1.1: Structural mapping of the dissertation

Chapter Two: Literature Review

2.1 Introduction

This chapter presents a literature review of rework, the theories surrounding ethics as well as the application of ethics within the construction industry. This literature review further examines the quality systems that are available and applied within the South African construction industry. Additionally, the various codes of conduct instilled within the South African construction industry are examined as well the impact that these codes of conduct have on a construction project manager's ethical decision making process. The topics are researched to gain a greater understanding of the impact of how a construction project manager's ethical standards can have an influence on the recurrence of rework within the South African construction industry.

2.2 Rework

Non-conformances occur in all industries in many shapes and forms and are the result of numerous factors (Feng, et al., 2009). The construction industry is one such industry in which non-conformances are continually occurring albeit unnecessarily. According to Feng, et al. (2009) non-conformance almost always results in the creation of rework.

Rework has been described by Feng, et al. (2009) as work that is required to be repeated due to design change, omissions or poor workmanship. Burati, Farrington and Ledbetter (1992) state that rework is a result of quality deviations and Love and Li (2000) suggests that rework is solely caused by the occurrence of non-conformances. It is important to note that Fayek, Dissanayake and Campero (2003) maintain that additions and omissions due to the consulting team and the client cannot be considered as rework and should rather be treated as new work. For the purpose of this study, rework is considered as remedial work on any defective work that occurs during the construction phase of a project.

According to Koskela (1994) the construction process contains two forms of work namely value-adding actions and non-value adding actions. Value adding actions are activities which add worth to a completed project. These are activities in which the end user will benefit. Non Value adding actions are actions that will not benefit the end user and in most cases serve no value to the project as a whole (Seibert, Seppanen, Kunz and Paulson, 1996).

Koskela (1994) continues to explain that rework is continuously considered as non-value adding and should therefore be avoided.

Rework is synonymous with the construction industry and ultimately rework has a negative impact on the cost of a project (Love, Edwards and Smith, 2005). Rework therefore puts undue pressure on the project budget as well as the project team. Furthermore, this pressure is experienced by the construction project manager (Love, Edwards and Smith, 2005). According to Feng et al. (2009) rework will ultimately lead to the increase in cost to the contractor's account as well as schedule delays causing the contractor to exhaust additional resources and time to rectify the non-conformances through rework. Hwang, Thomas, Haas and Caldas (2009) argue that rework involves redoing work to rectify non-conformances and the rework results in cost and schedule overruns for the project. The cost implications to rework include all resources, such as plant, material and labour, to be expended to correct the defect during the rework (Hwang, et al. 2009).

Joseph and Hammarlund (1999) conducted a study on the cost implications of rework within the construction industry. The findings indicated that the cost of rework on all construction projects can vary between 2% and 6% of the final contract value. Similarly, Hwang et al. (2009) state that rework can result in cost overruns of up to 5% of the contract value.

However, Hwang et al. (2009) also state that when poor quality management is in place on a construction project, the cost of rework due to non-conformances can escalate to more than 5% of the contract value.

Studies conducted by Hwang et al. (2009) as well as Joseph and Hammarlund (1999) suggest that non-conformances result in rework, and in turn, the rework has a negative effect on the project cost resulting in a overrun by the contractor of between 2% and 5%.

2.2.1 Influential factor involved in rework

While rework occurs in all construction projects regardless of the size or nature of the project (Love, Edwards and Smith, 2005) certain aspects of a project may have an additional influence in the increase in rework. These factors include, but are not limited to the nature of the work (Love, Wyatt, and Mohammed, 1997), project complexity (Naoum and Mustapha 1994) as well as the tendering process used during a project (Maizon 1997). Depending on

the specific nature of the work, the outcome of rework may vary. According to Love, et al. (1997) refurbishments and restorations to buildings increase the amount of rework experienced by the contractor. The reason being for this is the uncertainty of what may have previously been completed by previous contractors.

Naoum and Mustapha (1994) stated that in projects where the specification may be of a complex nature or the type of work is outside of the norm, rework would increase due to lack of experience by the contractor within the specific field.

Maizon (1996) stated that where presumptions have been made at tender stage of specific areas of work, rework will increase due to poor investigation by the contractor into specific areas of the project.

2.2.2 Cause of Rework

In order to address the concept of rework within the construction industry, an understanding of the cause of such rework needs to be determined. The Construction Owners Association of Alberta (COAA) developed a classification matrix which categorises the causes of rework (Fayek, et al. 2003). Figure 2.1 presents the classification matrix of rework

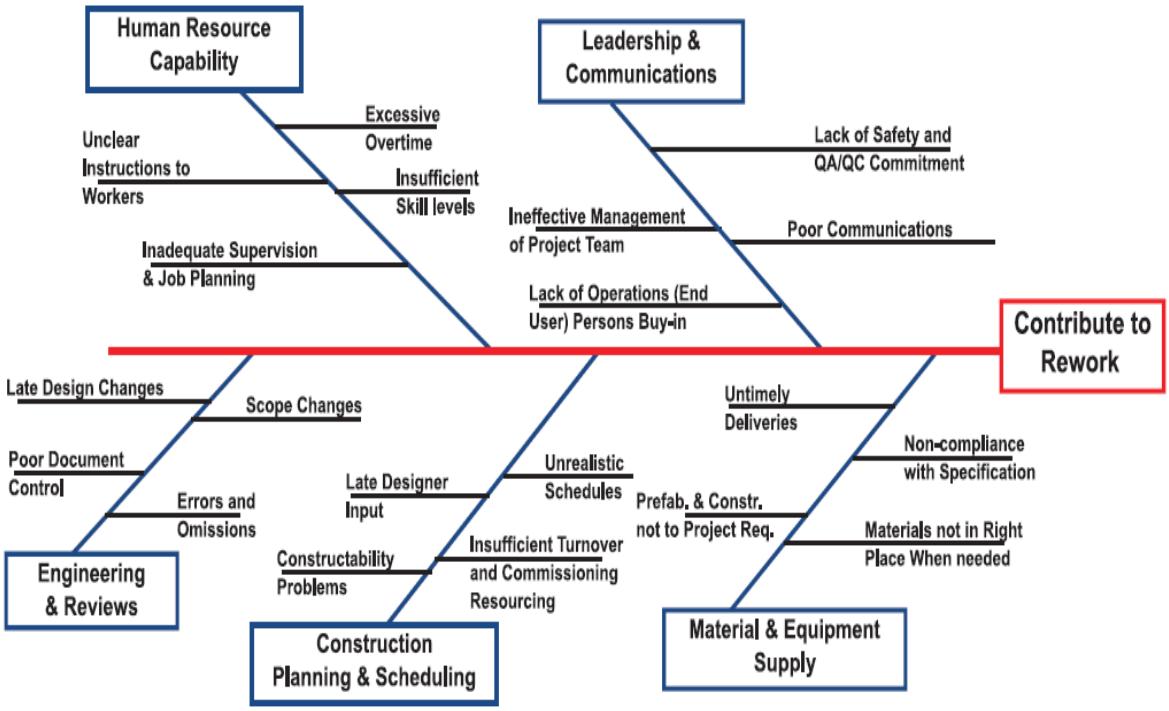

Figure 2.1: Fishbone matrix of rework classification

(Source: Fayek, et al. (2003:18))

Figure 2.1 presents the classification matrix of rework and classifies the causes of rework into five defining categories. Each category of the matrix can have an ultimate impact on the quantum of rework experienced in a construction project (Fayek, et al., 2003). The five categories are defined as follows:

Material and equipment supply

The human influence to rework is a major contributor and as such results in many difficulties during the construction process. Poor quality of supervision, inadequately skilled workers and inexperienced supervisors play a large role in the occurrence of rework within the construction industry (Alwi, Hampson and Mohamed, 2001). Alwi, et al. (2001) go further in explaining that implementing adequate supervision will drastically reduce the possibility of rework. Having satisfactory supervision ensures that the artisans are adequately skilled, the project is correctly resourced and proficiently planned, all of which contribute to a reduction of rework. Correct supervision is required to ensure a quality product is produced (Alwi et al., 2001).

Leadership and Communication

Poor communication between organisational leaders and staff results in inadequate messages being relayed which has a direct impact on the extent of rework during a project (Love, Edwards, Smith and Walker, 2009). According to Alwi et al. (2001) it is the responsibility of management to correctly inform all staff of expectations and requirements for a project. Staff can react according to guidance and commitment from supervision and management. Therefore, it can be argued that poor communication and management might result in an increase of rework, motivated by unethical decision making, during a project (Alwi et al., 2001).

Engineering and Reviews

The design team can have a negative impact on the occurrence of rework. During the construction phase of a project, errors and omissions from the designers can have a major impact on the performance of the project and ultimately on the rework during a construction project (Love and Li, 2000). However, according to Fayek, et al. (2003) additions and omissions due to the consulting team and the client cannot be considered as rework and should rather be treated as new work.

Construction Planning and Scheduling

Love and Li (2000) indicate that the occurrence of rework is generally the result of inadequate planning and resourcing by the contractor. Poor project planning will invariably lead to a change in construction techniques which will result in the manifestation of rework during the construction phase of a project (Love and Li, 2000).

Material and Equipment

During the construction phase materials and equipment will ultimately fail. Failure of materials and equipment can be for a multitude of reasons and can result in rework taking place (Ashby, Shercliff and Cebon, 2007).

The causes of rework are extensive as indicated in Figure 2.1. However, a common predominant factor among all rework causes has been identified as human influence (Alwi et al. 2001). In all rework causes it is evident that through better management of all construction activities rework will drastically be reduced (Alwi et al. 2001). With this in mind it is arguably human input, which plays a key role in the reduction of rework.

As further stated by Alwi et al. (2001) it is not adequate enough to provide supervision, the supervision needs to be skilled and vigilant to ensure all processes are correct. The supervisor should therefore possess all of the required skills and behaviour to ensure the reduction of rework. One such behaviour which guides and motivates all actions is ethics (Heikes 2009).

2.3 Ethics Defined

Ethics is the process of determining the difference between right and wrong (Levi-Strauss 1966). Ethics is a branch of moral philosophy and can be found in all walks of life, from religion, social environments as well as business environments (Levi-Strauss 1966). According to Levi Strauss (1966) the concept of ethics was originally envisaged by Socrates in 470BC. However, according to Johns (1910) the concept of ethics dates back to 1750-1700BC (Circa) where the ideas that forge the modern understanding of ethics was established by King Hammurabi and the Hammurabi code.

According to Lafollette (2000) ethics is the study and understanding of conscious decision making and the repercussions of these conscious decisions made by humans. Not all actions performed by humans are purely voluntary; many actions are conscious and voluntary. The conscious and voluntary actions are those actions defined within the realm of moral perception and are regarded as choices made by humans (Lafollette, 2000).

Lafollette (2000) explains how ethics and morals are often used in context together. Ethics refers to the science of correct and incorrect decisions, whilst morals refer to the conduct displayed in relation to a human's actions. As the two concepts work hand in hand they are believed to substantiate each other. For example, the morals (actions) displayed by a person may not be ethically based. Ethical decisions are based upon social understanding of a social group or organisation to which the decisions are made. Furthermore, one organisation's ethical understanding may differ from another organisation's ethical understanding (Lafollette, 2000).

2.4 Branches of Ethics

According to Heikes (2009) ethics can be subdivided into two varying branches, namely normative ethics and non-normative ethics. Normative ethics is that branch of ethics associated with correct and incorrect actions as well as the establishment of rules and boundaries. Normative ethics is therefore a means for humankind to establish and monitor rules of conduct (Heikes, 2009). Non-normative ethics, on the other hand, is not the establishment of rules and regulations, but rather establishing what ethical beliefs exist within a community and the ethical beliefs the occupants possess within the community.
Heikes (2009) further subdivides normative ethics into ethical theory and applied ethics, whilst non-normative ethics is subdivided into Metaethics and descriptive ethics. The breakdown of the subdivision of ethics is presented in Figure 2.2.

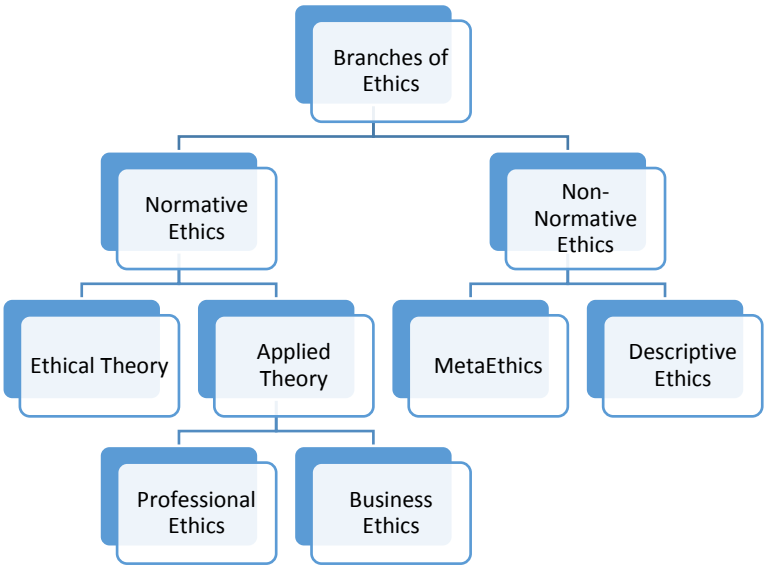

Figure 2.2: Breakdown of the subdivision of ethics

(Source: Heikes (2009:8))

2.4.1 Non-Normative Ethics

As previously stated by Heikes (2009) non-normative ethics is the establishment of what ethical beliefs exist within a community and what ethical beliefs the occupants within the community possess, rather than what is dictated and should be adhered to. Two sub areas within non-normative ethics that will be explored are Metaethics and Descriptive ethics.

2.4.1.1 Metaethics

According to Brink (1989) Metaethics is the attempt to understand the concepts of moral thought and ethical beliefs. Metaethics examines a person's values, reasons for action and motivation and questions such areas as: do moral thoughts exist, is moral thought a truth or a belief, and how does a society set an ethical understanding within their limits?

Metaethics examines the view and commitments of persons engaging in ethical debate by stepping back and viewing a situation from an alternate standpoint. It examines the people and the situation (context) in which the moral decision was established (Sayre-McCord, 2012). Metaethics offers a neutral background in which to examine and compare all ethical and moral behaviour. However, Wielenberg (2014) indicates that there is no good and justifiable way to vindicate the commitments and assumptions of morality.

Shafer-Landou (2007) states that the various principles of moral obligations are the beliefs put in place by those advocating the moral principles. This creates an understanding that a moral obligation can only be installed and exercised within a community to which the obligations belong.

Metaethics therefore examines the root of not only the ethical and moral decision, but also the reasoning behind the decision making.

2.4.1.2 Descriptive Ethics

Descriptive ethics is the exploration into beliefs, values and characteristics of the person's understanding of right and wrong. Descriptive ethics also examines what actions are punishable by law, as opposed to establishing what may be seen as right and wrong. (Leach, Stevens, Lindsay, Ferrero and Korkut, 2012).

To understand the true interpretation of descriptive ethics, empirical research needs to be undertaken to understand a society's ethical standards and thoughts. Areas such as anthropology, psychology, sociology and history are examined to understand the beliefs and ethical understanding of a group. An area which is important to note when considering descriptive ethics is that a rule enforced through law does not imply that the society of the law believes that the rule is ethically correct or should be adhered to (Leach et al. 2012).
In a study conducted by Kohlberg (1984) a group of adolescent males were asked to choose whether to either steal medicine to save the life of a fatally ill person or to refrain from theft and let the person die. The intention of Kohlberg's (1984) study was to understand the moral reasoning behind each of the participant's decisions.

Kohlberg's (1984) study evaluated descriptive ethics, as the study examined actual moral development rather than how moral development should occur, which forms the basis of Metaethics.

2.4.2 Normative Ethics

Normative ethics is the branch of ethics associated with correct and incorrect actions as well as the establishment of rules and boundaries. Normative ethics is therefore a means for humankind to establish and monitor rules of conduct (Heikes, 2009).
Kagan (1998) defined normative ethics as the understanding behind a belief. For example, one should not question whether or not murder is correct. Possessing such a thought of undertaking murder, according to the principles of normative ethics is wrong. Normative ethics would therefore not require an answer of yes or no, it would merely state that the thought process was ethical or unethical. Normative ethics can be further explained through the subdivision of ethical theory and applied theory. Both ethical theory and applied theory are further examined in this study.

(a) Ethical Theory

Reich (1978) defines ethical theory as the classification of philosophical actions into the broad definition of right and wrong.

According to Mackinnon (2011) the most crucial area of study within normative ethics are values, virtues and norms. A definition of values, virtues and norms is as follows:

- Values are items or convictions that are deemed to be worth striving for
- Virtues are traits of a person that allow them to possess behaviour competencies such as honesty, loyalty and courage
- Norms are rules that dictate acceptable behaviour in given situations

Mackinnon (2011) describes the major ethical theories as Utilitarianism, Duty and Kantian ethics, Rawlsian ethics and Egonism.

Utilitarianism

Utilitarianism is often referred to as the greater good. Utilitarianism posits that the consequence of an action determines the ethical thought process which led to the action (Mackinnon, 2011).

Shafer-Landau (2007) explains that Utilitarianism is an action that results in a beneficial outcome and has been determined through good ethical thought. An action that bears any negative outcome is created through poor ethical thought (Shafer-Landau, 2007). Utilitarianism is therefore often referred to as the consequential ethical theory (Shafer-Landau, 2007).

Within utilitarianism theory, an action is viewed as ethical if the action eliminates harm and negativity and maximises positivity and benefits all persons involved within the action (Shafer-Landau, 2007). Shafer-Landau (2007) states that utilitarianism demands the greatest good to be experienced by all.

Reich (1978) states that the greatest good can be related to fulfilling ultimate human happiness while at the same time minimising unhappiness. Reich (1978) further states that happiness is what all humans seek and can therefore be seen as the greatest good.

Mackinnon (2011) explains that Utilitarianism should not be an excuse to perform selfish acts. Society rather than an individual should benefit from actions. Mackinnon (2011) further explains that both short and long term benefits need to be taken into account when considering ethical decisions. Ethical decisions must have minimal negative consequences in both the long and short term (Mackinnon, 2011).

Kay (1997) states that there are a number of objectives to Utilitarianism, namely:

- One can never be certain what the effects of an action will be and who the effects will have an influence on
- Risk calculation is extremely time consuming and complicated. A decision does not always allow for such in depth thought
- The greatest good is described in terms of an aggregate. Meaning that an individual could suffer an extreme loss whilst many others receive a much larger gain
- A person's rights are not taken into account when determining the greatest good

A school of thought, known as the *virtue ethics school*, believes that ethics follows a given set of rules or guidelines and the importance of developing good habits of character such as morality. This school of thought also follows the notion that in order to be ethical one must avoid negative traits such as cowardice, insensibility, and vanity. The virtue ethics school of thought goes further to describe how a younger person needs to be taught these virtues by adults as one cannot develop ethics alone (Fieser, 2009).

Duty Theory of Ethics

Another school of thought exists within normative ethics, this school of thought is known as the duty theories of ethics. The duty theory describes how humans have certain ethical duties, such as to care for ones loved ones whilst forfeiting financial gain in the process (Fieser, 2009).

There are four central duty theories, the first of which was driven by Pufendorf (Fieser 2009). Fieser (2009) stated that Pufendorf posited that man has three main obligations; obligations to oneself, to God and to others. From these duties Pufendorf explains that one should avoid performing wrongful acts (Fieser, 2009).

The second duty-based approach is the *right theory*. This approach discusses the rights of people in terms of ethics. For example, a person should have the right not to be harmed by another; it is in turn the ethical responsibility of others not to cause harm. These rights are not created by a government or society. The rights are adopted by all cultures and societies across the world, and do not discriminate between race, gender or culture. These rights are referred to as Human Rights (Fieser, 2009).

The third duty based approach emphasises a single principle of duty (Johnson, 2010). The theory of duty ethics is the most well know and researched system of ethics (Johnson, 2010). This theory is also referred to as the Kantian ethical theory and believes in one universal principle known as the categorical imperative (Johnson, 2010).

Johnson (2010) describes how Kant formulated the categorical imperative. Firstly, the formula of universal law stated that all actions could be predetermined through laws that could be applied universally to all persons. The laws should not allow for the occurrence of contradiction (Johnson, 2010). Secondly, every action should not allow for an individual to consider the end result, rather to consider the means of the action only (Johnson, 2010).

Johnson (2010) explains that the categorical imperative can be understood as an imperative due to the initial thought being a command of what one should or should not do. The imperative wills an individual to perform an action or prevents that person from performing the action. Johnson (2010) further explains that the categorical imperative does not allow one to think of a means to an end, rather to act within the creation of laws that determine one's actions.

A fourth approach by philosopher Ross (1936) emphasises prima façade duties. Ross (1936) argues that humans' duties are part of the universe and in order to continue on a natural path a person should adhere to all duties. The duties are defined as fidelity, reparation, gratitude, justice, beneficence, self-improvement, and non-maleficence (Fieser, 2009).

Ross (1936) understood that instances would arise when a person needs to choose to perform a right or wrong action. When faced with this choice Ross (1936) encourages all to choose the correct path.

Rawlsian Ethics

Using elements from both Kantian ethics and utilitarianism ethical theories, Rawls developed the ethical theory of just and fairness (Kay, 1997). This theory is also known as the Rawlsian ethical theory (Kay, 1997). According to Kay (1997) the Rawlsian ethical theory describes a method of moral evaluation for both social and political environments.

Kay (1997) further explains how Rawls (1971) envisaged the Rawlsian ethical theory. Initially in the development of the theory, Rawls (1971) removed all personal prejudice and bias from himself and chose to view the world through what is described as *the veil of ignorance* (Kay, 1997: 38). The veil of ignorance is a state of existence where all thought becomes rational, free, moral and equal (Kay, 1997).

