



THE SCHOOL OF THE BUILT ENVIRONMENT

THE UNIVERSITY OF SALFORD

**Health and Safety in the Construction Industry : A Review of
Procurement, Monitoring, Cost Effectiveness and Strategy.**

By

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Health and Safety in the Construction Industry : A Review of Procurement, Monitoring, Cost Effectiveness and Strategy.

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ABSTRACT.

The management of health and safety is an issue that is relevant and crucial to all organisations across all industries, to include traditional industries, commercial, information technology (IT), the National Health Services (NHS), care homes, schools, higher educational institutions, travel and leisure, etc. Health and safety is specifically significant and crucial for the construction industry. In the United Kingdom, the construction industry is the largest of all industries. It accounts for about 8% of gross domestic product, employs about 10% of the national workforce and generates an annual turnover of up to £250 billion. The UK construction industry has a global reputation for the quality of its work but yet it remains one of the most dangerous industries in the nation.. Research on this thesis is based on a general overview of health and safety in the construction industry, highlighting on a strategic approach to dealing with three major issues with regards to health and safety in the construction industry. First, the thesis tries to deal with the problem of how to improve organisational health and safety (OHS) through the monitoring of the process of procurement in construction projects. For instance, there is a strong belief in the construction industry that any organisational culture of any bidder chosen for a particular project will have an influence on the entire project. Hence, there is a need for the contractor to properly scrutinize bidders with regards to how they handle OHS and how this reflects on their organisational culture. In addition to the proper scrutiny of a client's OHS record, there is also an issue of financial and legal status of a client with regards to indemnity or any insurance considerations in the case of construction accidents. That is, can a client be held accountable for an accident? What type of accidents that will happen during work on the project that the client will be accountable for? Secondly, the thesis will address the issue of cost-effectiveness in construction projects and how OHS is dealt with simultaneously. For instance, in the process of choosing a bidder, sometimes contractors may tend to ignore health and safety issues and decide to choose a client that will result in cost savings, or choosing the highest bidder irrespective of OHS concerns. Hence, there is a risk management concern to be dealt with in such cases. Third, the thesis considers what type of strategic decisions and the responsibilities of both the contractor as well as the client in terms of dealing with OHS with regards to construction projects. In so doing, the research considers various literatures along with previous and practical cases of construction projects and the type of strategic decisions taken by both contractors as well clients with regards to OHS. A quantitative/qualitative research approach is employed in conducting this research

alongside an inductive research paradigm. Data collection includes various sources, such as library, internet, (such as web searches with various keywords and databases as Emerald Insight, SPSS, Elsevier, Mintel, etc.). Materials to be used include textbooks, journal articles (print and online), peer review journals from databases, online publications, websites, media articles, PDF documents, and more. Henceforth, this research will discuss and try to identify a gap within health and safety in the construction industry, reviewing procurement monitoring, cost effectiveness and strategy.

KEYWORDS

Health and safety, organisation, construction, industry, culture, procurement, management, accidents, projects, risk, cost, effectiveness.

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LIST OF ABBREVIATIONS.

OHS - Occupational Health and Safety

HS - Health and Safety

HSW - Health and Safety at Work

CDM - Construction Design Management

ILO - International Labour Organisation

UK - United Kingdom

US - United States

EU - European Union

SMS - Safety Management System

HSCE - Health and Safety Consultation of Employees

ACAA - Australian Civil Aviation Authority

OHSAS - Occupational Health and Safety Assessment Series

MHSWR - Management of Health and Safety at Work Regulations

RHCD - Random House College Dictionary

WHO - World Health Organisation

CHAPTER 1

INTRODUCTION

1.1 Research Background.

1.1.1 Introduction

Health and safety is very important to all areas in the building and construction industry. It has always been considered very important as it is considered to be a greatly exposed sector when it comes to occupational accidents. Indeed, improvements have been made in health and safety performance in some aspects of the construction industry, very little attention has been given to how the process of procurement impacts within the industry, with underlying themes of financial and legal liabilities and accountability for accidents. This has been seen in most countries – the reality is that the construction industry continually has injury and fatality statistics that make it one of the most dangerous industries in which to work predominantly, and how these statistics bear up within the organisational culture. Cutting corners, to deliver a project on time and to forego any relevant health and safety legislation, indeed to win a contract illegally, within the jurisdiction, is becoming a concern. In view of this and as a result of the increasing number of accidents, the development and publication of standards and good engineering practices based on experience and codes started. In the UK for example, the required documentation is published in accessible outlets and forms such like official governmental publications, laws, directives and in standards, such as Health and Safety at Work Acts (HSWA, 1974). Based on previous accidents, the general and technical weaknesses of the designs (such as poor use of codes, poor judgement because of lack of experience, etc.), were reduced significantly by adding new requirements, but after that it became apparent that many accidents still occurred and that the root causes of these accidents were hardly the result of technical failures but rather of the result and consequences of bad or illegal practices within the organisation, non observance of the relevant health and safety legislation regarding the specific incident or accident. However, such occurrences could also be due to the lack of adherence to standard health and safety rules or lack or poor communication within the company. Other studies, (Hinze, 2002; Vredenburg, 2002) have shown that health and safety improvements will only be achieved if workers, contractors and the client change their behaviours and incentive schemes are