Behind the veil of ignorance, Rawls (1971) created fundamental principles for society to adhere to (Kay, 1997). Kay (1997) stated that Rawls (1971) sought for all principles needed to be fair to all and eliminate all bias. Through the creation of the fundamental principles, Rawls (1971) created two imperative rules for society to conform to namely. The first of the two rules promoted that all persons are to have equal rights to liberty. The second, that Social and economic inequalities are to be positioned so that all persons receive an advantage in life and that the advantages are available to all (Kay, 1997).

Kay (1997) further explains that Rawls (1971) merely added an additional principle to the Kantian ethical theory. Kay (1997) describes the additional principle as the difference principle which stated that all persons regardless of social and economic standing should act in a moral and ethical manner.

Egoism

Kay (1997) explains that Egoism is an ethical theory which is concerned with benefiting one's own great goal rather than society as a whole. Hosper (1967) further argues that by nature, humans are motivated by self-interest. All acts performed by humans regardless of how selfish the act may seem, are motivated by selfishness and self-gain (Hospers, 1967).

Kay (1997) describes Egoism as an individual performing acts to benefit the individual. Kay (1997) further explains that if all people look after their own personal interests, then society

will become more efficient and will provide a greater good for all. Ethical Egoism provides that through selfish actions, all persons ultimately gain and the result is that society achieves the greatest good (Rachels, 1995).

Although there are a several theories concerning ethics and ethical principles, the backbone to all the theories and schools of thought remains constant. Humans can pursue the difference between what is wrong and what is right. It is a human's ethical decision that determines whether that human makes the correct or incorrect decision.

(b)Applied Ethical Theory

Applied ethical theory is the application of ethical principles in a specific field of practice or a profession. Applied ethics incorporates various other divisions of ethics and applies these divisions into certain areas of business and professional circumstances. Two vital branches of applied ethics that are pertinent to this study are business and professional ethics.

Business Ethics

Business ethics is defined as the behaviour that an organisation's employees are expected to adhere to at all times whilst interacting with all market and customer related entities (Fieser, 2009).

Fieser (2009) further explains that business ethics can be determined as one of three sub-theories namely:

- The avoidance of acting unlawfully and partaking in criminal activity
- Preventing actions that may result in law suits against one's organisation
- Preventing a negative image of the company from being portrayed

Fieser's (2009) three business ethics sub-theories indicate the concept of putting the best interest of the company first over personal gain or development. This belief is the ethos of business ethics. Crane and Matten (2007) state that the sole purpose of a company is to create profit from the market place within which the company operates. Crane and Matten (2007) explain that a company will only be concerned with something that negatively impacts the image or bottom line of the company. In line with this Fieser (2009) explains that ethics and business are founded within a symbiotic relationship. Profit will only be realized from ethical

business practice, where unethical business practices are applied negativity will prevail. The grounding of the symbiotic relationship between ethics and profit is based upon the theory that the application of good ethical practices will result in good ethical business decisions (Fieser, 2009).

Hartley (1993) disagrees that ethical business practices result in larger profit margins and that moral business practices will only benefit a company in the long term. Many companies exist for short term profit turn around; ethical business practice would therefore not assist companies with the short term goal of profit. Due to the competitive market place experienced in most industries, companies are solely interested in short term profit in order to sustain the company into the future (Hartley, 1993).

Hooker (2003) argued that correct ethical behavior applied to business practices will result in a good reputation for the company, and a good reputation often yields financial reward. However, Hooker (2003) stated that ethical behavior cannot be founded in financial reward alone. If the business applies ethical business practice for financial reward alone, the business and the employees of such a business will only act ethically in situations that would financially benefit the company (Hooker, 2003).

Hooker (2003) stated that motivation cannot be gained through applying ethics within the business environment. The application of ethics encourages people to conduct moral acts; the application of ethics does not inspire the moral acts. Business ethics should not treat profit as a means to an end.

According to a survey conducted by KPMG in 2001, within the South African business market, 91% of consumers stated that an ethical business would be more attractive to interact financially with than an unethical business. The consumers questioned for the purpose of the survey viewed an ethical business as a business with a long term view on society rather than a short term view on profitability (www.info.gov.za).

Trevino and Nelson (2010) stated that production related businesses have an ethical responsibility to ensure that the process of production does not bring about harm to all. Trevino and Nelson (2010) further stated that a production company has an ethical

responsibility to ensure that the final product is of the desired standard and that the final product is correct in all aspects.

The application of ethics in the business environment is not a means to achieve a greater profit margin for a company. As with personal ethics, the application of business ethics should be based in the desire to conduct correct business practices, rather than the appearance or benefit gained by a business for conducting such behaviour. Profitability and business ethics need to be separated during consideration of business practices. All acts should be ethical within business regardless of any financial benefit (Trevino and Nelson, 2010).

Professional Ethics

A professional is defined by Whitbeck (1998) as an individual who has conducted intensive study into an area of knowledge. Johnson (1991) stated that a professional is one who services the needs of society.

According to Johnson (1991) professionals are not exempted from acting ethically. All professionals should consider ethical behavior as a front runner in practice in order for the professional's service to be conducted adequately.

Strahlendorf (2003) indicated that professional ethics is a guideline for professionals who encounter problems involving conflicts of ethical decisions whilst conducting services. Professional ethical guidelines will assist in problem solving for the professional and ensure the professional does not steer from the correct path. Strahlendorf (2003) described a professional as a member of a professional body who acts within the profession in which they are registered.

Brien (1998) stated that professional ethics is the way in which a professional acts in terms of the industry, to promote the professionals field, rather than promoting an organization or company.

According to Fieser (2009) it is important to distinguish the difference between business ethics and professional ethics. Business ethics is the behavior required or expected by the employees of a company in order to place the company's interests first. Professional ethics is

the manner in which a governing body believes the professionals within the industry should act in order to promote the profession and industry as a whole (Brien, 1998).

2.5 Professional Codes of Conduct

Governance of professional ethics has led to, and resulted in, the creation of many professional codes of conduct. Codes of conduct illustrate a level of development or need for professionals to obtain higher results and exceed standard expectations within industries (Strahlendorf, 2003). Codes of conduct do not form part of the legal system to the country in which they belong, therefore it is imperative that a distinction is made between legal acts and ethical acts. A professional can behave legally but unethically, and an unethical act is not necessarily an illegal act (Strahlendorf, 2003). Strahlendorf (2003) stated that it is a common rationalization of unethical behaviour to argue that the act was not illegal, and as such the act should be considered ethical. For this very reason, it is important to separate legality and professional ethics. Strahlendorf (2003) continues to explain that professional ethics delves far deeper into the understanding of ethical issues than any legal system. To understand professional ethical behaviour, it is important to have a yard stick of measurement against which to identify such behaviour. A professional code of conduct provides this measurement tool by proposing professional standards to be adhered to (Strahlendorf, 2003).

Numerous codes of conduct indicate the behaviour that should be displayed by the professional in their line of work. Therefore, the *reasonable man* test can be set down as a guideline for codes of conduct, as well as for a basis for the advice the code of conduct should provide (Strahlendorf, 2003).

Strahlendorf (2003) further states that in order to provide a resolution to a moral concern, there needs to be an outcome that can be either moral or immoral. Where there is only one outcome, a moral concern does not exist. However, where there are two or more outcomes a moral dilemma will exist. Strahlendorf (2003:4) describes three ways in resolving moral dilemmas, namely:

- *Come up with a creative third alternative that satisfies both moral outcomes;*
- *If possible, act sequentially on each to satisfy both; or*

- *Evaluation will show which is the strongest moral explanation and decision.*

Ethical reasoning considers all possible explanations and eradicates all unethical outcomes to produce an ethically true conclusion to a dilemma (Whitbeck, 1998).

Resolution to ethically challenging situations can be complicated. The implementation of ethical codes of conduct address the complication and are widely adopted amongst modern professional organisations operating within their respective industries (Whitbeck, 1998).

2.6 Professional Associations and Ethical Codes of Conduct

Professional associations can be divided into two separate categories, namely regulatory bodies which promote regulation and ensure ethical compliance by means of a code of conduct, and professional bodies which promote the interests of the professional, education and in some instances a code of conduct (Harvey and Masons, 1995). In many situations a regulatory body may empower a professional body to implement a code of conduct on their behalf (Harvey and Masons, 1995). The primary purpose of professional associations is to reassure the public that the professionals are capable of acting within the profession. The professional associations maintain and enforce minimum requirements for acceptance into the specified profession and enforce training and ethical codes upon the professionals wishing to enter the professional field (Harvey and Masons, 1995). Professional bodies provide professional certification to indicate that a professional has the required qualifications to practice in that profession.

In certain cases, membership with a professional association is a legal requirement for professionals, and can determine whether a professional may operate within the required field or industry (Harvey and Masons, 1995). Throughout South Africa there are a large number of professional bodies pertaining to the relevant professions. In most cases a professional may not practice without having sworn to adhere to the professional code of conduct imposed by the professional body.

Harvey and Masons (1995:138) define a code of conduct as: "*A set of conventional principles & expectations that are considered binding on any person who is a member of a particular*

group". The "*conventional principles & expectations"* noted by Harvey and Masons (1995:138) are those that ensure that a professional within a specific industry acts within their capabilities and boundaries which ensures ethical behaviour is considered at all times.

2.7 Professional Organisations within the Construction industry

According to Fan, Ho and Vincent (2001) the construction industry is continually growing and as a result, more professionals are entering the industry. A need for the application of regulation and standard is required to improve the standards and quality of the products being produced.

Ethics has become the common denominator that controls the professionals within the construction industry (Fan, et al. 2001). The fundamental reason for the need for regulation within the construction industry is highlighted during a lapse in ethical conduct and behavior, the entire industries credibility suffers as result of the ethical lapse (Fan et al. 2001).

In order to address the issues associated with the application of ethical standards, the construction industry authorities need to investigate the prospect of implementation of ethical control within the construction industry (Brien, 1998). The construction authorities have a responsibility to ensure that clients and designers are satisfied with the products produced within the construction industry (Brien, 1998). Furthermore, the construction industry authorities need to ensure that the professional is granted the freedom to perform in a way that ensures that society as a whole benefits from the professional's actions (Brien, 1998).

The construction authorities needed to create a process to monitor the performance of the construction project manager to ensure that the construction project managers are complying with the accepted criteria within the industry. This requirement led to the creation of the Council for the Built Environment (Brien, 1998).

2.7.1 Council for the Built Environment

In South Africa, application of ethical awareness in the Built Environment is enforced by Professional Acts set out by the Government. The Built Environments Professionals Acts, which forms part of the South African legal system, received a complete overhaul in the early 1990's due to inadequate governance within the construction industry. As a result, a new set of Professional Acts were published in 2000.

The most relevant Act for this study is Act 43 of 2000 which is The Council for the Built Environment Act (2000) (www.info.gov.za). The primary function of Act 43, as well as the creation of the Council for the Built Environment, is to ensure that professional bodies within the construction industry monitor and uphold correct ethical behaviour through implementation of a code of conduct for the professional members within the construction industry (Stevens, 1999). A code of ethics is required to form part of the code of conduct. The codes of ethics are implemented to ensure that the professionals uphold an ethical responsibility towards operations performed by the professionals within the construction industry (Stevens, 1999). Ferrel and Fraedrich (1991:77) stated:

> *"A professions code of ethics is perhaps it's most visible and explicit enunciation of its professional norms. A code embodies the collective conscience of a profession and it's testimony to the group's recognition of its moral dimensions*"

Ferrel and Fraedrich (1991:77) argue that an ethical code largely reassures the public, clients and colleagues that the construction professionals associated to the professional bodies are competent, have integrity and maintain a high standard of work. Furthermore, Ward (1993) stated that the implementation of a professional code of ethics reassures individuals that competence and due diligence are integral to the decision making process undertaken by professionals.

The idea that an ethical code will improve the ethical conduct of construction project managers is supported by findings from a study conducted by Maitland (1985). Maitland (1985) stated that ethical codes of conduct represent honest attempts to promote social responsibility of the individual adhering to the oath. Furthermore, Maitland (1985) argued that by enforcing ethical codes of conduct, the individual will be obliged to follow a path of correct ethical judgment when posed with a decision of being ethical or unethical (Maitland, 1985).

The Council for the Built Environment Act 43 (2000) stated that a Council should be formed to be responsible for regulating the construction industry to ensure that Act 43 of 2000 is

adhered to. To achieve this, the Council for the Built Environment nominated individual and statutory bodies that govern architecture, engineering, landscape architecture, project and construction management, property valuation and quantity surveying. The construction and project management's statutory body that was nominated by the Council for the Built Environment to govern construction project managers was the South African Council for Project and Construction Management Professionals (SACPCMP) (www.sacpcmp.co.za).

The Council for the Built Environment empowered the SACPCMP through Act 48 of 2000 which stipulated that a Professional Council for Construction and Projects Managers must be formed and regulated the behaviour required by Construction project managers. According to Act 48 of 2000, all practicing construction and project management professionals should become members of the SACPCMP in order to practice as a professional construction project manager (www.sacpcmp.co.za).

As stipulated in Act 48 of 2000, the SACPCMP are to provide members with a code of conduct and ensure that all members adhere to this code of conduct. The SACPCMP's code of conduct for construction project manager can be found in Appendix A (www.sacpcmp.co.za).

As can be seen from the code of conduct, presented in Appendix A, little emphasis has been placed upon construction project manager's ethical responsibility towards operations that are performed by the construction project manager's employees. The SACPCMP code of conduct rather concentrates on the construction project manager's responsibilities towards relationships with the public, the clients, and other professionals within the construction industry.

This study examines a construction project manager's ethical responsibility to the specific actions performed by the construction project manager's employees during the construction phase of a project.

2.7.2 CIOB and IECS

Until 2016, research that evaluated the ethical responsibilities of a construction project manager was not easily established. There was a lack of a code of conduct that specifically addressed the need for conformity of a construction project manager toward their ethical responsibilities.

The Chartered Institute of Building (CIOB) is the "*largest and most influential body for construction management*" (www.ciob.co.org, 2016:1). The CIOB upholds and sets out the direction for professionals in the construction management sector worldwide, as well as providing assurance to the public of the professionalism and reliability of the CIOB members.

During the course of 2016/2017 the CIOB proposed to set out the parameters of an ethical code of conduct for all CIOB members to ensure ethical compliance by the construction industry professionals. According to the CIOB president, Nash (2016), professionals play an instrumental role within the property and related fields. Nash (2016:1.) further states:

"Ethics defines what it means to be a professional. Behaving ethically entails tough decisions and we have a responsibility to help our members make those right decisions."

During December 2016, the CIOB together with the International Ethical Standards Coalition, of which CIOB is an active member, published the IES (International Ethical Standards). The IES is an ethical framework which sets out to emphasise a standard guideline for professionals acting within the property and construction industries worldwide. The IES sets out three key ethical principles which for the background of the code of conduct, namely:

1. *Maintenance of reliable services for clients;*
2. *Sustaining proper standards of conduct and behavior;*
3. *Uphold the reputation of professionalism.*
   (*https://ricstest.files.wordpress.com/2016/12/international-ethics-standards-final.pdf*, 2016:5)

The Chairman of the IES, King (2016:1) stated that many professional bodies have had ethical codes of conduct for many years and that it was time for the construction industry to focus on ethics and ethical standards.

> *"Ethical values act as an anchor to appropriate behaviours and research tells us that investment in real estate markets by pension funds and sovereign wealth funds is predicted to double over the next decade. Therefore, publishing one set of International Ethics Standards helps to underpin existing codes of ethics and create an opportunity to strengthen the role these values play in the property industry"* (King, 2016:1).

The publication of the IES, reinforces the importance of ethical responsibilities which should be adopted by all construction project managers and further emphasises the role which ethical accountabilities plays within the construction industry.

2.8 Construction Project Management Ethics

For a construction project manager working on a construction project , it is important to complete a project within the allowable budget, on schedule and according to the specified standards, all of which are detailed by the owner of the project and the project designer (Vee and Skitmore, 2003). The requirement of time, cost and quality put forward by the client and the designer is a realistic request of which the contractor will agree (Vee and Skitmore, 2003).

Due to the current building standards and modern demands on the construction industry and the professionals within the construction industry, the professionals should be able to produce the desired quality project to meet the client's needs. However, this is not the reality. For example, overtime projects are not always completed according to the correct standard of quality and numerous quality deviations and non-conformances are evident throughout the construction industry (Vee and Skitmore, 2003). According Dhir and Henderson (1999:132) "*Poor construction quality control standards are becoming more evident.*"

As stated by Vee and Skitmore (2003) the reasons for poor product delivery of buildings can be attributed to a number of reasons, from poor quality materials to work not being executed correctly. However, according to Vee and Skitmore (2003) poor product delivery is ultimately the responsibility of the construction project manager and the construction project

manager needs to ensure that all areas of compliance are met with, in order to deliver the product as per the agreement with the client. This is not to say that the construction project manager will not encounter instances that will test their ethical judgment. The construction project manager should keep the project's best interests as the minimum standard at all times (Vee and Skitmore, 2003).

Belis and Impe (2001) state that the construction project manager confronts a number of issues on a daily basis such as dealing with the elements, labour requirements as well as costing and others. The majority of the issues have a direct or indirect impact on the resultant quality of the project. When resolving these issues, the construction project manager has the choice to do so ethically or unethically using ethical judgment (Belis and Impe, 2001).

According to Reilly and Kyi (1990:47) "*ethics is behaviour"* and according to Xiadong, Kirley and Zhang (2008:11) *"All humans display behaviour"*. Given that *"ethics is knowing the difference between what is right and what is wrong*" (Peters, 1970:10) it can be argued that all construction project manager possesses ethics and can judge the difference between right and wrong. According to Gill (2003:3) *"We all have ethics but do we apply them and make decisions that reflect our standards".* Gill's (2003) statement applies to the actions of construction project managers. A construction project manager may possess the correct ethical understanding and beliefs, however they may not always act according to their ethical beliefs.

A number of surveys have been conducted involving ethics in the construction industry. Many of the surveys investigate the interaction between the construction project managers and construction activities.

In 2002 the Construction Management Association of America (CCMA) questioned 782 construction professionals from all areas of the American construction industry regarding their ethical standpoint within the construction industry. The results suggest that 80% of the professionals questioned had been involved in or witnessed unethical conduct or unethical practice within the construction industry (www.siue.edu.ce). Furthermore, in a study undertaken in the Western Cape Province of South Africa during 2006 that explored ethical practice within the construction industry, it was shown that there were various unethical activities occurring within the construction industry (Samuels, Haupt and Shakantu, 2006).

However, based on findings it is questionable whether construction project managers are acting ethically in every facet of the construction process. The findings also question whether, the unethical actions of the construction professionals will have an effect later on in the life cycle of the project.

Carrol (1996) explains the nature and character of ethics are easily identified by a number of characteristics. The most prominent characteristics that most ethical decisions have are extended to consequences, for example, multiple alternatives, mixed outcomes, uncertain consequences and personal implications.

Given Carrol's (1996) characteristics of ethical principles, if a construction project manager is qualified to perform in the position of a professional construction project manager then the construction project manager should understand the outcomes and reactions involved in making the correct decisions at the correct time. This would eliminate instances of not having the correct knowledge or not knowing the required outcome (Carrol 1996).

Vee and Skitmore (2003) undertook a study in Australia that explored the possibility of the occurrence of unethical behavior within the construction industry. Seventy five companies were randomly selected to take part in the study. A total of 31 responses were received. The average level of experience of the respondents was 21 years within the construction industry. The respondents consisted of architects, contractors, project managers and construction project managers. The survey covered various areas of ethical conduct within the construction industry. The main findings from the study conducted by Vee and Skitmore (2003) were as follows:

- Code of conduct
    - Fourteen of the 31 respondents (45%) had an existing ethical framework put in place by the organization with which the respondents were employed
- Ethical practice within an organisation
    - Seventeen (55%) of the 31 respondents indicated that ethical conduct was imperative to achieve an organisations business goals
- Business ethics vs. personal ethics

- In the study 29 (93%) of the 31 respondents believed that business ethics should always take preference over personal ethics

- Professional responsibility
  - Twenty four (77%) of the 31 respondents stated that a breach of responsibility toward the workplace had been witnessed by themselves
- Fraud
  - Of the 31 respondents to the study, 11 (35%) of the respondents had been exposed to a fraudulent activity where poor workmanship had been covered up

In conclusion Vee and Skitmore (2003) stated that unethical behaviour is widespread within the construction industry and that contractors are the largest culprits when unethical behaviour within the construction industry has occurred. Vee and Skitmore (2003) further explain that in order to control unethical behaviour within the construction industry, guidelines and policies restricting such behaviour should be implemented.

Parson (2005) conducted a study within the American construction industry to examine the level of unethical behaviour by construction professionals within the industry. The study consisted of a questionnaire that was distributed to the members of the construction Management Association of America. Based on the results from 270 respondents it was determined that 84% of respondents answered yes when questioned if an unethical act had occurred to their knowledge within the workplace within the last year.

Parson (2005) discovered that 69% of the respondents to the study believed that the construction industry needs to review the ethical standpoint of the industry. Parson (2005) also discovered that the most prevalent ethical issues were tender irregularities, over ordering by contractors and over billing by contractors. The study concluded in stating that unethical acts are rife within the construction industry and correction of the unethical behaviour would create a challenge within itself.

As indicated by Parson (2005), Vee and Skitmore (2003) and Samuels, Haupt and Shakantu (2006) poor ethical decision making is occurring within the construction industry. The

unethical acts that had been performed ranged from unethical tendering and over billing to the concealing of poor workmanship. The concealing of poor workmanship impacts in the overall quality of the project. A method of eradicating or reducing poor quality workmanship needs to be examined in this study in order to prevent the decline of quality on a project.

2.9 Quality Systems

For the construction industry, quality is a measure of how the final product compares to the specifications indicated by the engineers, architects and project managers. The quality of the product can be measured against what was designed and required, this would give a required standard of quality for the final product (Hatindah, 2007).

2.9.1 Quality Defined

In order to establish the root cause of rework as poor ethical decision making, this study examined the ISO 900 quality system to determine if the implementation of such a system would be able to eradicate rework.

The construction industry has long been viewed as an industry that encompasses poor quality, from poor workmanship to poor quality materials. This view has tarnished the reputation of the industry. As a result many construction companies have begun to implement quality control standards to address such issues (Kubal, 1994).

For the quality issues within the construction industry to be addressed, all contributors within the construction process need to experience a mind-set alteration, from general workers to top management (Mahmood, Mahammed, Misnan, Mohd, and Bakri. 2006). This mind-set alteration would allow for an improvement in the construction industry's quality. To instil this mind-set alteration, organisations within the construction industry need to identify the contributing factors to poor quality (Mahmood et al., 2006).

The belief behind the lower standard of quality comes from the complex and complicated nature of operation. For example, one project comprises an assortment of professionals, organisations and workers all of who are involved in a certain aspect of the project. Failure to ensure compliance by one or more of the parties involved in the project will drastically affect the resultant quality of the project (Kanji and Wong, 1998).

It has also been noted that due to the non-standardisation of the construction industry the quality of final products is difficult to regulate (Rowlinson and Walker, 1995). For example, projects are performed in different areas throughout the world with environmental and external factors contributing greatly to the resultant quality of a project. Another highly influential factor is that of the various professionals having varying ideas of what constitutes quality, and it becomes difficult to set a standard for all to follow (Rowlinson and Walker, 1995).

According to Ahmed, Loh and Zairi (1999) quality within the construction industry is a three way relationship between cost, quality and time. For a quality project to be achieved, all three factors need to be balanced. The project needs to be achieved within budget, within the allocated time period and to the desired standard of quality set by the professionals.

In order for the standard of quality to be maintained many construction companies have introduced a quality system known as ISO 9000 (International Organisation for Standardisation) which was created from the British System of Standards and the United States Military standard system. The ISO standard sets out an effective quality assurance system for manufacturing and service industries and can be incorporated into the construction industry. ISO 9000 sets out a standard guideline for organisations who wish to ensure that products and services meet the requirements set out by the clients requiring those services or products. The ISO 9000 system ensures that quality within an organisation continually improves and prevents deterioration of quality standards (Hoyle, 2009).

In order to understand the ISO 9000 quality standard, the context of quality and quality assurance and the interpretation of such within the ISO 9000 standard is required. The ISO 9000 quality system defines quality as "*the degree to which a set of inherent characteristics fulfills certain requirements"* (Hoyle, 2009:24). Quality should not however be mistaken for grade, as an item of luxury is not necessarily an item of quality. Each item should be compared to the quality standards set out for the specific product. Grade focusses on functional use rather than the measurement of the end result (Seaver, 2001). Additionally, Hoyle (2009) indicates that the desire of a product to meet specifications is merely one step in the production of a quality product. In this regard, the ISO 9000 quality standard stipulates certain processes which need to be in place in order to produce a quality product. These processes are: progress reports, problems encountered during manufacture, delays in

providing the product on time as well as costing progress of the product (Hoyle, 2009). The ISO 9000 understanding of quality is echoed by Hatindah (2007) with regard to the description and role of quality and the quality process required in the construction industry. During the construction process the contractor is required to produce regular progress and cost reports notifying the professional team and client of any problems encountered with regard to time, cost or quality during the construction process (Hatindah, 2007). Hoyle (2009) indicates that quality needs to be viewed as a process of systematic activities rather than an end product.

2.9.2 Quality Control and Quality Assurance

According to Seaver (2001) given that humans are involved in a process, there is no guarantee that the end result will always meet the quality expectations. According to Seaver (2001) there are two specific processes that need to be introduced to a production process in order for the required level of quality to be produced, the two processes are quality control and quality assurance.

Hoyle (2009) indicates that the introduction of the quality control and quality assurance processes minimises possible deviations from specifications. Quality assurance is a process implemented before any production has taken place. The quality assurance process is a plan that ensures the quality process is maintained and specifications are met (Seaver, 2001). The quality control process is implemented during production and ensures that the quality assurance plan is correctly implemented (Seaver, 2001). Hoyle (2009) views the quality control process as an exercise in which careful planning and close and consistent monitoring are to be the prime tasks undertaken. The quality control process works hand in hand with the production process to ensure that all products are of the required specification (Hoyle, 2009). The quality control process assists in the production of many useful derivatives for the production process. During this process, production, costing as well as quality deviations can be followed and monitored (Hoyle, 2009). This process not only assists the end users but also assists the production firm in confirming that the product offered is of the desired standard and that the production method used is the most efficient process. Confidence in products by clients and manufactures can be ensured by knowing that the products meet the desired standard and specifications during the production/manufacturing process (Seaver, 2001).

The ISO 9000 quality management process indicated in Figure 2.3 illustrates the entire quality management process involved in ISO 9000 and depicts both the quality control process as well as the quality assurance process.

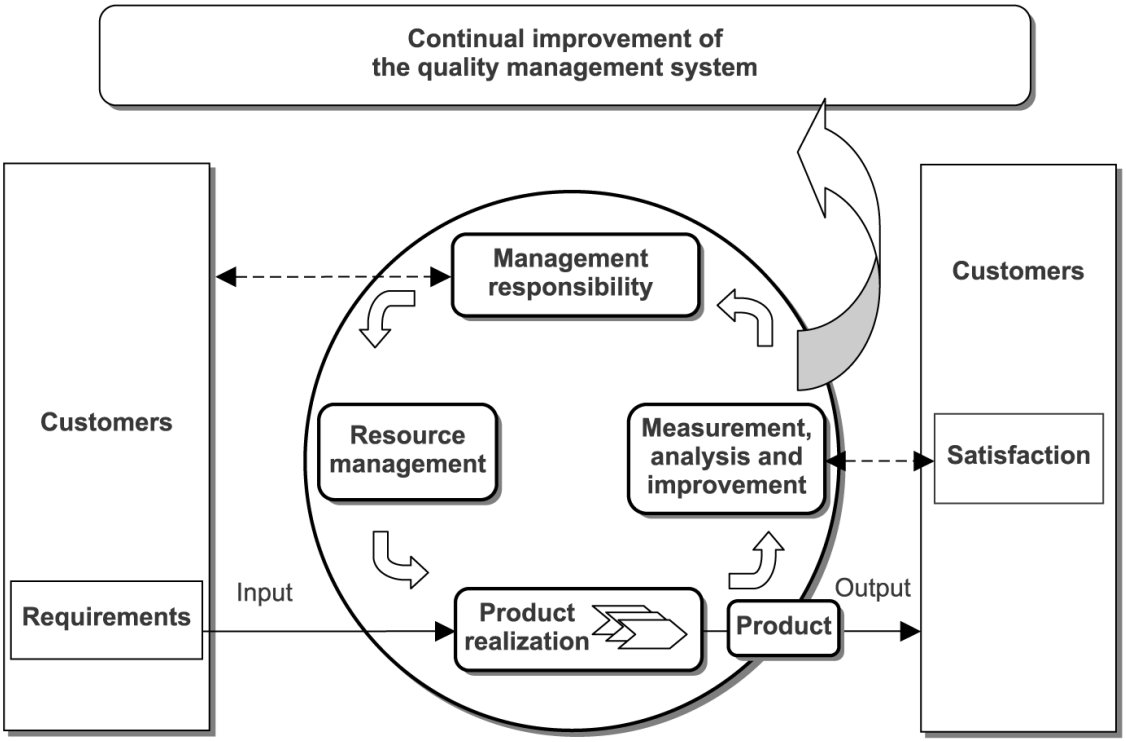

Figure 2.3: ISO 9000 Quality management process
(Source: Najini, Rigas, and Fan (2005:114))

As presented in Figure 2.3 the customer provides an input or brief of what is required as an end result. This input is then used to create the product or service required by the customer. During the product realisation stage, quality of the product or service is closely monitored and continually compared to the required standard as detailed by the clients. The information on the quality of the product or service is relayed to management. Based on the information received the management can make decisions to alter the resources and alter the quality of a product or service. This section of the quality management process is referred to as quality control.

Throughout the quality management process information on deviations and levels of service are relayed to management to continually improve the overall quality management process, this is the quality assurance process with quality management. Both quality control and

quality assurance play key roles in providing the customer with a satisfactory product or service (Najini, et al., 2005).

Having established an understanding of the quality management process including quality control and quality assurance, it is important to understand the benefits an organisation can yield from implementing such a quality management process.

A quality management process does not provide exact specifications and outline specific rules of an organisation's procedure. Rather, a quality management system provides guidelines for documentation and control and ensures that an organisation is aware of specific requirements and procedures to follow in order for the organisation to produce the specific product. A quality management system will also not be beneficial in cases where employees do not fully trust and believe in the specific quality system to be implemented (Najini et al., 2005).

The human effect is a major influence in the implementation of a quality system. However, the same human influence can prevent an organisation from reaping any benefits of a quality management system. Having said that, there are enormous benefits for the implementation of a quality management process (Najini, et al., 2005) namely:

- Customer loyalty is enhanced as the customer is aware of the exact quality standard which is being met.
- Reduction of costs through prevention of quality deviations providing a more profitable and competitive organisation.
- Provides an understanding to all employees of exact processes and systems to use in all situations.

An important point to consider when implementing a quality management system is the effect a poorly managed or ineffectively implemented system can have on cost and time. A quality management system needs to be implemented correctly or not at all. A poorly implemented system will force employees to find ways around specific processes resulting in the production of nonconforming service levels or products (Hatindah, 2007). The effects of mismanagement can be linked to unethical decision making by the management of an

organisation. A negative human influence will almost always produce a negative outcome (Hatindah, 2007).

One of the specific and deciding factors for the implementation of a quality system is the reduction of cost. All organisations, baring non-profit organisations, exist in order to generate a profit (Greener, Holden and Kilkey, 2010). One of the benefits of implementation of the ISO 9000 quality management system is the reduction of costs resulting from fewer non-conformances.

A non-conformance is the instance where a product or service does not meet the required standard and needs to be corrected (Hatindah, 2007). Having produced an inferior product, the organisation must rectify this error through a process of rework in order to correct the product and provide the required standard of quality to the customer.

Although the construction industry currently has measures in place to address the occurrence of rework, namely the ISO 9000 quality system, the human influence factor remains as the core factor in the occurrence of rework. Regardless of the number of measures implemented, without correct ethical decision making by the construction project managers, these systems will not yield the benefit they are implemented for and will not assist in the reduction of rework.

2.10 Summary

This literature review has examined the causes and effects of rework within the South African construction industry. This chapter also explored the concepts and definitions of ethics as well as the impact a construction project manager decisions can have on a construction project. Furthermore, quality systems including the ISO 9000 quality system were examined within the context of the South African construction industry.

This literature review studied the various branches of ethics. The underpinning philosophy among the theories is that all humans should strive to act for the benefit of all, rather than the individual.

As presented in this chapter research indicated the impact of human influence on processes. Both Feng et al. (2009) as well as Hoyle (2009) concluded that the human influence cannot be naturally removed from a process and needs to be continually monitored and analysed.

Although numerous studies have been conducted into the ethical standards displayed by the construction professionals, little research has been conducted on the impact of a construction project manager's poor ethical decisions on the rework during the construction phase of a project. Additionally, there has been limited research into the impact a construction project manager poor ethical decisions have on the occurrence of rework within the South African construction industry. The implementation of an ethical code of conduct by the CIOB in 2016, together with the IESC, illustrates the need for ethical conformity within the construction industry and further emphasis the existence of such unethical undertakings, not only within the South African construction industry, but across the international construction industry.

Chapter Three: Methodology of the study

3.1 Introduction

This chapter presents the research methodology applied in this study. A general overview and philosophy of the research is discussed including positivist and interpretivist research, after which the chosen research methodology for this study is analysed together with the detailed data collection protocol and method used. This chapter concludes with the presentation of the case study chosen for this research.

3.2 Philosophical Background of the Research

According to Denzin (1994) whilst undertaking research design, an important factor to consider is the distinction between positivist and interpretivist research methods. An analysis and interpretation of both interpretivist and positivist research are discussed here, providing clarification on the debate between the use of interpretivist and positivist research methods.

3.2.1 Interpretivist Research Methods

According to Denzin (1994) Interpretivist research is the study of a subject within a natural environment, whilst attempting to analyse and interpret the phenomena behind the behaviour in relation to the subject under review for the purpose of the study. Interpretivist research concentrates on existing information.

Meyers (2009) explains that Interpretivist research methods were developed within the social sciences to allow researchers to delve into cultural and social understanding.

One primarily distinguishable factor between Interpretivist and Positivist research lies within the approach for conducting Interpretivist research where the researcher may interact freely with the subjects of the research. Kaplan and Maxwell (1994) explained that a great amount of understanding with regards to the subjects of a study are lost once the data collected is quantified. For this reason, Interpretivist research allows the researcher to understand the subjects and not merely to quantify the subject's responses.

Various methods of interpretivist research exist, namely, interviews, documents, texts, researcher's impressions and reactions to given situations, as well as conversations between interviewer and interviewee (Meyers, 2009).

The researcher's choice on the method of Interpretivist research will result in a collection method for the raw data obtained. The three main methods of data collection are participant observation, in depth interviews and focus groups (Denzin, 1994).

- **Participant observation:** The observation of the subject's behaviour is viewed and interpreted by the researcher. This observation occurs within the environment of the subject and under naturally occurring situations. No environmental or other changes will be imposed by the researcher
- **In depth interviews:** Interviews are conducted between the researcher and the subjects questioned for the purpose of the study. The reasoning behind the interviews is for the researcher to understand the subjects' history, perspectives and experience within the environment or setting examined by the researcher
- **Focus groups:** The researcher conducts interviews between groups of subjects rather than individual interviews. The researcher conducts such discussions in order to appreciate the social norms and behaviour of a specific group of the subjects.

Application of the three methods will result in field notes drafted by the researcher whilst conducting the interviews. Transcripts from the raw data analysis will be drafted by the researcher after completing the field work (Denzin, 1994).

Interpretivist research explores phenomena, describes variation and records experiences of the subjects. The interpretivist method allows the researcher to become aware of group norms (Meyers, 2009). However, there are negatives with regards to Interpretivist research. The researcher can decide not to include specific information, the researcher may misinterpret the information received and the researcher may lead the subjects towards providing the desired answers (Denzin, 1994).

3.2.2 The Case Study Approach

According to Yin (1994) a case study is defined as a number of events that are examined as a unit of analysis. The unit of analysis can be a group or an individual from society, organisations, programs, nature or events. While a case study examines a single unit, it explores the effects experienced by the unit from the surrounding environment. Case studies generally provide additional data to support previously examined material.

A case study will provide a substantially more accurate understanding of a situation as opposed to alternative research methods, such as questionnaires. The use of case studies allows for data to be captured through a multitude of facets, allowing for a collaboration of surveys, observations and interviews. Through case studies, a researcher is able to generate a greater in-depth understanding of the research area by applying various research methods which combine to generate a whole set of data (Yin 1994).

A common drawback to the use of case studies is the ability of a case study to be generalised. The data set generated from case study research often pertains to the specific case study to which the data set belongs. This limits the extent to which similarities can be drawn and made into similar fields of research. Yin (1994) advises that generalisations should be made on all findings generated from the case studies evaluated, and that the findings are attached to theories.

3.2.3 Positivist Research Methods

According to the Creswell (2014) Positivist research is defined as a method of research largely based on quantity. This type of research generates a vast amount of quantifiable data which allows relationships to be established between two or more variables. Statistical analysis is generally used to test the strength of these relationships (www.encyclopedia.com).

Positivist research emphasises the importance in the comparison of variables. Interpretation of the data by the researcher is removed as the raw data is analysed as a numerical value (Smith 1983). Positivist research tests theory rather than gaining theory (Smith, 1983).

Positivist research is a research method that allows for the collection of data from a group of subjects on an existing theory. The main aim behind positivist research is to classify and quantify features within a field of study (Smith, 1983).

The main data collection methods within positivist research are questionnaire, structured surveys and structured observation. Data is gathered, captured and analysed to create numerical statistics that are related to the subject matter of the study. The statistics generated through capturing and analysing are used in conjunction with supporting literature to establish an existence of the theory proposed by the study (Smith, 1983).

3.3 Adopted Research Methodology

In this section, the research methodology adopted for this study is presented. A mixed method approach is used in this study incorporating positivist as well as interpretivist research methodology. Interpretivist methodology has been applied in the form of the structured and unstructured interviews and the application of positivist research comprises a questionnaire.

3.3.1 Case Study approach applied in this study

Yin (1994:13) defines a case study as "*an empirical inquiry that investigates a contemporary phenomenon within its real life context and where the boundaries between phenomenon and context are not clearly evident"*. From Yin's (1994) definition, the deduction can be made that in order to examine a real life environment and examine the actions of individuals within that environment the researcher needs to interact with the environment and examine the individuals within it.

Case study material has been viewed by many researchers as a weak form of research and is considered not as valuable as theoretical study. However, a case study can provide a scientific generalisation on a research area and can allow variables to be tested against each other (Starke, 1995). For this reason, a case study approach was deemed best suited to this study.

3.4 Presentation of the Case Study

This section discusses the case study that was undertaken for this study.

3.4.1 Overview

The case study chosen for this research was the Medupi Power Station Project. The justification for the chosen case study is presented in Table 3.1.

3.4.2 Case Study: The Construction of Medupi Power Station

The case study was the Medupi Power Station construction site. The Medupi Power Station was constructed 100km south of the Botswana border in the Limpopo province 20km north of the town Lephalale. At the time of this study it was anticipated that upon completion, the Medupi Power Station will be the fourth largest coal fired power station in the world and the largest of its kind in Africa.

Construction of the Medupi Power Station commenced in May 2007 and is due for completion at the end of 2020. Initially, the aim of Medupi Power Station was to provide a power supply to the national grid by the end of the financial year of 2014 (www.mpsjv.co.za). However, due to ongoing disruptions and delays in completion the first turbine was put on line in February 2015 (www.eskom.co.za).

As at June 2011, there were 15 main contractors on site consisting of a daily fluctuation of between 9 000 and 12 000 personnel. From the 15 main contactors on site, the largest contract values and portions of construction and civil work were being undertaken by Murray and Roberts, Aveng Grinaker-LTA, Concor Construction and Karena Africa (www.eskom.co.za). The mentioned contractors comprise 60% of the workforce and management teams on site at the time of the study. The whole construction site is solely controlled and monitored by Eskom, from all aspects of safety, quality control, project management and specifications. All contractors were to adhere to the precise specifications of Eskom. The stipulations which apply to areas such as the specifications, safety standards and quality standards are similar for all scopes of work. Figure 3.1 presents an aerial view of the Medupi Power Station Project on August 2011.



Figure 3.1: The Medupi Power Station Project at August 2011
(Source: www.mpsjv.co.za)

3.4.3 Case Study Justification

The selection criteria for the case study applied in this study are presented in Table 3.1. The selection criteria was determined on the following basis:

- The project was required to be under construction during the year 2011 to be able to examine any non-conformances
- The study required a minimum of 100 construction project managers in order to allow for a large capture area
- The contractors had to have experienced non-conformances during the construction process
- The project required a minimum of three contractors on site to ensure that the procedures on site were not attributed to a specific contractor's structure
- The same project management and professional team were to oversee all the contractors to ensure uniformity within specifications
- All contractors needed to be exposed to similar environmental and geographic conditions

After evaluation it was deemed that the Medupi Power Station possessed all of the required criteria in order for the project to be incorporated as a case study into this study. Moreover, after evaluation it was determined that geographical and environmental aspects were not similar and the project management and professional team were also different on other projects.

Table 3.1: Selection criteria for case study

Name of proposed/ examined projects	Must be under construction during 2011.	Minimum of 100 Construction project manager Construction	Occurrence of non-conformances.	Number of contractors on site.	Identical project management team.	Similar environmental and geographic conditions.	Suitability for this study based upon the selection criteria.
Sandton City JV	Yes	No	Yes	Two	Yes	Yes	No
Rosebank Towers	Yes	No	Yes	One	Yes	Yes	No
Medupi Power Station.	Yes	Yes	Yes	Sixteen	Yes	Yes	Yes
A combination of Blue Route Mall and Boardwalk Casino	Yes	Yes	Yes	Three	No	No	No
Department of Environmental Affairs offices.	No	No	Yes	One	Yes	Yes	No
Babelegi Nestle Factory.	Yes	No	Yes	One	Yes	Yes	No

3.4.4 Sample Choice

According to Hendrickson (2008) a construction project manager is a supervisor in control of a section of works and is responsible for production and cost control in relation to the specified section of works.

This study explored the occurrence of non-conformances as a result of poor ethical decision making by the construction project managers. The construction project managers were in control of the quality standards on each section of works under their responsibility. Therefore, individuals who were in control of a section of works production as well as costing were selected to be participants to this study.

The construction project managers where chosen because of their supervisory position and ability to have a direct influence on the works on site, as well as being ultimately responsible for all actions that occur on the section of works under their control. The construction project manager's employees were not questioned with regards to the occurrence of non-conformances as the construction project manager is ultimately responsible for all actions that occur on site.

The selection criteria for the respondents in this study were grounded in the contractors' contractual contribution to the project (www.eskom.co.za). Generally, it was determined that those contractors with greater contractual contribution to the project presented a greater number of construction project managers. The five contractors selected were those with the highest contract value of civil and construction work for the construction of the Medupi Power Station. The five contractors selected were: Murry and Roberts, Aveng Grinaker-LTA Building Division, Aveng Grinaker-LTA Civil Engineering Division, Concor Construction and Karena Africa.