implemented to motivate the workforce. It could be seen that these efforts are not sufficient truly to curb the occurrence of unsafe acts on construction sites. Accordingly, preventing occupational injuries and illness and the maintenance of legal, financial and scrutiny of the bidders at the pre-stages of the construction project, should be a primary concern for all employers, contractors, stakeholders in all parts of the industry, in all parts of the world. In the global market there is evidence of the same construction problems which appear very similar from country to country. Construction health and safety problems appear to be everywhere. Consequently health and safety can be improved by addressing construction problems in many different ways as it reflects the common threat that binds the global research efforts in construction safety.

1.1.2 Health and safety at the workplace

Health and safety management is a problem that relates to and is vital for all companies, belonging to various industries, ranging from traditional to commercial and information technology (IT) industries, the National Health Services (NHS), care homes, schools, higher educational institutions, travel and leisure, etc. Health and safety is specifically significant and crucial for the construction industry (Grigg, 2010). The organization and its functions are influenced by health and safety issues and practices at the workplace. For a company that is considered to be at 'low hazard', the health and safety issues can be managed by a single proficient manager. However, in a 'high hazard' organisation, such as a manufacturing plant or construction project, different specialists (engineers, medical doctors, lawyers, trainers, supervisors, work planners, etc.) may be assigned the responsibility of helping the manager responsible for health and safety in the organization in making certain that the health and safety regulations in the firm are up to the mark. In the United Kingdom, the construction industry is the largest of all industries. It accounts for about 8% of gross domestic product, employs about 10% of the national workforce and generates an annual turnover of up to £250 billion (Hughes & Ferrett, 2012). The UK construction industry is well known all over the world for its quality operations, however, it continues to be one of the riskiest industries in the country (House of Commons, Business and Enterprise Committee, 2012). For instance, back in 2004/2005 the rate of injury per 100,000 workers was 3.4 with an industrial average of 0.8 and in 2006/2007 there was a 28% increase in fatalities accounting for about 32% of all recognisable fatal injuries. The Health and Safety Executive (HSE)

found that till August, 2010, there was an 5% decrease in output in 2009, as compared to 5% drop for the whole economy (Hughes & Ferrett, 2012). The UK Government initiated the 'Revitalizing Health and Safety' campaign in collaboration with the Health and Safety Commission in June 2000. This led to the establishment of targets by the construction industry for bringing a decline in the number of major and critical injury to the workers.. For example, a client managing a construction project is perceived to be a significant stakeholder seeking to enhance the levels of health and safety standards This kind of client should be firm on obtaining sufficient evidence for good health and safety performance and record at the preliminary tendering stage, and should make certain that health and safety standards are fulfilled at the construction site. The client should require that all individuals working on the construction site have adequate training with regards to their specific jobs on the site. There are various challenges and responsibilities involved in terms of dealing with OHS in the construction industry, and such challenges and responsibilities are based on the stakeholders in the industry. For example, the HSE is obliged to make certain that there are adequate risk controls with respect to health and safety of the workers (Health and Safety at Work Act 1974). According to the HSE, the effective management of OHS is important to the well-being of employees, and contributes towards the improvement of organisational reputation, which may lead to the achievement of high-performance teams and financial benefits for the organisation. In terms of corporate responsibility as far as OHS is concerned, the HSE encourages organisations to demonstrate, at board level, the significance of OHS; enhance OHS systems within the organisation in order to reduce ill-health and injuries; and report publicly on OHS - alongside performance measured against goals. As stakeholders in the construction industry, organisations also have various challenges and responsibilities in terms of dealing with OHS. Some of the challenges faced by organisations include organizational complexity, the pressure of performance target and production and budget and financial constraints (Shehu & Akintoye, 2010). However, (Wang, 2004), states there are certain powerful incentives available for organisations to strive towards improving OHS standards, such as economic, legal and moral considerations, which are normally covered under the aspect of corporate responsibility or corporate social responsibility.