3.5 Further Research

In order to further test and substantiate the results obtained through data collection at the Medupi Power Station project additional data was collected during 2016. The original case study was conducted during 2011. The researcher sought to examine the behaviour of construction project managers in a separate location in order to test the previous findings of the case study. The further study also investigated whether the opinions of ethical conduct

and its impact on rework of the construction project managers had altered over the previous four years

3.5.1 Determining the Sample

The second data collection was to be collected from construction project managers as defined in this study, to enable a comparison to be made from the previous data collection. In order to maintain consistency, the construction project managers where selected based upon the same criteria as the case study.

In determining the sample, the researcher needed to consider a number of factors to ensure that the construction project managers questioned as part of the 2016 further research were comparable with the construction project managers who partook in the 2011 case study. In order to test this, Table 3.2 was created to ensure compliance. Six key factors needed to be comparable between the two sets of samples, namely;

1. The construction project manager was required to have construction site experience as a construction project manager
2. The construction project manager must have experienced non-conformances during their career
3. The construction project manager had to be responsible for cost, quality and time
4. The construction project manager had to be the ultimate responsible individual on site
5. The construction project manager had to encountered re-work during their career

The researcher obtained authorisation via email from a construction company within the Johannesburg area to test the 5 requirements set out in Table 3.2. According to Pricewaterhouse Coopers, Johannesburg is home to the largest construction sector in South Africa in terms of turnover as well as in total square meters produced per year (http://www.pwc.co.za/construction).

The chosen contractor was selected as a result of the other contractors either refusing to allow their employees to partake within the study or failure to respond to the researchers numerous attempts to discuss their possible inclusion into the study. The company's operations director was approached and written permission was obtained on the agreement that the name of the company was not published. The researcher received permission to contact 16 construction

project managers to undertake the interviews. All 16 construction project managers agreed to participate within the study.

Further details of the selection methodology undertaken can be found in section 3.6.2 of this dissertation.

Table 3.2: Comparison of construction project managers

Comparison Criteria	Medupi Power Station Project	Waterfall Wilds Retail Centre	Fabric Park Warehouse	Houghton Apartments	Summer field Shopping Centre	Renaissance Park Warehouse	Midrand Central Warehouse and Office Park	Monte Circle Office Park	Kyalami Race Track Pit Building
Experience as a construction project manager on a construction site?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Experience of non-conformances during their working career?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Responsible for the successful delivery of, cost and quality and ensuring that the project is completed on time?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ultimate responsible person on site?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Responsible for all actions of subordinates as well as subcontractors?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Encountered rework during their career?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

3.6 Protocol for Data Collection

This section presents and discusses the methods and protocols followed for the collection of data obtained through interviews and questionnaires.

3.6.1 Overview

Figure 3.2 presents a breakdown of the data protocol and research methodology applied in this study. Each phase of the data collection process presented in Figure 3.2 was conducted concurrently.

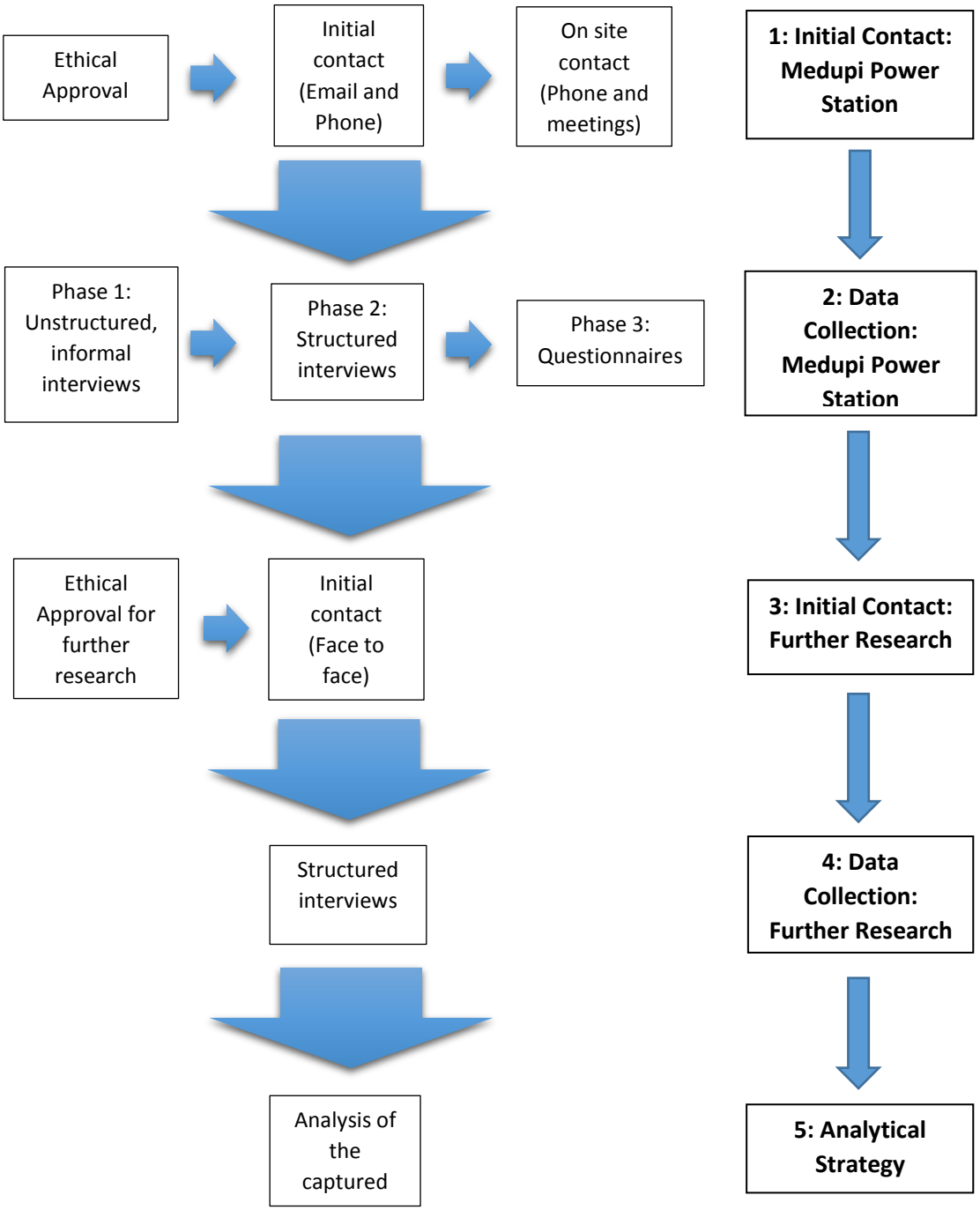

Figure 3.2: Protocol and methodology applied for data collection in this study

3.6.2 Phasing

The phases of the research collection are set out in the following sub headings.

Initial Contact

The initial step in undertaking the case study adopted in this study was to receive approval to undertake the research by the School of Construction Economics and Management research committee. Once approval was granted, application was made for ethical clearance from the University of the Witwatersrand Human Research Ethics Committee (Non-Medical).

Following consent from the Human Research Ethics Committee (Non-Medical) at the University of Witwatersrand to undertake the study (clearance certificate attached as Appendix B) five contractors working at the Medupi Power Station project were identified. The five contractors were selected based on contract value. According to www.mpsj.co.za, five contractors had been awarded the largest portions of the work to be carried out at the Medupi Power Station Project and as a result, employed the largest number of construction project managers.

Contact was established with the contracts directors of the selected contractors to ensure that permission was granted to question the construction project managers with regards to their work environment as well as their ethical decision making in the workplace. The following contractors were contacted: Murray and Roberts, Aveng Grinaker-LTA Building Division, Aveng Grinaker-LTA Civil Engineering Division, Concor Construction and Karena Africa to gain permission to conduct interviews and distribute questionnaires amongst the construction project managers working within the teams of the contracts directors.

An email requesting permission to undertake the questionnaires and interviews was sent to the contracts directors of the five chosen contractors. Approval was received verbally as written confirmation was not received from the contracts directors. A telephonic conversation was then conducted between the researcher and the contracts directors to confirm that permission was granted. Four of the five contractors granted permission, with one contractor refusing permission. Refusal to grant permission was based on the grounds that participation within the case study would interfere with the construction project manager's production on the project.

Once permission was received from the respective contracts directors, the researcher contacted the contractor's representative at the Medupi Power Station. This was carried out to establish a relationship with the contractors, to inform the contractors that the study was being undertaken as well as to receive contact information with regards to the construction project managers. Upon receipt of the contact information, the researcher telephonically contacted the construction project managers to establish their involvement with the study.

Data Collection

The case study was conducted in three separate phases. Each phase supplied information to and for the next phase of the study. The three distinct phases for data collection are detailed as follows:

Phase 1

Phase one consisted of unstructured informal interviews between the researcher and two construction project managers from each contractor totalling eight construction project managers. The convenience sampling method was used when selecting the respondents for the unstructured informal interviews. Questions relating the construction project managers' understanding of rework, ethical knowledge as well as ethical behaviour were discussed.

The unstructured informal interviews were conducted on the Medupi Power Station site during lunch hour between 12h00 to 13h00. This time allocation was selected by the researcher due to the availability of the construction project managers.

The feedback generated by the respondents to the unstructured informal interviews was used by the researcher to test the questions to be posed during the structured interviews. Had the results from the informal interview indicated that the questions posed on the formal interview were misleading, the questionnaire would have needed to be adjusted to align with the results from the informal interview. The responses from the respondents to the unstructured interviews were used to better define specific topics and to disregard any areas which did not impact on this study. Exploring the role of ethics to construction project manager's decision making and its impact assisted in the formation of the formal interviews.

Through undertaking the unstructured informal interviews the researcher gained an understanding of the construction project manager's view on ethics as well as their view on the impact ethics played on the outcome of rework. The researcher wanted to formalise this train of though and chose to interview the same eight construction project managers. The researcher believed that the continuation of thought, would allow a more in-depth thought pattern to develop by the construction project managers. Having taken part in the unstructured interviews, the construction project managers were given time between the unstructured interviews and structured interviews to reflect on the idea of ethics and its impact on rework. The construction project managers were not provided with the formal interview questions before hand.

Phase 2

Phase two of the case study consisted of structured formal interviews between the researcher and the construction project managers. The structured interviews consisted of 15 questions that pertained to the objectives as well as the literature areas within the study. The interview questions utilised for the formal interviews is presented as Appendix C.

The structured interviews had an average duration of 16 minutes with the shortest interview duration being 12 minutes the longest taking 21 minutes. The details of the interviews are presented as Appendix D. The interviews were conducted after working hours as the researcher found that during working hours, the respondents (construction project managers) were busy and could not focus on the interview. The researcher chose the venue for the interviews to be at the construction project managers own office. The researcher believed that being in a comfortable environment would allow the construction project managers to relax and be more receptive to answer the questions. Appendix C presents the structured interview applied in this study.

The results from the formal interviews conducted with the construction project managers were coded, entered in an excel spreadsheet and analysed. The analysed data was utilized as a pilot in order to test the clarity of the questions posed on the questionnaire. Had the results from the interviews indicated that the questions posed on the questionnaire were misleading, the questionnaire would have needed to be adjusted to align with the results from the interview. The questionnaire was to be self-administered to other construction project managers working on the construction of the Medupi Power Station.

Phase 3

The third phase of the case study consisted of a questionnaire distributed to construction project managers working at the construction of the Medupi Power Station. Twenty-Five construction project managers from each of the four companies partaking within the case study were selected through convenience sampling. Twenty one construction project managers refused to take part in the questionnaires. The majority of the refusals were based on availability of the respondents. Each construction project manager that was willing to take part in the research was given an explanation of the research background and context. This explanation was consistent as is indicated on the construction project manager's questionnaire included as appendix E to this study. The questionnaire was self-administered by the researcher. The researcher chose to distribute and collect the questionnaires by hand as the researcher believed that this would increase the number of returned questionnaires.

The questionnaire was distributed and collected over a two week period. Persistence by the researcher assured that a high return rate was realised. The method of distribution was by hand and the researcher would in many cases wait while the questionnaire was completed by the respondent. The total number of construction project managers invited to participate in the study and requested to complete the questionnaire was 100. However, only 86 construction project managers returned the questionnaire. Fourteen questionnaires were not returned; of the 14 questionnaires that were not returned, eight construction project managers indicated that they did not have adequate time to respond whilst six construction project managers were unable to be contacted after the distribution, this resulted in a return rate of 86%.

Appendix E presents the questionnaire distributed to construction project managers. The questionnaire is divided into three distinct sections. Section one contains the biography questions posed to the respondents. Section two presents questions relating to the theories of ethics, and section three presents questions relating to ethics in practice. The questionnaire was aligned with the research questions and research objectives to the study. This alignment is explained through Table 4.1 in Chapter Four.

3. Initial Contact: Further Research

The initial step in undertaking this further research was to make application and to receive approval to undertake the research from the University of the Witwatersrand's Human Research Ethics Committee (Non-Medical) for further research as the previous application had expired in 2013. Following consent from the Human Research Ethics Committee (Non-Medical) at the University of Witwatersrand to undertake the data collection (clearance certificate attached as Appendix F). The following process was undertaken to determine the appropriate companies to participate in the study:

- A list of construction companies undertaking several construction projects within the greater Johannesburg area was drawn up by the researcher.
- A list of criteria was developed for the appropriateness of the companies to be utilized in this study. The criteria was that the companies were undertaking construction projects in the Johannesburg area, that the companies were undertaking two or more projects in Johannesburg, that the companies utilized construction project managers and that the companies had experience with rework on construction projects.

In order to determine whether the identified companies fulfilled the criteria several companies were approached telephonically to request their permission of being included within the research and to provide an overview of the research area, research objectives as well as their role within the study. The researcher explained how the interviews would be conducted as well as analysed to form part of the study. Furthermore, the option of remaining anonymous was provided should the company feel that it would be adversely effected by the responses of their employees.

In contacting the six identified construction companies the researcher wished to gain their acceptance to allow their construction project managers to partake in the research. Three of the construction companies could not be contacted, three attempts were made to contact these companies. Two construction companies indicated that they would not allow their employees to partake within the research and cited "*poor publicity*" should the results of the research be published. The sixth construction company agreed to allow their employees to be interviewed as part of the research, however the company requested that anonymity was assured. The company was concerned that adverse results from the interviews would create a poor image of the construction project managers and reflect badly of the company within the construction industry.

Following evaluation six construction companies that fulfilled the criteria were selected. The identification and selection criteria of the companies is presented out in Table 3.3.

Table 3.3: Identification and selection process of the Johannesburg based construction company

Proposed Construction Company	Currently undertaking construction projects with Johannesburg.	Undertaking multiple (more than 2) construction projects at present?	Employ construction project managers?	Experienced rework within the company?	Suitability for this study based upon the selection criteria.
Company A	Yes	Yes	Unanswered	Unanswered	No
Company B	Yes	Yes	Unanswered	Unanswered	No
Company C	Yes	Yes	Unanswered	Unanswered	No
Company D	Yes	Yes	Yes	Refused to answer	No
Company E	Yes	Yes	Yes	Refused to answer	No
Company F	Yes	Yes	Yes	Yes	Yes

Contact was established with Operations Director of the company who agreed to participate in this study. Contact was made with the Operations Director to determine the appropriate procedure for conducting the proposed interviews with the construction project managers. The Operations Director distributed an email to the construction project managers within the organisation to indicate the company's acceptance for the construction project managers to partake in the study and further introduced the researcher. The researcher telephonically contacted the 16 construction managers to arrange for a convenient date and time to conduct the interviews. Verbal consent was obtained from each of the interviewees following the written authorisation received from the Operations Director.

4. Data Collection: Further Research

During the initial case study, unstructured interviews were conducted to establish the extent and validity of proposed questions to be asked during the formal interviews. As the unstructured interviews had already taken place, the researcher opted to only conduct formal interviews to test the previous results from the case study. Questionnaires were not undertaken as the researcher wanted to verify previous results from the case study. Questionnaires would have provided mass data and not specific data that was obtained during the formal interviews.

The additional formal interviews were conducted during March and April 2016. Formal interviews were conducted with sixteen construction project managers. The selection of the construction project managers is set out in section 3.5.1 as well in Table 3.2 of this dissertation Appendix H sets out the interview duration, the location where the interview was conducted and time of day that the interview was conducted. The interviews duration ranged between 13 minutes and 28 minutes at various times of the day. The interviews were conducted at the site where the construction project managers were based to avoid unnecessary travelling time by the construction project managers. The interviews were also conducted at the construction sites where the construction mangers were employed as this provided a degree convenience, comfort and relaxation for the respondents. As stated by Roberts (2011), comfort and relaxation are associated with being placed in recognisable settings Roberts (2011) further explains that a sense of relaxation and comfort allows respondents to adequately engage with a specified task, the task in this situation, being the interview. The time of day that the interview was conducted was selected to suit the construction project manager's schedule.

5. Analytical Strategy

Overview

According to Lofland (1976) analysis usually occurs through qualitative research and provides an explicit order among a faction of participants to a study. Analysis is conducted on collected data and occurs before presentation of findings (Daly, 2007). In other words, an analytical strategy is the process in which raw data is quantified for the purpose of analysis, interpretation and presentation. Without this phase, the data would not be presentable for discussion.

Analysis Applied in this Study

The raw data collected from the questionnaire conducted with the construction project managers was collected, coded and analysed by the researcher.

Once the completed questionnaires were collected, the data presented on the questionnaire was collated and coded. Questions posed on the questionnaire were closed questions, open questions and scale questions. Codes were developed and applied for each of the question type for the purpose of analysis. The coded data was then entered into an excel spreadsheet to be interpreted and analysed and presented through graphical representation. The formal interview questions conducted during 2016 were then individually analysed and compared with the results from the previous case study. Comparisons between the 2011 case study and the 2016 further study are provided in Chapter Four of this study.

Analysis of the coded data was further undertaken through the process of cross tabulation. A Chi-Square test was applied on cross tabulations in order to statistically test the significance of the relationship between specific variables. The bivariate questions were analysed by the researcher together with the results obtained from the Chi-Square test.

Data Testing

According to Reynolds (1984) nominal data is where values can be assigned to each outcome. For example, if a question posed on a questionnaire or interview schedule contains three possible answers a, b or c, a value of 1 can be given to a, a value of 2 to b and a value of 3 to c. This allows for quantitative analysis of quantitative data. Reynolds (1984) goes

further in stating that nominal data cannot be measured or ordered and therefore a mean cannot be established. However, a mode can be established for the data range. A mode is defined as the value that occurs the most in a data range (Reynolds 1984).

Nominal data is associated with nonparametric statistical procedures. These procedures are statistical methods applied to determine the possible correctness of the data and established the association of variables that are used to test sub hypothesis which can then be used to test the research hypothesis (Key, 1997). According Key (1997) there are various advantageous methods used in nonparametric statistical analysis, one such method is the Chi-Square test. The Chi-Square test is applied to determine the relationship between two variables (Key, 1997).

Reynolds (1984) posits that the obtained data from the research survey will yield a statistic or value; this value will then be coded and interpreted for the possible occurrence using statistical interpretation. This statistical interpretation will yield the confidence limits.

The Chi Square test was applied in this study to examine the cross tabulated data where two variables were compared against each other (Reynolds, 1984). For this reason, the Chi Square is deemed the most appropriate statistical method of analysis for testing bivariate data.

Single Variate and Bivariate Data Analysis

According to Lewis-Beck, Bryman and Futing (2003) there are three main systems for data analysis, single variate analysis, bivariate analysis and multivariate analysis. Single variate data analysis is the analysis of a data set that contains one set of variables; bivariate data analysis is the analysis of data containing two variables whilst multivariate data analysis is the analysis of a data set with more than one set of variables.

The analysis of data in this study initially examines data applying single variate analysis. Bivariate analysis is then applied to examine possible correlations between two sets of data variables. Bivariate analysis is undertaken to compare the age of the construction project managers with the ethical principles of the construction project managers, as well as comparing the experience of the construction project managers with their ethical principles.

Unstructured informal and formal Interviews were conducted by the researcher following which a self-administered questionnaire was distributed to respondents. The response rate of the unstructured informal interviews, structured interviews and questionnaire is presented in Table 3.4 and Table 3.5.

Table 3.4: Response rate for unstructured informal interviews, structured formal interviews and questionnaire undertaken during 2011

Research Methodology Employed	**Distribution Number (N)**	**Responses (N) Rate**	**Response Percentage (%)**
Unstructured informal Interviews	8	8	100
Formal structured Interviews	8	8	100
Questionnaires	100	86	86

Table 3.5: Response rate for structured formal interviews conducted as part of the further research undertaken during 2016

Research Methodology Employed	Distribution Number (N)	Responses (N) Rate	Response Percentage (%)
Unstructured informal Interviews	16	16	100

Linking Theory to Empirical Evidence

According to Griffiths, Kalish, and Lewandowsky (2008) a link needs to be created between the theory that a study is based upon and the empirical evidence of a study. This is usually achieved through interpretation of the theory together with the empirical findings from the study. The linking between the theoretical and empirical findings is described by Yin (1994) as reviewing information to ensure that a link has been created.

3.7 Data Collection

As illustrated through Figure 3.2 there were three Phases in the research data collection. The initial phase was to establish ethical behaviours of construction project managers and to gain a greater appreciation of the construction project manager's understandings on ethics. Phase one also examined the occurrence of non-conformances on the work under the construction project manager's supervision. The analysis determined the dynamics of the on-site activities that may have resulted in non-conformances. From the structured informal interviews discussions with the construction project managers, a set of questions that encompassed the construction project managers structured interviews were developed. Appendix C presents the construction project manager's formal interview and Appendix E presents the construction project managers questionnaire.

3.8 Summary

The research approach adopted in this study is a mixed method approach incorporating positivist as well as interpretivist research methodology. The interpretivist aspect of the study comprises the structured and unstructured interviews from both the original case study as well as the follow up research. The positivist aspect of the study comprises the questionnaire.

This study adopted the following data collection process:

- A case study was undertaken. The case study was the Medupi construction project
- Unstructured informal interviews were conducted with construction project managers at the Medupi construction project
- Structured interviews were conducted with construction project managers at the Medupi construction project
- A questionnaire was distributed to 100 construction project managers working at the Medupi construction project
- Further formal interviews were later conducted in Johannesburg in 2016 to determine the reliability the results obtained from the questionnaires administered at the Medupi construction project.

The questionnaire as well as the three sets of interviews examined application of ethical decisions by construction project managers and the outcomes of these decisions.

The linking of the theory to the empirical evidence was done through "*theoretical replication" (*Yin, 1994:34). The interviews and questionnaire were conducted to collect data to test the theoretical debate.

Chapter Four: Data Presentation, Analysis and Discussion of Results

4.1 Introduction

This chapter presents the findings and analysis of the data generated through the interviews and questionnaire. Analysis of the data is presented in two methods. Firstly, the raw data is presented and analysed and secondly, in order to determine the relationships between variables, Chi-Square tests have been adopted. The Chi-Square tests were applied to bivariate sets of data and not on multiple responses.

The data obtained is interpreted in accordance with the research questions as well as the objectives of this study. As presented in Table 4.1, each research question is linked to a research objective. The research questions and research objectives posed in Chapter One are addressed through data analysis within a specific section in this chapter. With this in mind, there are four sections of analysis presented in this chapter.

While sections one, two and three of analysis in this chapter examine the research questions and objectives, section four of this chapter presents recommendations based on findings.

Table 4.1 presents the links between the research questions, objectives and the interviews and questionnaire that were conducted.

Table 4.1: Comparison and analysis of research questions and objectives

Research Question	**Research Objective**	**Section of discussion from the construction project manager's questionnaire.**	**Related questions from the construction project manager's formal interviews conducted in 2016**
Research Question 1 Does rework exist within the context of the South African construction industry and is rework an obstruction in the successful completion of construction projects?	**Objective 1** Establish the existence of rework and its impacts on the successful completion of projects within the context of the South African construction industry.	**Section 1** Questions 3.1 and 3.9 were analysed in this section.	**Section 1** Questions 1 and 2 were analysed in this section.
Research Question 2 Is poor ethical decision making during the construction phase of a project, by the construction project manager resulting in the occurrence of rework?	**Objective 2** Examine a correlation between rework and poor ethical decision making by the construction project manager.	**Section 2** Questions 1.2, 1.4, 2.1, 2.2, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 and 3.8 were analysed in this section.	**Section 2** Questions 3, 4, 5, 6, 7, 8, 9 and 10 were analysed in this section.
Research Question 3 What preventative measures are in place to prevent construction project managers from acting unethically during the construction of a project?	**Objective 3** Ascertain the possibility of a professional code of conduct having an impact on a construction project manager's ethical decision making process. **Objective 4** Explore possible quality control methods to prevent the occurrence of rework within the construction industry.	**Section 3** Questions; 2.3 and 3.10 analysed in this section.	**Section 3** Question 11 was analysed in this section.

As presented in Table 4.1 questions 1.1, 1.3 and 1.5 were not included into the analysis of the data. The questions (1.1, 1.3 and 1.5) were posed to acquire a general social understanding of the respondents to the study. Questions 2.4 and 2.5 were also not included into the data analysis. These questions were contextual questions and were included into the study for the respondents to understand the line of thought leading up to other questions.

4.2 Presentation and Analysis of Data

This section of this chapter presents the analysis of the data obtained during questionnaires.

4.2.1 Single Variate Analysis

This section presents single variate analysis and is separated into three sub sections which address the research objectives.

Section 1

This section relates to research question 1 as well as research objective 1 as presented in Table 4.1

Question 3.1 on the questionnaire required the respondents to state if rework was an obstruction to the successful completion of a construction project, results are presented in Figure 4.1.

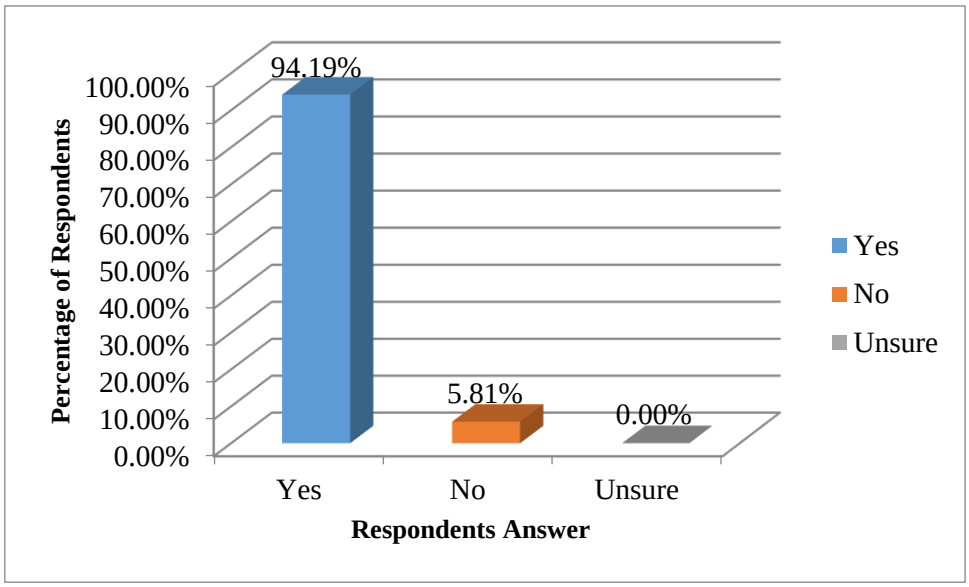

Figure 4.1: Impact of rework on successful completion.

As shown in Figure 4.1, 94% or 81 of the 86 respondents to this question stated that rework is an obstruction to the successful completion of a construction project. The results of **Question 3.1** indicate that rework has an impact on the overall successful completion of a construction project.

The results of **Question 3.1** were reinforced through the findings from the 2016 interviews. During the interviews with the construction project managers, 100% of the 16 respondents to **Question 1** believed that rework was an obstruction to the successful completion of a construction project.

Question 3.10 on the questionnaire requested the respondents to state whether or not a non-conformance would result in extra time spent by the construction project manager's team in order to correct the non-conformance through rework. The results are presented in Figure 4.2.

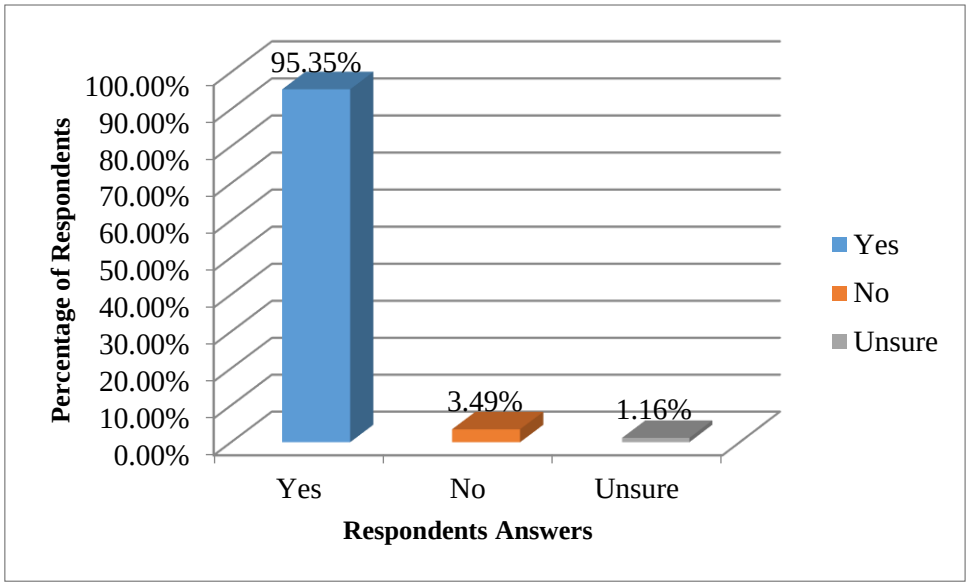

Figure 4.2: N**on-conformance result in extra time spent by the contractor on site**

Findings presented in Figure 4.2 indicate that of the 86 construction project managers who chose to answer this question, 95% (82 of the respondents) believed that a non-conformance would result in extra time expended by the construction project manager's team to rectify the non-conformance. The rectification of the non-conformance can be considered as rework.

The results of **Question 3.10** were reinforced through the findings from the 2016 interviews. During the interviews with the construction project managers 100% (16 of the respondents) to **Question 2** agreed that a non-conformance would result in extra time spent by the construction project manager's team in order to correct the non-conformance through rework.

Feng et al. (2009) stated that rework can have a negative impact on the construction project manager's motivation as well as the motivation of the construction project manager's team. Feng et al. (2009) further state that rework will result in schedule delay and ultimately increase the time expended by the contractor to in order to complete the project to the required specifications.

Section 2

This section relates to Research Question 2 as well as Research Objective 2 as presented in Chapter One and Table 4.1

Question 1.2 on the questionnaire requested respondents to indicate their age at the time of the survey. The results are presented in Figure 4.3.

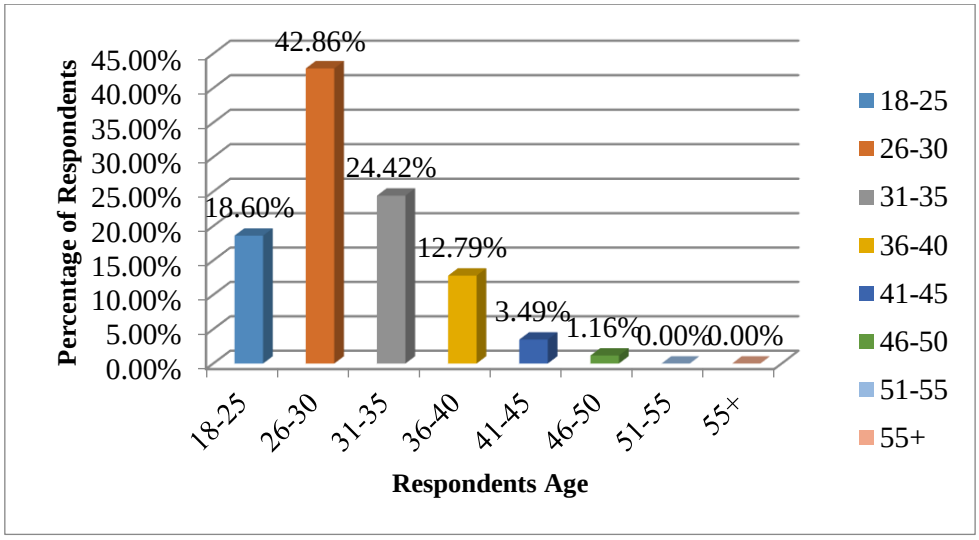

Figure 4.3: Age of respondents

As presented in Figure 4.3 from the 86 respondents who chose to answer this question, up to 43% (37 of the respondents) were between the ages of 26 to 30. This age group can be seen as individuals who are qualified and/or have some form of construction experience within the construction project management field. Up to 19% (16 of the respondents) respondents were between the ages of 18 and 25, it can be assumed that this age are those recently graduated from tertiary education and are those who have limited construction experience.

Question 1.4 on the questionnaire required the respondents to provide their experience within the construction industry between a given set of parameters. The results are presented in Figure 4.4.

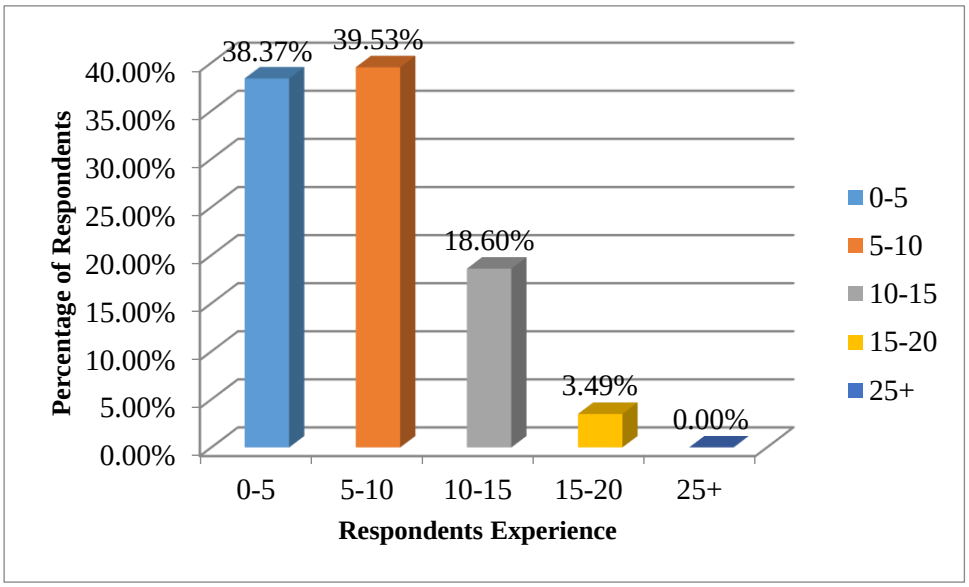

Figure 4.4: Experience of the respondents

Figure 4.4 indicates that of the 86 respondents who chose to answer this question, up to 40% (34 of the respondents) had a level of experience between five and ten years whilst 38% (33 of the respondents) had a level of experience between zero and five years. Considering that the retirement age for a construction project manager is 65 years and an individual could gain approximately 40 years of experience before retiring from the industry, the modal responses of this question (0 to 10 years' experience) indicates that the respondents to this study had a low level/exposure of experience within the construction industry.

Question 2.1 on the questionnaire asked the respondents to rate between 1 and 5 their belief that the given definition for ethics was correct. Where the value one represented a strong disagreement with the definition and the value five represented a strong agreement with the definition. The definition posed for the respondent's comment was: "*ethics is knowing the difference between wrong and right"*. The results are presented in Figure 4.5.

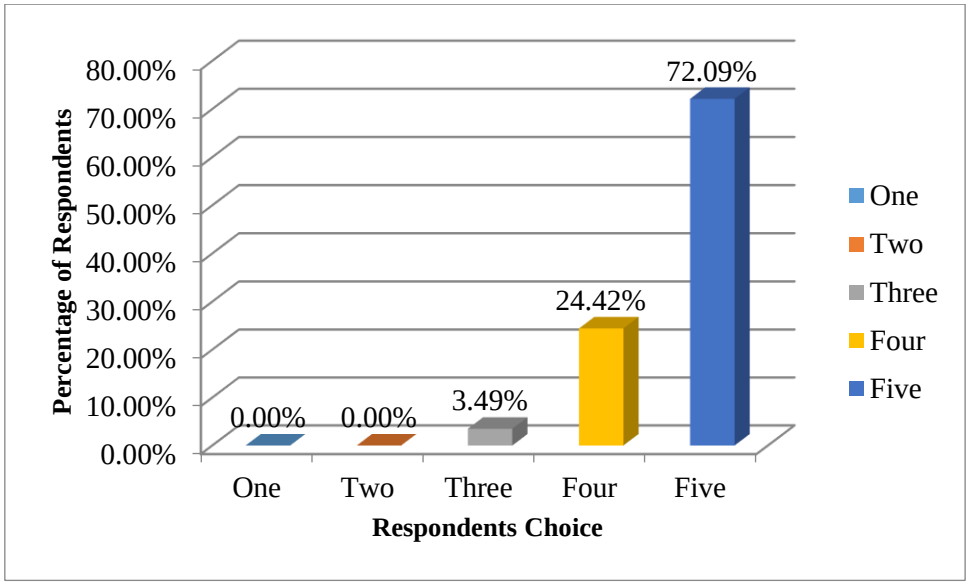

Figure 4.5: Understanding to the definition of ethics

As presented in Figure 4.5, of the 86 respondents who chose to answer this question, 72% (62 of the respondents) strongly believed that the definition for ethics provided was accurate. Nickols (2011) explained that an individual cannot be instructed to perform a task if the individual us unaware of the meaning and definition of the said task. Nickols' (2011) statement was applied to question 2.1 believing that an individual could not be ethical in his ways if the individual did not understand the definition of ethics. The results from **Question 2.1** indicate that the modal number of respondents did understand the definition of ethics.

The results of **Question 2.1** were strengthened through the findings from the 2016 interviews, during the interviews with the construction project managers. 87% or 14 of the respondents to **Question 3** provided a definition to ethics closely resembling the definition set out in question 2.1. The remaining 13% (2 of the respondents) of the respondents to Question 3 could not provide a definition for ethics that linked the knowledge of the variance between right and wrong.

Question 2.2 on the questionnaire asked the respondents to state if they believed themselves to be an ethical individual in terms of the definition: *"ethics is; knowing the difference between wrong and right."* The results are presented in Figure 4.6.

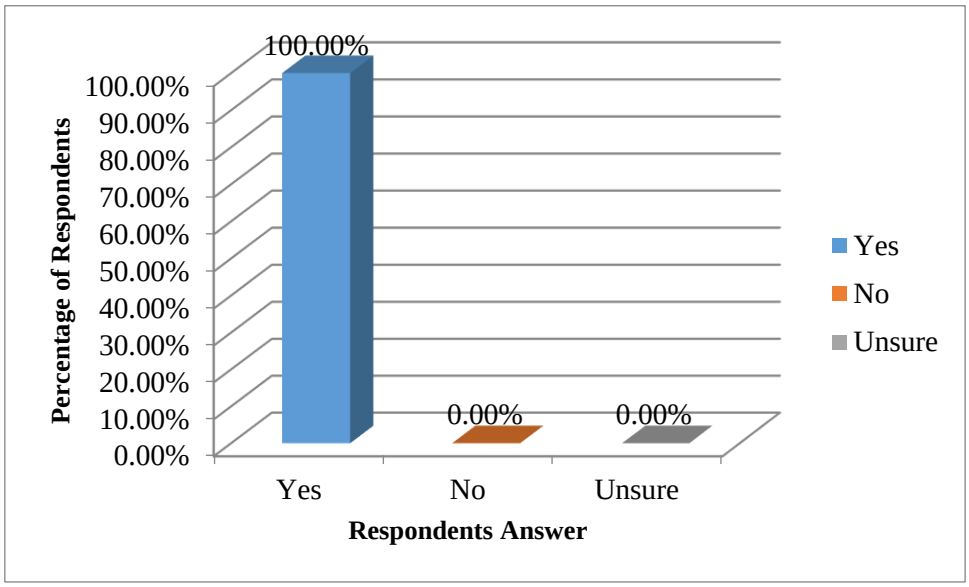

Figure 4.6: Self-belief of being ethical

As presented in Figure 4.6, 100% of the respondents believed themselves to be ethical. However, when the respondents were asked to agree or disagree with the definition of ethics, 4% (3 of the respondents) were unsure if the provided definition was accurate. While 100% (86) of the respondents indicated that they were ethical, it can be assumed that if or when an individual performed an unethical act, the individual was aware that the unethical act was being performed. This finding can be linked to the concept proposed by Plato who stated that while all humans have ethics, not all humans choose to display the principles of ethics at every occasion (Shorey, 1903).

The results of **Question 2.2** were reinforced through the findings from the 2016 interviews. During the interviews with the construction project managers 100% of the 16 respondents to **Question 4** defined themselves as an ethical person.

Question 3.2 on the questionnaire required the respondents to indicate if a non-conformance had occurred on a section of works under the respondent's control. The results are presented in Figure 4.7.

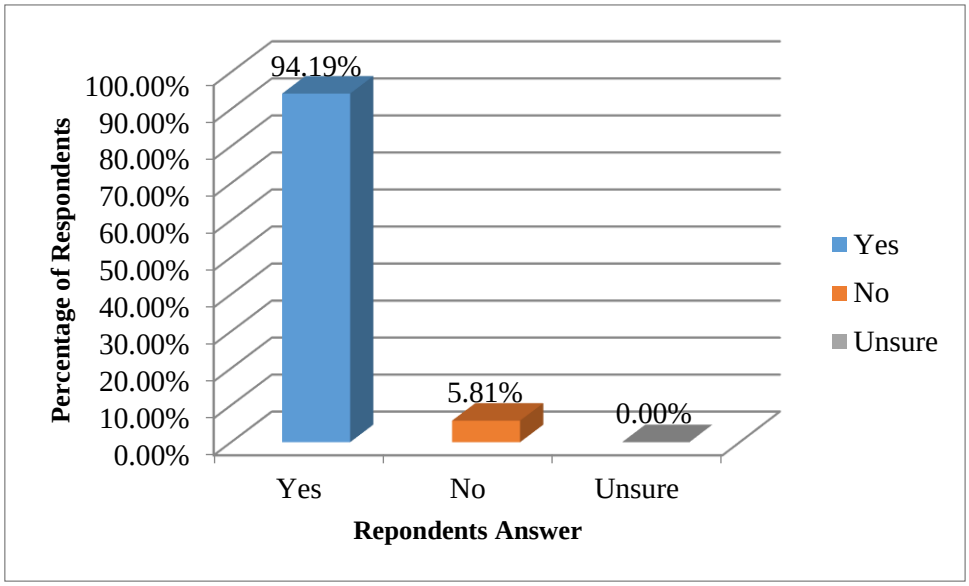

Figure 4.7: Occurrence of a non-conformance

As shown in Figure 4.7, 94% or 81 of the 86 respondents to this question stated that a non-conformance had occurred on a section of works under their control. The results of **Question 3.3** indicate that non-conformances are occurring on construction projects. Moreover, the findings support Abdul-Rahman et al. (1995) who stated that all construction projects will experience some type of non-conformance during the construction phase of the project.

During the 2016 interviews with the construction project managers, 100% of the 16 respondents to **Question 5** indicated that a non-conformance on the works under their control had occurred, which strengthened the results of **Question 3.2** posed on the questionnaire.

Question 3.3 on the questionnaire required the respondents to state whether or not they had performed an unethical act on a section of work under their control at the Medupi Power Station construction site. The results are presented in Figure 4.8.

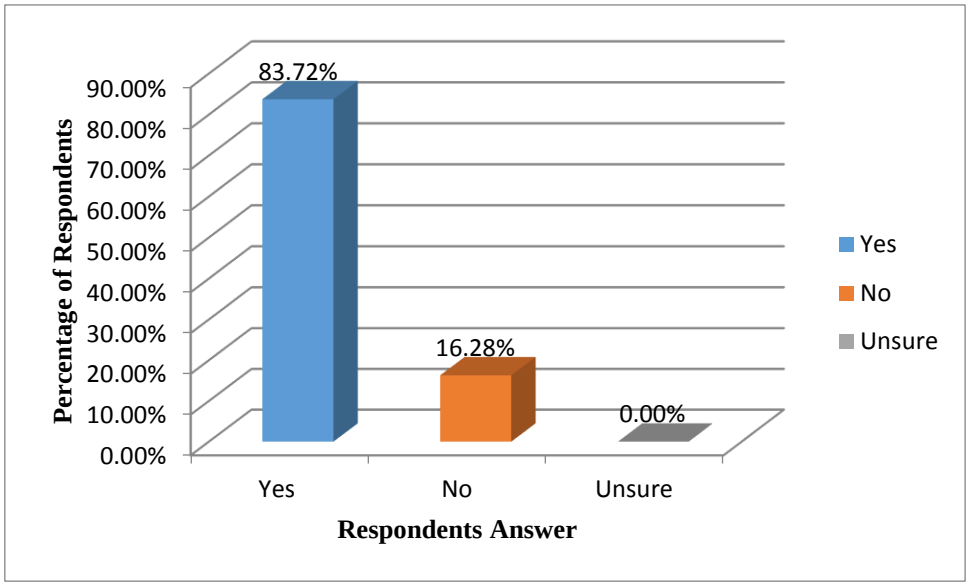

Figure 4.8: Admission to conducting an unethical act in the workplace

According to Johnson (2010) ethical individuals can perform unethical acts. Findings presented in Figure 4.8 indicate that of the 86 respondents who chose to answer this question, up to 84% (72 of the respondents) indicated that they had performed an unethical act. During interviews with construction project managers, all construction project managers to the interviews (100%) responded that they had performed an unethical act in the workplace. This indicates that the construction project managers are capable of performing unethical acts and are aware that the acts that they are performing are unethical.

The results of **Question 3.3** on the questionnaire were reinforced through the findings from the 2016 interviews, during the interviews with the construction project managers. Up to 63% (10 of the respondents) of the 16 respondents to **Question 6** indicated that they had undertaken an unethical act during the course of their working career in the construction industry.

Question 3.4 on the questionnaire asked the respondents to elaborate on the responses indicated for **Question 3.3**. Respondents were asked to indicate the specific area within the workplace which had motivated their ethical behaviour or act. The results are presented in Figure 4.9.

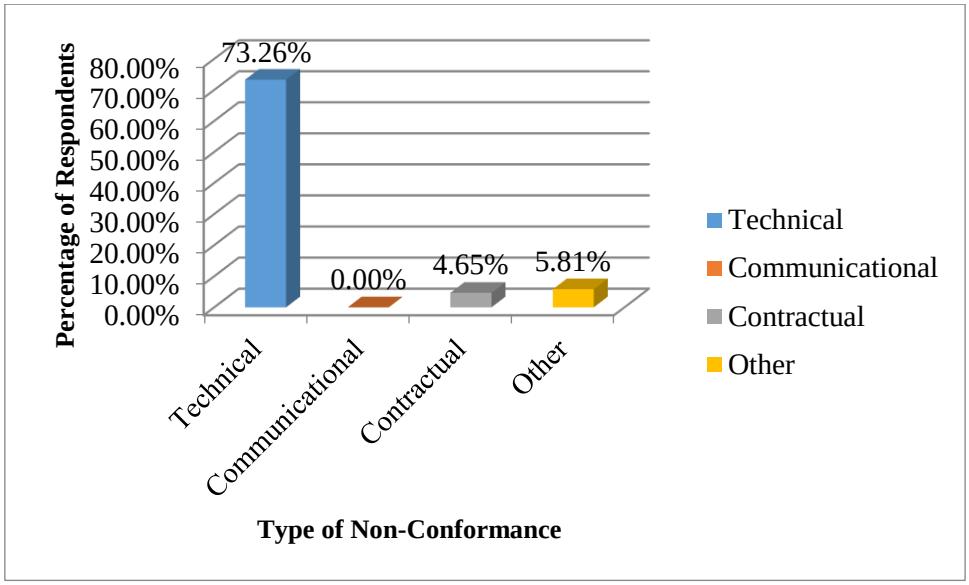

Figure 4.9: Area of the unethical act

As shown by Figure 4.9, from the 72 respondents to this question, 73% (52 of the respondents) indicated that they had performed an unethical act within the technical field of the construction industry. During the initial interviews, respondents A, B, C, D and F detailed in Appendix D admitted to performing an unethical act in the technical area of the site work. This indicates that an unethical act performed on a technical aspect of the construction site, may result in the occurrence of a non-conformance. The technical area in this study is seen as all construction work that is carried out in order to complete the project.

Question 3.5 on the questionnaire required the respondents to state whether or not, in their opinion, a non-conformance on the section of works under their control would be the result of an unethical act by themselves. The results are presented in Figure 4.10.

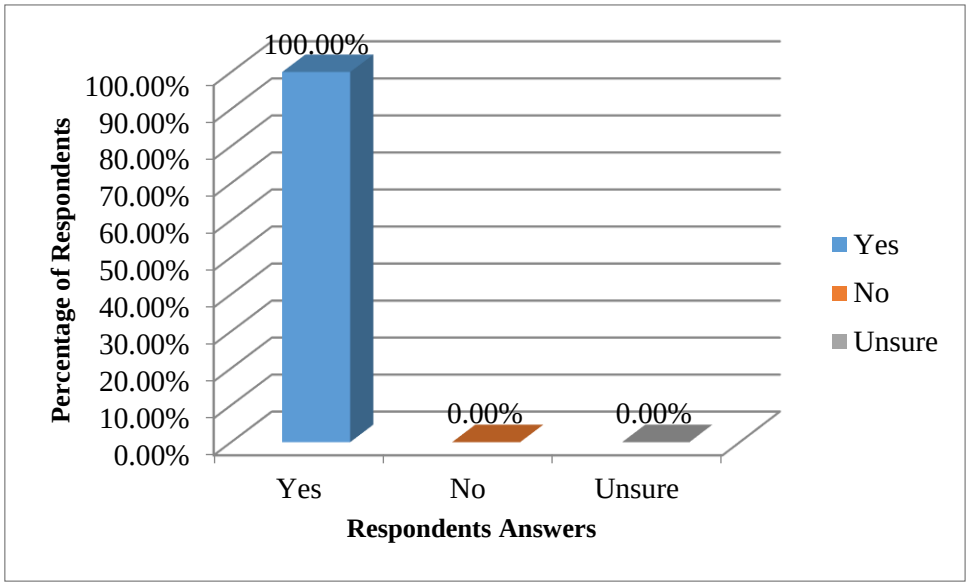

Figure 4.10: An Unethical act resulting in a non-conformance

Findings presented in Figure 4.10 indicates that of the 86 respondents who chose to answer this question, 100% of the respondents believed that a non-conformance on a section of works under their control would be the result of an unethical act performed by themselves. These results reinforce Vee and Skitmore (2003) who argued that non-conformances were the result of errors on the part of the construction project manager. The results to **Question 3.5** indicate a link between unethical acts and non-conformances.

The results of **Question 3.5** were strengthened through the findings from the 2016 interviews, during the interviews with the construction project managers. Of the 16 respondents to **Question 7,** 75% (12 of the respondents) indicated that an unethical act performed by themselves would result in the occurrence of a non-conformance.

Question 3.6 on the questionnaire asked the respondents to indicate if an unethical act performed by an employee could be attributed to the construction project manager for whom the employee worked. The results are presented in Figure 4.11.

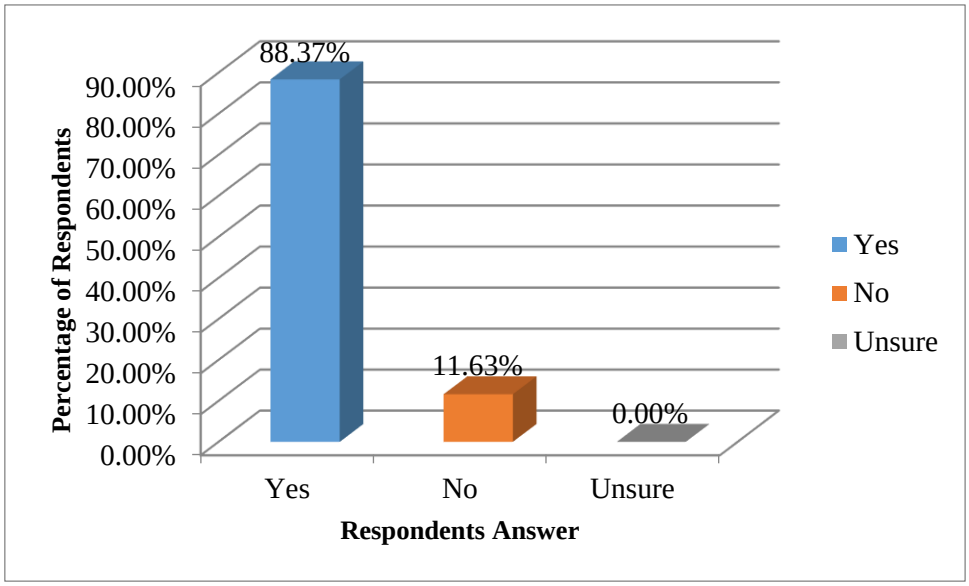

Figure 4.11: Attribution of accountability for unethical acts performed by construction project manager's employees

As presented by Figure 4.11, of the 86 construction project managers who chose to answer this question, 88% or 76 of the respondents stated that a construction project manager can be held accountable for all unethical decisions made by the construction project manager's employees. This suggests that the result of any unethical act performed on site whether performed by the construction project manager or the construction project manager's employees can be attributed to the construction project manager. The construction project manager must accept responsibility for the unethical acts and all consequences that may occur as a result of the unethical act.

The results of **Question 3.6** were supported through the findings from the 2016 interviews. During the interviews with the construction project managers, 75% (12 of the respondents) of the 16 respondents to **Question 8** stated that an unethical act performed by an employee would be attributed to themselves. Of the 16 respondents to **Question 8,** 13% (2 of the respondents) stated that they could not be held responsible for acts performed by their employees.

Question 3.7 on the questionnaire required respondents to state if they had requested an employee to perform an unethical act on their behalf. This question was contextualised in terms of work carried out under the control of the respondent. The results are presented in Figure 4.12.

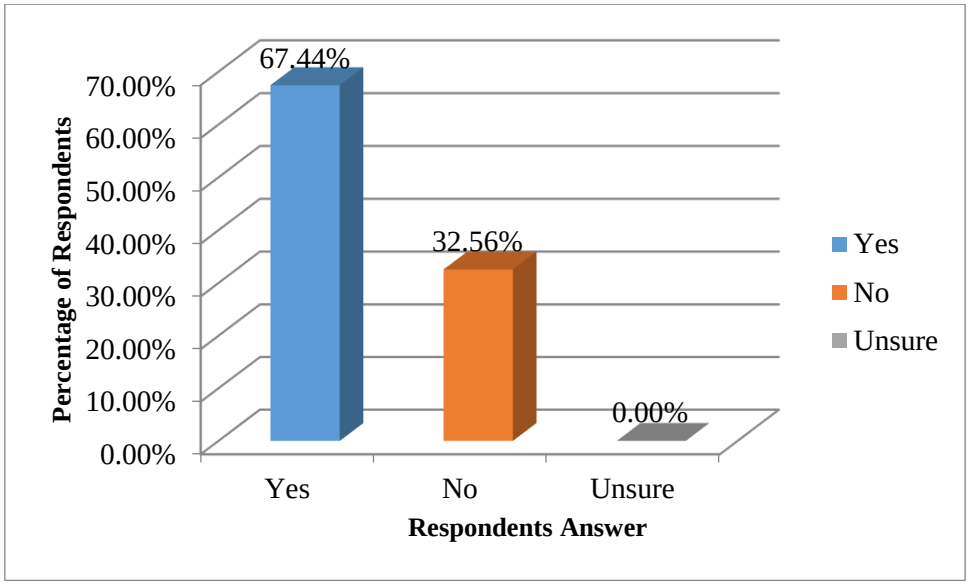

Figure 4.12: Respondents who instructed a member of their team to perform an unethical act

Findings presented in Figure 4.12 indicate that of the 86 respondents who chose to answer this question, up to 68% (58 of the respondents) had instructed an employee to perform an unethical act. This supports the theory that actions resulting in a non-conformance performed by the construction project manager's employees are as a result of an unethical decision made by the construction project manager. Moreover, it can be determined from this finding that the construction project manager can motivate employees under his supervision to perform unethical acts.

The results of **Question 3.7** were reinforced through the findings from the 2016 interviews. During interviews with the construction project managers of the 16 respondents to **Question 9,** 88% (14 of the respondents) stated that they had requested an employee to perform an unethical act on their behalf.

Question 3.8 on the questionnaire asked respondents that answered yes to **Question 3.7** to indicate if the employee had disputed the fact that the respondent was requesting them to perform an unethical act. The results are presented in Figure 4.13.

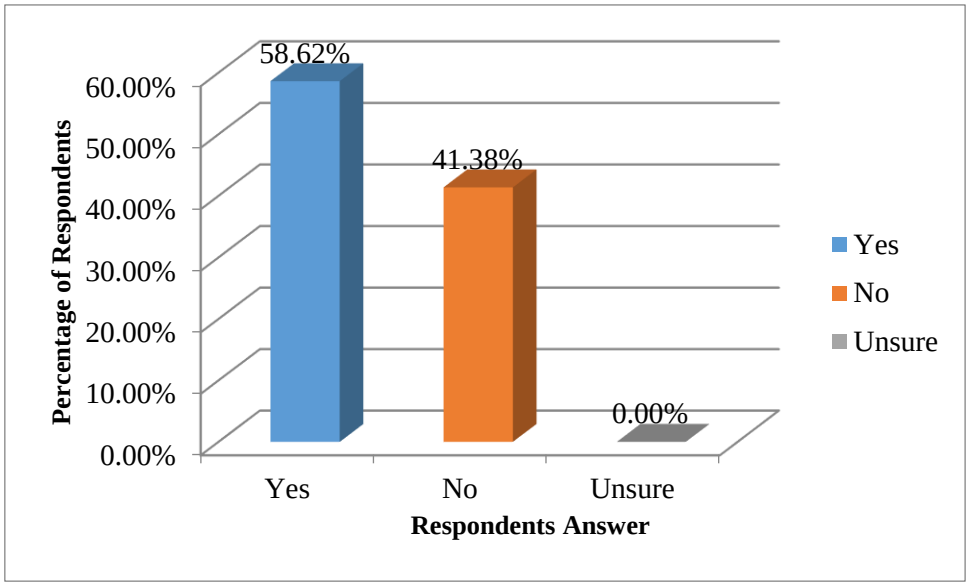

Figure 4.13: Respondents who were challenged by an employee when conducting an unethical act

As presented in Figure 4.13, of the 58 respondents who chose to answer this question up to 59% (34 of the respondents) indicated that they had been challenged by an employee with regards to the occurrence of the unethical act. The respondents to this study further indicated that despite being challenged they had continued with the unethical act. This finding suggests that the respondents to this study were fully aware that they were performing an unethical act, although were willing to continue with the act even after being challenged. During interviews, interviewee C and F presented in Appendix D indicated that an employee had confronted them with regards to an unethical act that they had requested an employee to perform. Moreover, once challenged both interviewee C and F defended their behaviour and informed the employee that the unethical act needed to be performed in order to complete the given task within the required time frame.

Section 3

This section relates to Research Question 1 as well as Research Objective 1 as presented in Table 4.1

Question 2.3 presented on the questionnaire required the respondents to state whether or not they were aware of the South African Council for Project and Construction Management Professional (SACPCMP). The results are presented in Figure 4.14.

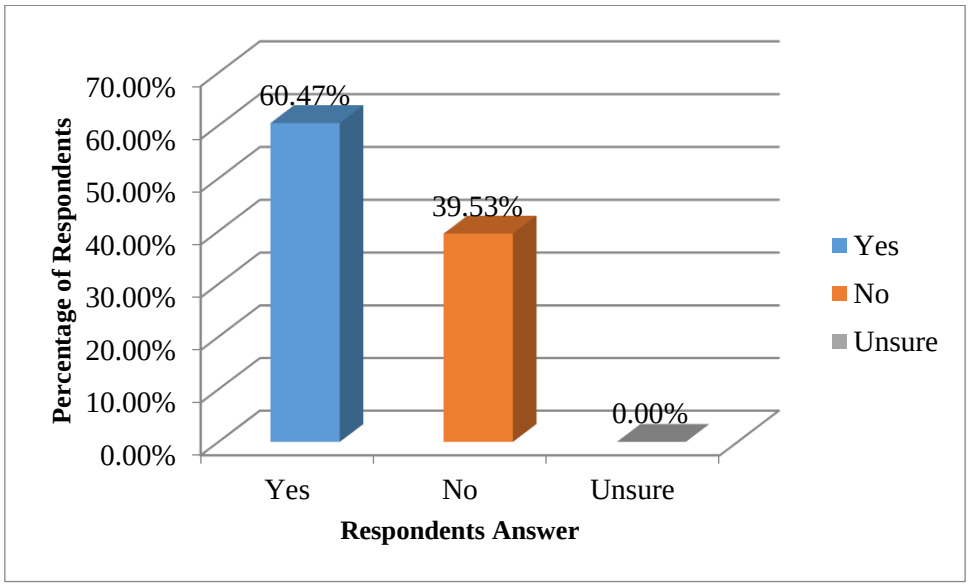

Figure 4.14: Awareness of the existence of the SACPCMP

Figure 4.14 shows that of the 86 respondents who chose to answer this question, up to 61% (52 of the respondents) were aware of the SACPCMP. During interviews, two respondents indicated that they were not aware of the SACPCMP.

During the interviews with the construction project managers that took place in 2016, 100% (16 of the respondents) of the 16 respondents to **Question 10** stated that they were aware of the SACPCMP. The results from **Question 10** support the results from **Question 2.3** posed during the questionnaire to the construction project managers. The SACPCMP together with the Universities and Colleges where construction project managers are educated, would form the correct avenue for the implementation of an ethical code of conduct for construction project managers. The implementation of the ethical oath is further discussed in Chapter Five.

Question 3.10 on the questionnaire requested the respondents to state if an ethical code of conduct sworn by construction project managers would prevent the occurrence of non-conformances. The results are presented in Figure 4.15.

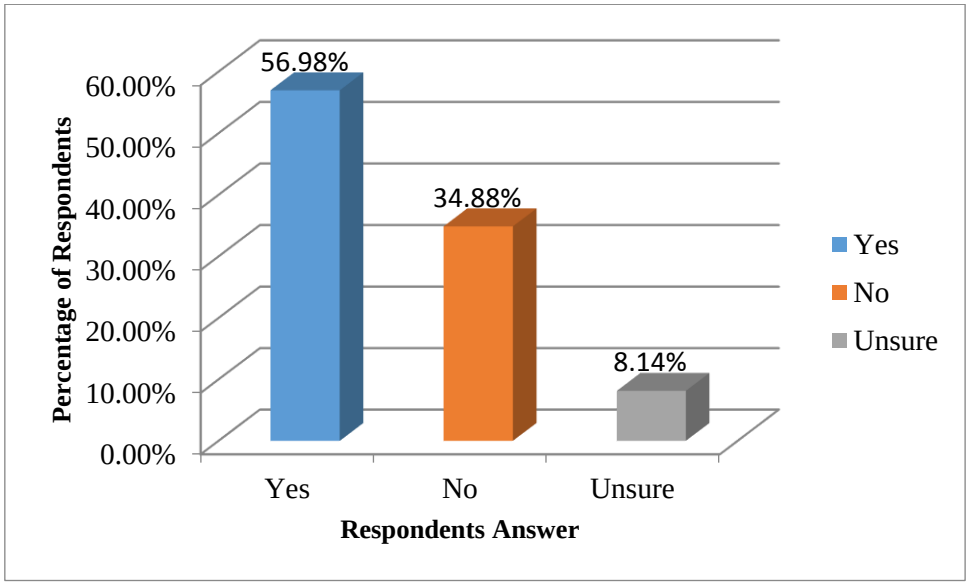

Figure 4.15: Impact of implementation of ethical code of conduct on ethical behaviour

Findings presented in Figure 4.15 suggest that of the 86 construction project managers who chose to answer this question up 57% (49 of the respondents) believed that enforcement of an ethical code of conduct sworn by, and implemented for, construction project managers, would prevent the occurrence of unethical acts by construction project managers, thus potentially reducing the possible occurrence of non-conformances.

The results of **Question 3.10** were further strengthened through the findings from the 2016 interviews. During interviews with the construction project managers, 5% (12 of the respondents) of the 16 respondents to **Question 11** stated that an ethical code of conduct could deter unethical decisions from occurring.

4.4.2 Bivariate Analysis

Bivariate analysis of the data was undertaken to determine the correlation between the respondent's ethical principles and the age and experience of the construction project Management respondents.

Cross tabulation 1

The respondent's admission to acting unethically was cross tabulated with the age of the respondents to the questionnaire. This test was undertaken to establish whether age can impact on ethical behaviour. The results of the cross tabulation are presented in Figure 4.16.

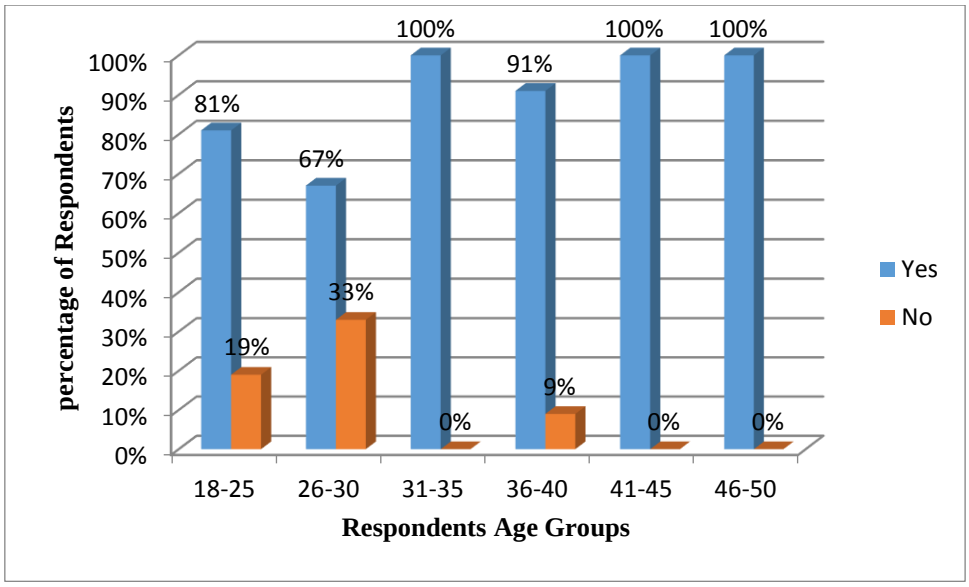

Figure 4.16: Unethical acts cross tabulated with the age

As presented in Figure 4.16, 100% of construction project managers between the ages of 31–35, 41-45 and 46-50 indicated that they had acted unethically whilst 67% of respondents between the ages of 26-30 indicated that they had acted unethically.

A cross tabulation of the age of the construction project managers with their admission to having acted unethically is presented in Table 4.2. Table 4.3 presents the results for the Chi-Square test.

Table 4.2: Age of Respondents Cross Tabulated with Admission of an Unethical Act

Chi Square Test			
	Value	**df**	**(p)**
Pearson's Chi Square	**9.68**	**2**	**0.008**
Number of Valid Cases	**86**		

Table 4.3: Chi-Square Test Results Between the Respondent's Age and Performing an Unethical Act.

		Age in years			
		18-30	31-40	41-50	Total
Answer	Yes	36	31	3	70
	No	15	1	0	16
	Maybe	0	0	0	0

As presented in Table 4.4, findings suggest that there is a statistical relationship between the age of the construction project managers and the ethical behaviour of the construction project managers.

Results of the Chi-square test shows an association of 0.008 (99.2%). The association can be assessed through the analysis of findings presented in Table 4.3. As indicated in Table 4.3 the statistical relationship between the age of the construction project manager and the likelihood of undertaking an unethical act is most prevalent by the respondents who are aged between 41 and 50. As presented in Table 4.3 the age group who are least likely to commit an unethical act are represented by those aged between 18 and 30 (with 33% of that age group not having performed an unethical act.)

It must be noted that these findings are based on respondents' admission of conducting an unethical act. These findings do not imply that construction project managers within the age group of 18 to 30 are more unethical or ethical than those in other age groups.

Cross Tabulation 2

The respondent's admission to acting unethically was cross tabulated with the level of experience in years. This test was carried out to determine whether a relationship was prevalent between the level of experience and the likelihood of carrying out an unethical act. The results of the cross tabulation are presented in Figure 4.17.

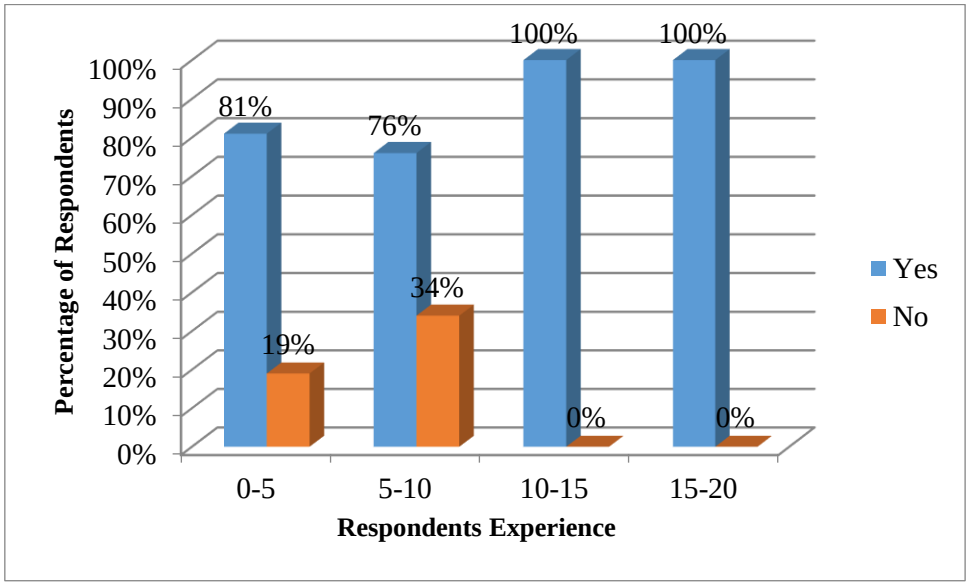

Figure 4.17: Unethical acts cross tabulated with the level of experience

As presented in Figure 4.17, 100% of the respondents with a level of experience between 10-20 years (19 respondents) admitted to performing an unethical act whilst 76% of respondents with a level of experience between 5- 10 years (26 respondents) admitted to performing an unethical act.

A cross tabulation of the experience of the construction project managers with their admission to having acted unethically is presented in Table 4.4. Table 4.5 presents the results for the Chi-Square test.

Table 4.4: Experience of respondents cross tabulated with admission of an unethical act

		Experience in years				
		0-5	5-10	10-15	15-20	Total
Answer	Yes	27	26	16	3	72
	No	6	8	0	0	14
	Maybe	0	0	0	0	0

Table 4.5: Chi-square test results for the comparison between the respondent's experience and performing an unethical act

Chi Square Test			
	Value	**df**	**(p)**
Pearson's Chi Square	**3.91**	**1**	**0.048**
Number of Valid Cases	**86**		

A cross tabulation of the construction project manager's experience in years with their admission to having acted unethically is presented in Table 4.4. Table 4.5 presents the results for the Chi-Square test. As presented in Table 4.5 there is a statistical relationship between the age of the construction project managers and the ethical behaviour of the construction project managers.

Results for the Chi-square test presented in Table 4.5, shows an association of 0.048 (95.2%). The association can be assessed through the analysis of presented in Table 4.3. As indicated, the association suggests that unethical behaviour seems more likely as the construction project managers gains more experience as represented in figure 4.17. Construction project managers with a level of experience between five and ten years are less likely to perform an unethical act whilst construction project managers with a level of experience between 10 to 15 years and 15 to 20 years were most likely to perform an unethical act.

It must be noted that these findings are based on respondents' admission of conducting an unethical act. These findings do not imply that construction project managers with a level of experience between five and ten years are more unethical or ethical than those in other age groups.

Cross Tabulation 3

The respondent's admission to requesting an employee to act unethically within the working environment was cross tabulated with the age of the respondents to the questionnaire. This test was undertaken to establish if age has any reflection of ethical behaviour. The results of the cross tabulation are presented in Figure 4.18.

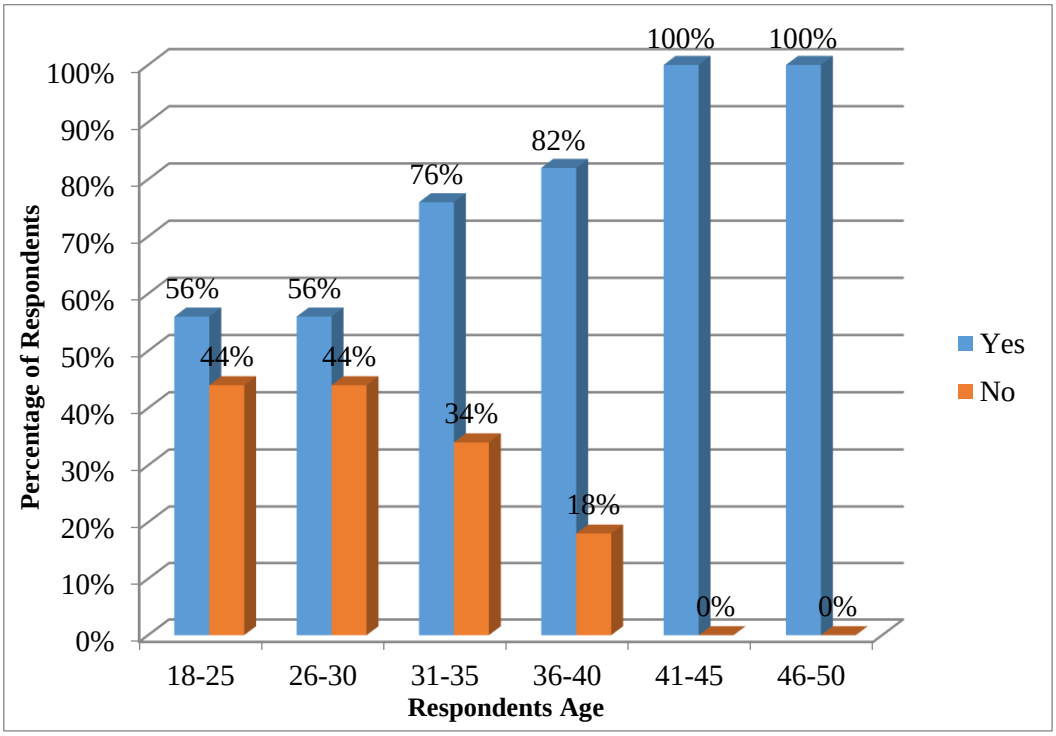

Figure 4.18: Requesting an employee to perform an unethical act cross tabulated with age

Findings presented in Figure 4.18 indicate that 100% of the respondents between the ages of 41-50 (4) admitted to requesting an employee to perform an unethical act whilst 56% of respondents (30) between the ages of 18-30 admitted to requesting an employee to perform an unethical act.

A cross tabulation of the age of the construction project managers with their admission to requesting an employee to act unethically within the working environment is presented in Table 4.6. Table 4.7 presents the results for the Chi-Square test.

Table 4.6: Age of respondents cross tabulated with the admission to requesting an employee to act unethically within the working environment

		Age in years			
		18-30	31-40	41-50	Total
Answer	Yes	29	25	3	70
	No	22	7	0	16
	Maybe	0	0	0	0

Table 4.7: Chi-square test results for the respondent's age and the admission to requesting an employee to act unethically within the working environment

Chi Square Test			
	Value	**df**	**(p)**
Pearson's Chi Square	**4.74**	**1**	**0.029**
Number of Valid Cases	**86**		

A cross tabulation of the age of the construction project managers with their admission to request an employee to perform an unethical act is presented in Table 4.6. Table 4.7 presents the results for the Chi-Square test. As presented in Table 4.7, there is a statistical relationship between the age of the construction project managers and the whether or not they have instructed an employee to perform an unethical act.

The Chi-square test presented an association of 0.029 (97.1%). The association can be assessed through the analysis of data presented in Table 4.6. As presented, the association indicates that the younger the construction project manager, the less likely the construction project manager is to request an employee to perform an unethical act on the works under the supervision of the construction project manager. The results indicate that the respondents

between the ages of 18 to 25 and between the ages of 26 to 30 are the less likely to request an employee to perform an unethical act on the works under the supervision of the construction project manager. Whilst construction project managers between the ages of 41 to 45 and 46 to 50 are most likely to request an employee to perform an unethical act on the works under the supervision of the construction project manager.

It must be noted that these findings are based on respondents' admission to requesting an employee to act unethically within the working environment. These findings do not imply that construction project managers within the age group of 18 to 30 are either unethical or more ethical than those in other age groups.

Cross Tabulation 4

The respondent's admission to requesting an employee to act unethically within the working environment was cross tabulated with the level of experience of the respondents to the questionnaire. This test was undertaken to establish if age has any reflection of ethical behaviour. The results of the cross tabulation are presented in Figure 4.19.

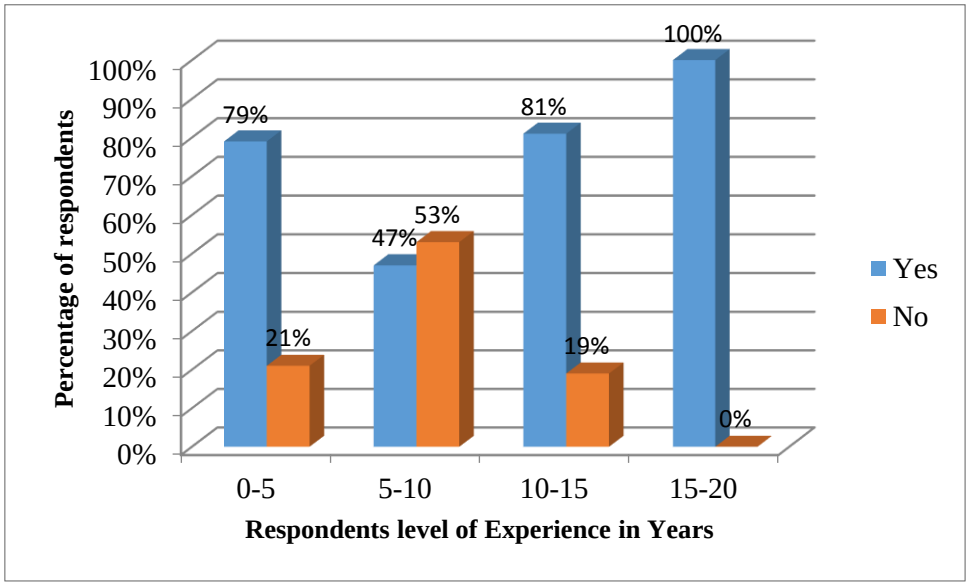

Figure 4.19: Respondent's admission to requesting an employee to act unethically within the working environment cross tabulated with the level of experience of the respondents

Figure 4.19 indicates that 100% of respondents with a level of experience between 15-20 years admitted to requesting an employee to perform an unethical act, whilst 47% (16) of respondents with a level of experience between 5-10 years admitted to requesting an employee to perform an unethical act.

A cross tabulation of the experience of the construction project managers with their admission to requesting an employee to act unethically within the working environment is presented in Table 4.8. Table 4.9 presents the results for the Chi-Square test.

Table 4.8: Experience of respondents cross tabulated with the admission to requesting an employee to act unethically within the working environment

		Experience in years				
		0-5	5-10	10-15	15-20	Total
Answer	Yes	26	16	13	3	70
	No	7	18	3	0	16
	Maybe	0	0	0	0	0

Table 4.9: Chi-square test results for the respondent's experience and admission to requesting an employee to act unethically within the working environment

Chi Square Test			
	Value	**df**	**(p)**
Pearson's Chi Square	**4.74**	**1**	**0.029**
Number of Valid Cases	**86**		

A cross tabulation of the experience in years of the construction project managers with their admission to request an employee to perform an unethical act is presented in Table 4.8. Table 4.9 presents the results for the Chi-Square test. As presented in Table 4.9, there is a statistical relationship between the age of the construction project managers and the whether or not they have instructed an employee to perform an unethical act.

The Chi-square test presents an association of 0.029 (97.1%). The association can be assessed through the analysis of data presented in Table 4.7. As indicated, the association suggests that construction project managers with experience of between five to ten years in construction are least likely to request an employee to perform an unethical act on the works under the supervision of the construction project manager, whilst construction project managers with experience between 15 to 20 years in construction are most likely to request an employee to

perform an unethical act on the works under the supervision of the construction project manager.

It must be noted that these findings are based on respondents' admission to requesting an employee to act unethically within the working environment. These findings do not imply that construction project managers with experience between five and ten years in construction are either more unethical or ethical than those with more experience within the construction industry.

Cross tabulation 5

The respondent's admission to acting unethically was cross tabulated with the respondent admitting to experiencing rework on the works under their control. This test was undertaken to establish if a link existed between unethical behavior and the occurrence of rework. The results of the cross tabulation are presented in Figure 4.20.

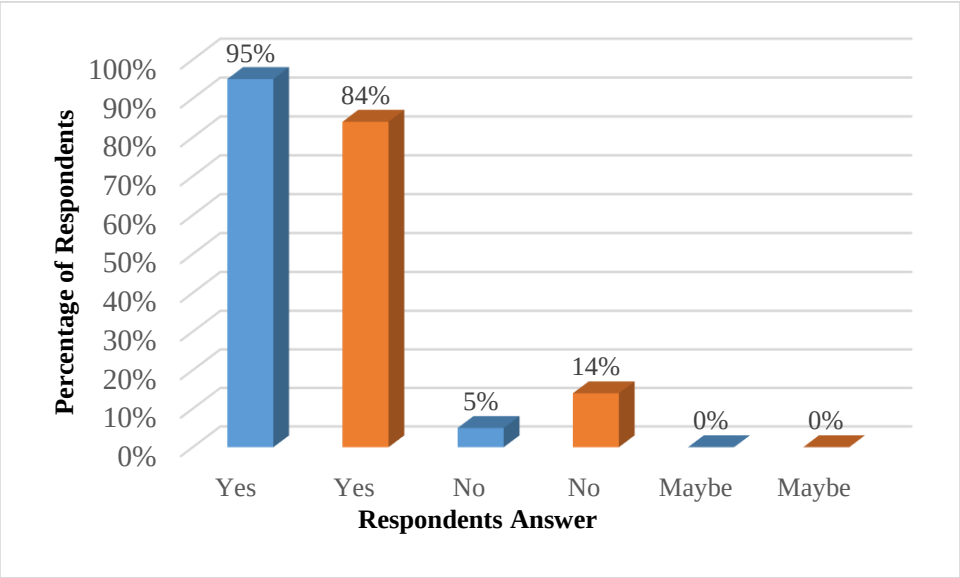

Figure 4.20: Unethical acts cross tabulated with the occurrence of rework

As presented in Figure 4.20, 95% of respondents (80 respondents) stated that they experienced rework on works under their control. In addition, 84% of respondents (70 respondents) stated that they had performed an unethical act during the construction of a project.

A cross tabulation of the age of the construction project manager's admission to acting unethically and the occurrence of rework presented in Table 4.10. Table 4.11 presents the results for the Chi-Square test.

Table 4.10: Unethical acts cross tabulated with the occurrence of rework

Chi Square Test			
	Value	**df**	**(p)**
Pearson's Chi Square	**9.52**	**2**	**0.008**
Number of Valid Cases	**86**		

Table 4.11: Chi-square test results between the respondents admitting to performing an unethical act and the occurrence of rework on the works under the respondent's control

		Admission to performing an unethical act			
		Yes	No	Maybe	Total
Occurrence of Rework	Yes	72	6	0	78
	No	4	4	0	8
	Maybe	0	0	0	0
	Total	76	10	0	

As presented in Table 4.11, there is a statistical relationship between an unethical act performed by a construction project manager and the occurrence of rework on the work under the construction project manager's control.

The Chi-square test presents an association of 0.008 (99.2%). The association can be assessed through the analysis of data presented in Table 4.10. As indicated, the association suggests that construction project manager's unethical decisions may have an impact on the occurrence of rework on the work under the construction project manager's control.

4.5 Research Hypothesis Revisited

The research hypothesis presented in Chapter One posits that rework is preventing the successful timeous completion of construction projects. Rework is caused by construction project managers making unethical decisions during the construction process. Currently, there are no restrictions in place from preventing a construction project manager from making unethical decisions during the construction process.

Persuasive evidence presented through the findings in this study support that the hypothesis is positive.

Findings presented in Figure 4.1 generated from **Question 3.1** posed on the construction project manager's questionnaire in this study show that 94% of respondents indicated that rework was a barrier to the successful timeous completion of construction projects. Further findings presented in Figure 4.10 generated from **Question 3.5** posed on the construction project manager's questionnaire indicated that 100% of respondents believed that rework on a construction project was a direct result of poor ethical decision making by the construction project manager. Furthermore, findings presented in Figure 4.13 produced from **Question 3.8** posed on the construction project manager's questionnaire provided that 57% of respondents believed that the implementation of an ethical code of conduct would have a direct impact on the reduction of amount of rework experienced during a construction project.

A Chi-Square test testing the association between the occurrence of rework and whether or not a construction project manager had knowingly acted unethically indicates a 99% association (results presented in Table 4.11) The results of the Chi square test supports the theory that construction project managers ethical decision making has a direct impact on the occurrence of rework.

The further findings from the construction project manager's interviews conducted during 2016 together with the findings from the 2011 formal and informal interviews strengthen and reinforce the findings from the questionnaire undertaken during the case study.

4.6 Summary

The findings and analysis presented in this chapter can be associated with the theoretical debate presented in Chapter Two of this study. Moreover, the findings in this study present additional information that address gaps in the available literature. From the data generated through this study, a link can be drawn between rework on a construction project and timeous completion. Furthermore, findings of this study indicate that there is a correlation between the occurrences of rework with poor ethical decision making. The data presented in this chapter also provides supportive evidence that the implementation of an ethical code of conduct may have an impact on a construction project manager's ethical decision making onsite.

The data generated in Chapter Four suggests that construction project managers with a level of experience between 10 and 20 years are more likely to make unethical decisions on site as opposed to construction project managers with a level of experience between 0-10 years. Furthermore, the data suggests that construction project managers between the ages of 41-50 years are more likely to request an employee to perform an unethical act on their behalf as opposed to construction project managers between the ages of 18-30 years.

The conclusions and recommendations to this study are presented in Chapter Five.

Chapter Five: Conclusions and Recommendations

5.1 Introduction

This chapter presents the conclusions to the study, highlights the limitations that were encountered during the study as well as recommendations based on the findings generated from the study. The conclusions are drawn from evaluation of findings in association with the research questions and objectives posed in Chapter One. The conclusions are drawn from the literature reviewed (Chapter Two) as well as from the findings and analysis determined from the data provided through the interviews and questionnaire (presented in Chapter Four).

5.2 Rationale for the study

The rationale for this study is based on the premise put forward by Feng, Tommelein and Booth (2009) who argued that rework within a construction project prevents the successful timeous completion of the same construction project. Moreover, rework is as a result of unethical decision making on the part of the construction project manager (Feng et. al., 2009).

5.3 Findings

The research questions posed in this study in Chapter One were presented in three distinct sections. Four research objectives were aligned with the three distinct sections. Table 4.1 presented in Chapter Four presents the association between the research questions and the research objectives presented in Chapter One. Within the three sections presented the general findings of each objective are discussed.

The analysis of the research questions and objectives are presented in three sections as follows:

- Section one presents conclusions for research question one and objective one.
- Section two presents conclusions for research question two and objectives two.
- Section three presents conclusions for research question three as well as objectives three and four.

Section 1

The existence of non-conformances occurring within the construction industry has been established and well documented. Feng, et al. (2009) argued that the continual occurrence of non-conformances are taking place unnecessarily within the construction industry. Furthermore, the consequence of non-conformance is almost always the occurrence of rework.

Findings from this study suggest that rework undertaken during construction is having a negative impact on the construction process as well as the final completion of the project. The findings from the questionnaire administered in this study further reinforced the findings from the literature review with 86% of respondents indicating that rework will have a negative impact on the successful completion of a project. These findings are supported through the additional interviews conducted during 2016.

Determining the causes of rework is an import step in understanding the problem of unsuccessful project completion. Several root causes of rework exist. However Alwi et al. (2001) established that the common denominator amongst all root causes is the human influence.

The amount of rework occurring on construction sites has been found to be drastically reduced through the implementation of better management systems and processes. It is the human input or lack thereof which plays a key role in the reduction of rework and ultimately the successful completion of the job.

Section 2

Since the emergence of the philosophies surrounding ethics and ethical behaviour developed through, among others, Hammurabi, Plato, Socrates, Xenophon and Aristotle, it can be argued that humans have a propensity to comprehend and apply the virtues of ethics and ethical behaviour. The comprehension of ethical concepts was demonstrated and reinforced through analysis of the findings obtained through the interviews and the questionnaire by construction project managers. The findings indicate that all of the construction project managers who participated in the study believed themselves to be ethical and agreed with the definition of ethics as presented by the Oxford English Dictionary (2006).

The findings to this study suggest that all of the construction project managers who participated in this study believed that they are ethical and that they maintain and promote ethical standards. All of the construction project managers who participated in the study indicated that they could determine the difference between what is correct and incorrect in terms of work under their control. However, the construction project managers who participated in this study admitted to and knowingly acted unethically towards works under their control. Furthermore, 34 (40%) of the construction project managers who participated in this study had continued to act unethically, even after being confronted by an employee with regards to the unethical circumstance.

Gill (2003) explained that humans have ethics, but in some instances, humans choose not to apply ethical standards. The construction project managers who participated in this study demonstrated similar behaviour to that described by Gill (2005) toward the work under their control. Results from the questionnaires indicate that 83% of construction project managers who participated in this study admitted to performing an unethical act. Moreover, 67% of the respondents had requested an employee to perform an unethical act. During the interviews conducted in 2016, up to 63% of the construction project managers admitted to performing an unethical act. From these findings it can be determined that the construction project managers who participated in this study had acted unethically in relation to works under their control.

One hundred percent (100%) of the construction project managers who participated in this study claim that construction project managers are aware that employees perform unethical acts in the work environment. Findings from this study suggest that in most circumstances the construction project manager is the source of the unethical act, by way of instructing the employee to perform the unethical act. Findings from this study further indicate that the construction project manager is willing to accept responsibility for the occurrence of non-conformances performed by employees, as ultimately it is the construction project manager who accepts overall responsibility on site. Findings in this study indicate that 83% of the construction project managers who participated in this study believe that a construction project manager is responsible for all actions of all employees on site.

Kubal (1994) stated that the construction industry is viewed by the general public as an industry that often has to deal with poor quality end products and the rework associated with

the poor quality. Poor quality of end products needs to be addressed and rectified, through various quality systems.

In this study a non-conformance has been defined as an element which does not meet the required specifications set forward by the professional team. Moreover, the non-conformances that occur on construction sites are brought about by poor quality workmanship. However, findings from this study suggest that the occurrence of non-conformances on a section of works under the construction project manager's control can be attributed, in part to non-application of ethical conduct by the construction project manager. Findings from the questionnaire adopted in this study indicate that 96% of construction project managers had experienced a non-conformance in terms of the work under their control. Furthermore, it was established that 100% of construction project managers who participated in this study believed that an unethical act would result in the occurrence of a non-conformance. These findings were further reinforced through the interviews conducted in 2016 where 100% of construction project managers had experienced a non-conformance.

Having established through findings in this study that rework is a constraint to the successful timeous completion of a construction project and having established that non-conformances commonly occur due to poor ethical decision making, a link can be established between poor ethical decision making by the construction project manager, and the quantity of rework undertaken on a construction project.

Section 3

According to Harvey and Masons (1995:138) a code of conduct is "*A set of conventional principles & expectations that are considered binding on any person who is a member of a particular group".* Establishing a code of conduct is required to establish regularity and ensure compliance of professionals. This compliance will ultimately provide a level of trust for the end users as well as the owners of construction projects.

Ethical codes of conduct can have an impact on the ethical responses of individuals. When individuals are subjected to enforce ethical conduct, correct decision making almost always prevails. The implementation of an ethical code of conduct by the CIOB together with the

IES in December 2016, reinforces the importance of such a code of conduct and further indicates the requirements of an Ethical code of conduct in the construction industry.

During questionnaires and interviews, the notion of an ethical code of conduct having a positive impact on construction project managers was reinforced by the fact that 57% of the construction project managers who participated in this study stated that the implementation of an ethical code of conduct would reduce the number of poor ethical decisions made. Further to these findings, 75% of construction project managers interviewed during the 2016 interviews agreed with the implementation of an ethical code of conduct. The benefit of reducing the number of poor ethical decisions, would directly impact the amount of rework that would take place on a construction project and ultimately the timeous completion of construction projects.

5.4 Defence of Methodology

The selection criteria for the case study applied in this study are presented in Table 3.1. The selection criteria was determined on the following basis:

- The project was required to be under construction during the year 2011 to be able to examine any non-conformances
- The project required a minimum of 100 construction project managers in order to allow for a large capture area
- The contractors had to have experienced non-conformances during the construction process
- The project required a minimum of three contractors on site to ensure that the procedures on site were not attributed to a specific contractor's structure
- The same project management and professional team were to oversee all of the contractors to ensure uniformity within specifications

After evaluation, it was deemed that the Medupi Power Station construction project presented all of the required criteria in order for the project to be incorporated as a case study into this study. Moreover, after evaluation it was determined that geographical and environmental aspects were not similar on other projects.

The use of multiple case studies would not have allowed the elimination of the environmental factor which remained constant at the Medupi Power Station project. Furthermore, by utilizing multiple case studies there may have been an impact from multiple professional team's specifications not remaining constant, an item which was eliminated by the using the Medupi Power Station project for the case study.

Further interviews conducted during 2016, were undertaken to reinforce the original findings from the interviews and questionnaires. The further interviews were not conducted on construction project managers from the Medupi Power Station project in order to provide a comparative set of data for analysis from addition construction projects.

5.5 Challenges Experienced During the Study

During the undertaking of the interviews and questionnaire, the following problems were experienced:

- Obtaining consent from the Johannesburg construction companies proved to be difficult. One out of the six construction companies allowed the research to be undertaken.
- The construction project managers had demanding schedules and finding to suit the construction project managers to conduct the interviews proved difficult.

5.6 Limitations Revisited

The following limitations were experienced during the undertaking of this research:

- This study was limited to data gathered from the construction industry of the Medupi Power Station project in the Limpopo province in South Africa as well as data collected from construction projected managers engaged in construction projects in the city of Johannesburg, South Africa.

- External factors such as time and funding limited the study given that the time and funding available for the research extended from September 2010 to December 2012.

The researcher undertook a hiatus between January 2012 and December 2013 due to personal and professional commitments. The research recommenced in January 2014.

5.7 Recommendations for Further Study

The following recommendations for further study are as follows:

- Further study should examine the nature of the unethical decisions being made by the construction project managers.
- Further study should review the impact of rework caused by the construction project manager's unethical decision making.
- Further study should test the creation and application of an ethical code of conduct applied within the construction industry sector. Further research should test and monitor the effect of the code of conduct on the construction project manager's ethical behaviour.

5.8 Summary

It has been shown through the findings in this study that the application of ethics and ethical behaviour of construction project managers exists within the construction industry. However, application of ethical behaviour by construction project managers is lacking. The ethical principles of the construction project managers are not being upheld and applied and are resulting in the occurrence of non-conformances and ultimately rework on construction projects, which ultimately leads to construction projects not being completed timeously. Through the implementation of an ethical code of conduct, the number of poor ethical decisions might have the potential to be reduced. The impact of an improved ethical decision making process by construction project managers could be the reduction of rework occurring on a construction projects and improvement with regard to timeous completion of works.

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APPENDICES

Appendix A: SACPCMP Code of Conduct

1. Definitions:

The Act – means the Project and Construction Management Professions Act, 48 of 2000.
Council - means the South African Council for the Project and Construction Management Professions established by Section 2 of the Act, 48 of 2000.
Project – means the Total Development envisaged by the client including the Professional Services.
Registered Persons – means persons registered in terms of section 19(2) of the Act.

2. Introduction

All persons registered with the South African Council for the Project and Construction Management Professions shall uphold and advance the honour and dignity of these professions in keeping with high standards of ethical conduct and shall:
2.1 act with integrity and sincerity in serving their employers, clients and the public with diligence and care.
2.2 strive to increase their competence and the prestige of their profession.
2.3 shall apply their skill and knowledge to advance human welfare.
2.4 not engage in any act of dishonesty, corruption or bribery.

3. Relations with the public

Registered Persons shall:
3.1 in carrying out their responsibilities have full regard to the public interest.
3.2 uphold the honour and dignity of their profession.
3.3 be objective and truthful in professional reports, statements, or testimonies, including all relevant and pertinent information therein.
3.4 have due regard for the safety, health and welfare of the public and the environment.
3.5 express an opinion on a project or construction management subject only when it is founded on adequate knowledge and honest conviction.

4. Relations with employers and clients

Registered Persons shall:

4.1 discharge their duties to their employers and clients in a responsible and competent manner.

4.2 act in all matters as faithful agents or trustees of each employer or client.

4.3 not accept compensation from more than one party for the same service, or for other services pertaining to the same project, without the consent of all interested parties.

4.4 disclose to their employers and clients any interest, whether direct or indirect, with other parties dealing with or relating to or in conflict with the business of their employers and clients.

4.5 disclose, in writing, to their employers and clients, the status of their professional indemnity cover insurance.

4.6 not unless required by law or by this code, divulge any information of a confidential nature which they obtained in connection with an appointment.

5. Relations with other professionals

Registered Persons shall:

5.1 Act with integrity, sincerity and honesty in all dealings with all other professionals.

5.2 not maliciously or recklessly injure or attempt to injure, whether directly or indirectly, the reputation, prospects or businesses of others.

5.3 not discriminate on grounds of gender, race or ethnic origin, sexual orientation, marital status, creed, nationality, disability or age.

5.4 not request, propose, or accept professional commissions on a contingency basis under circumstances that may compromise their professional judgement.

6. Standards of Professional performance

Registered Persons shall:

6.1 undertake work only for which they possess the necessary skills, knowledge and resources.

6.2 not falsify or permit misrepresentation of their own or their associates' academic or professional qualifications.

6.3 endeavour to provide opportunities for professional development and advancement of candidates in their employ or under their supervision.

6.4 undergo regular continuing professional development as prescribed to enhance and maintain their personal professional competence.
6.5 notify the Council immediately on becoming aware of a violation of this code by any other Registered Person.
6.6 notify the Council immediately of becoming insolvent.
6.7 Comply with all requirements or provisions of Act, 48 of 2000.

7. Disciplinary procedures

In the event of a complaint the disciplinary procedures as set out in the Act (48 of 2000) will be applied as follows:
7.1 Sect. 28: Investigation of charge of improper conduct.
7.2 Sect. 29: Charge of improper conduct.
7.3 Sect. 30: Appointment of Disciplinary Tribunal.
7.4 Sect. 31: Disciplinary Hearing.
7.5 Sect. 32: Proceedings after hearing.
7.6 Sect. 33: Appeal against decision of Disciplinary Tribunal

Appendix B: Ethics Approval Certificate 2011

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON MEDICAL)
H111014 Barnes

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER H111014**
PROJECT TITLE	The Cost of Non-Conformance
INVESTIGATOR(S)	Mr C Barnes
SCHOOL/DEPARTMENT	Construction Economics and Management
DATE CONSIDERED	14 October 2011
DECISION OF THE COMMITTEE	Approved Unconditionally
EXPIRY DATE	31 October 2013
DATE 20 December 2011	**CHAIRPERSON** (Professor R Thomson)

cc; E Heron

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10005, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

Signature

26 / 01 / 2012
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Appendix C: Construction Project Managers Formal Interview 2011

Explanations:
A Construction project manager is a supervisor in control of a section of works, and is responsible for production and cost control in relation to the specified section of works.
A non-conformance in the context of this study is interpreted as a non-conformance that has been brought to the attention of the client and professional team as well as non-conformance that has not been brought to the attention of the client and professional team.
The contents of this interview are completely confidential and anonymous. The contents shall remain property of the researcher and shall be published for the purpose of the study only.
You have the right to refuse to answer any question.

Questions

1. Please provide your understanding to the definition of ethics.

2. Please provide your understanding to the definition of a non-conformance.

3. Do you believe that rework has a negative impact on a construction project?

4. Do you believe that you are an ethical person in terms of the definition: *"ethics is; knowing the difference between wrong and right?"*

5. Are you aware of the existence of the South African South African Council for Project and Construction Management Professionals (SACPCMP)?

6. Are you a member of the SACPCMP?

7. Please explain your understanding of the function of the SACPCMP.

8. Are you aware of non-conformance occurring on your section of works at the construction of the Medupi Power Station?

9. Have you performed an unethical act during the undertaking of the works at Medupi Power station?

10. Would you ask one of your subordinates to perform an unethical act on your behalf in terms of the works in your section at Medupi Power Station?

11. What, in your view could be the result of a non-conformance performed by you or by a subordinate to you on your section of works during the undertaking of the works at Medupi Power Station?

12. Can a non-conformance performed by an operative under your control be attributed to an error on your behalf?

13. How, in your opinion can non-conformances resulting in rework be prevented from occurring?

14. Do you believe an ethical code of conduct would prevent a Construction project manager from allowing non-conformances from occurring?

Appendix D: Table of Interviewees 2011

Interviewee	**Place interview was conducted**	**Time interview was conducted**	**Duration of the Interview**
A	Interviewees' home	11:25	17 minutes. 26 seconds.
B	Interviewees' home	15:30	12 minutes. 13 seconds
C	Interviewees' office	17:40	16 minutes. 10 seconds.
D	Interviewees' office	18:45	15 minutes 9 seconds
E	Interviewees' board room	12:10	21 minutes 8 seconds
F	Interviewees' office	19:45	19 minutes 43 seconds

Appendix E: Construction Project Manager's Questionnaire

Explanations
A Construction project manager is a supervisor in control of a section of works, and is responsible for production and cost control in relation to the specified section of works.
A non-conformance in the context of this study is interpreted as a non-conformance that has been brought to the attention of the client and professional team as well as non-conformance that has not been brought to the attention of the client and professional team.
The contents of this questionnaire are completely confidential and anonymous. The contents shall remain property of the researcher.

Section 1: Biography

Please circle in accordance with your biography.

Question 1.1
Are you:
Male Female

Question 1.2
Your age:
18-25 26-30 31-35 36-40 41-45 46-50 51-55 55+

Question 1.3
Your Current Position:
_____

Question 1.4
Length of experience in the Construction industry:

0-5 years 5-10 years 10-15 years 15-20 years 25+ years

Question 1.5
What is your highest qualification?

Experience Only Diploma BTech Bachelor's degree Honours Degree
Master's Degree PHD

Section 2: Theories of Ethics

Question 2.1
Please use the following guide to answer the question that follows.
1 = Strongly Disagree, 2 = Disagree, 3 = Unsure, 4 = Agree, 5 = Strongly Agree.
The definition for ethics is: Knowing the difference between wrong and right.

1 2 3 4 5

Question 2.2
Do you believe that you are an ethical person in terms of the definition for ethics used in question 1?

Yes No Unsure

Question 2.3
Are you aware of the South African Council for Project and Construction Management Professionals (SACPCMP)?

Yes No Unsure

Question 2.4
Are you a member of the South African Council for Project and Construction Management Professionals SACPCMP?

Yes No Unsure

Question 2.5
If you answered no to question 4, please indicate a reason why you are not a member of the SACPCMP.

_____
_____
_____
_____

Section 3: Ethics in Practice

Question 3.1
Do you believe that rework is an obstruction to the successful completion of a construction project?

Yes No Unsure

Question 3.2
Has a non-conformance resulting in rework occurred on a section of the works under your control?

Yes No Unsure

Question 3.3
Have you performed an unethical act on the works under your control?

Yes No Unsure

Question 3.4
If you answered yes to question 3.2 please indicate if the unethical act was:

a) A technical matter
b) A communicational matter
c) A contractual matter
d) Other, please specify_____

Question 3.5
Do you believe an unethical act towards the works under your control will result in a non-conformance and ultimately result in the occurrence of rework?

Yes No Unsure

Question 3.6
Can a non-conformance performed by a member of your team under your supervision be attributed to an error on your behalf?

Yes No Unsure

Question 3.7
Have you asked a member of your team under your supervision to perform an unethical act on your behalf in terms of the works in your section at Medupi Power Station?

Yes No Unsure

Question 3.8
If you answered yes to question 3.6, did the member of your team dispute that you were instructing them to perform an unethical act?

Yes No Unsure

Question 3.9
Do you believe that a non-conformance will result in an extra time spent by the contractor in order to correct the non-conformance through rework?

Yes No Unsure

Question 3.10
Do you believe an ethical code of conduct would prevent a Construction project manager such as yourself from allowing non-conformances from occurring?

Yes No Unsure

Appendix F: Ethical Approval Certificate 2016

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Barnes

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H16/04/04**
PROJECT TITLE	Ethical decision making: The impact rework plays within the construction industry
INVESTIGATOR(S)	Mr C Barnes
SCHOOL/DEPARTMENT	Construction, Economics & Management/
DATE CONSIDERED	22 April 2016
DECISION OF THE COMMITTEE	Approved unconditionally
EXPIRY DATE	24 May 2019

DATE 25 May 2016 **CHAIRPERSON** (Professor J Knight)

cc: Supervisor : Dr E Heron

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10005, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to completion of a yearly progress report.**

Signature

26/05/2016
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Appendix G: Construction Project Managers Formal Interview 2016

Construction Project Managers Interview 2016

A Construction project manager is a supervisor in control of a section of works, and is responsible for production and cost control in relation to the specified section of works.

A non-conformance in the context of this study is interpreted as a non-conformance that has been brought to the attention of the client and professional team as well as non-conformance that has not been brought to the attention of the client and professional team.

The contents of this interview are completely confidential and anonymous. The contents shall remain property of the researcher and shall be published for the purpose of the study only.

You have the right to refuse to answer any question.

Questions

1. Do you believe that rework is an obstruction to the successful completion of a construction project?
2. Do you believe that a non-conformance will result in extra time spent by the contractor in order to correct the non-conformance through rework?
3. Please provide your definition of ethics.
4. Do you believe that you are an ethical person?
5. Has a non-conformance resulting in rework occurred on a section of the works under your control?
6. Have you performed an unethical act on the works under your control?
7. Do you believe an unethical act towards the works under your control will result in a non-conformance and ultimately result in the occurrence of rework?
8. Can a non-conformance performed by a member of your team under your supervision be attributed to an error on your behalf?
9. Have you asked a member of your team under your supervision to perform an unethical act on your behalf in terms of the works in your section.
10. Are you aware of the South African Council for Project and Construction Management Professionals (SACPCMP)?
11. Do you believe an ethical code of conduct would prevent a Construction project manager such as yourself from allowing non-conformances from occurring?

Appendix H: Table of Interviewees 2016

Interviewee	Place interview was conducted	Time interview was conducted	Duration of the Interview
A	Interviewees' office	07:15	19 minutes 18 seconds
B	Interviewees' office	07:55	16 minutes 12 seconds
C	Interviewees' office	08:22	22 minutes 6 seconds
D	Interviewees' office	11:25	14 minutes 47 seconds
E	Interviewees' office	11:52	17 minutes 11 seconds
F	Interviewees' office	13:10	28 minutes 2 seconds
G	Interviewees' office	13:45	20 minutes 3 seconds
H	Interviewees' office	15:09	17 minutes 9 seconds
I	Interviewees' office	16:35	18 minutes 23 seconds
J	Interviewees' office	18:10	15 minutes 8 seconds
K	Interviewees' office	08:22	14 minutes 42 seconds
L	Interviewees' office	10:51	18 minutes 37 seconds
M	Interviewees' office	11:30	21 minutes 39 seconds
N	Interviewees' office	13:45	18 minutes 56 seconds
O	Interviewees' office	14:22	19 minutes 55 seconds
P	Interviewees' office	17: 45	13 minutes 35 seconds