Corporate responsibility can be defined as approach by organisations in managing the core aspects of their business (economic) alongside social and environmental considerations in order to promote sustainable and positive effects on both the business as well as the society. The aspect of corporate

responsibility in the workplace has been extensively used in the 21st century, especially in the last few decades mainly due to corporate malpractices that affected the entire operations of organisations and even led to the collapses of many well-known businesses (Idowu & Filho, 2009). Corporate responsibility covers a broad area of issues such as the impact of an organisation's operations on human rights, Third World countries and the environment in general. Therefore, OHS plays a crucial role in corporate responsibility. It has been asserted earlier that a few significant motivations exist that motivate organizations to enhance OHS, one of which is that of moral considerations. A justification for this is the rate of workplace accidents as also mentioned above. Workplace accidents can sometimes lead to serious injuries, and can even be fatal. Accidents can be major, such as a fracture of a person's limb that may lead to a long-stay in the hospital. Also, work related disease or ill-health can lead to absence and even death. Such occurrences may result in costs to the organisation (such as sick pay or compensation payments), the industry (industry-based industrial scheme, and even the entire economy (for instance, back in 2009/2010 there were about 1.3 million people in the UK who were suffering from work-related ill-health, which led to a loss of about 23 million working days (Hughes and Ferrett, 2012). The legal incentive for the improvement of OHS by organisations includes organisations' civil and criminal law duty. There are legal consequences in place in the UK for organisations' breach of health and safety law, such as fines and compensation awards. Economic incentive for improving OHS includes the avoidance or reduction of the costs of accidents and ill-health in the workplace. For example, the organization is going to incur direct as well as indirect costs in case of any organization accident or ill-health. In addition, it will also incur insured and uninsured costs. Hence it is crucial to consider all these costs in the calculation of the full costs of accidents and ill-health in the organisation. Therefore, organisations do have a strong moral, legal and economic case to do more in order to reduce levels of accidents and ill-health in the workplace, thereby improving OHS.

In addition to the economic case for OHS mentioned above, there is a business case for OHS as well. Such a business case, according to Burke, Clarke and Cooper (2011) is based on the potential costs as a result of ineffective standards of OHS. And as mentioned previously, there are both direct as well as indirect costs incurred by organisations due to poor standards of OHS. Direct costs are those costs incurred as a direct effect of an accident or ill-health. Some costs may be insured or uninsured. Insured direct costs may include damage to plants, equipment, vehicles, and buildings; claims levelled against the

organisation and the public liability insurance; and any costs that can be directly attributed to the accident that has occurred or any ill-health to an employee. Uninsured indirect costs that may be incurred as a result of poor standards of OHS include sick pay; fines as a result of prosecution by government authorities; an increase in insurance premium due to an accident; damage to plants, equipment, vehicles, products, property as a result of an accident; compensation not covered by an insurance policy; and legal fees following court actions and claims for compensation. Unlike direct costs, indirect costs may not be attributed directly to an accident or ill-health, however such costs may result from accidents and ill-health over a period of time. Such indirect costs may also be insured as well as uninsured. Insured direct costs include liability claim for products and processes, cumulative business loss and cost of recruiting a replacement for the loss of an employee due to an accident or ill-health. Uninsured indirect costs include additional overtime payments, poor corporate image and loss of organisational goodwill, delays in processes and production, cost of providing first-aid treatments, lower employee morale which may affect the level of workplace productivity, and additional administration time. In terms of the legal framework regulating OHS in the UK, there are two applicable parts of the law: civil and criminal law. Civil law deals with disputes arising between individuals or those disputes between companies and individuals. In such a case an individual who normally brings a complaint to court is referred to as the plaintiff or claimant (in the case of Scotland, is known as the pursuer), and the person or company sued is referred to as the defendant (defender in Scotland). In civil law, the court is normally concerned with the liability and the extent of such liability - it is not concerned with guilt or non-guilt. Therefore, a 'balance of probability' serves as the degree of proof required, which is at quite lower degree of certainty in comparison to what is required in the event of a criminal court where 'beyond reasonable doubt' is needed. Criminal law is different from the civil law discussed earlier in the sense that it consists of rules of behaviour that the government has imposed, and these rules of behaviour are usually adopted by the Parliament through 'Acts of Parliament'. The Acts are applicable on the public for their own safety and are subsequently implemented by various government bodies. In case a person defies criminal law, that person is believed to have carried out a crime or offence, and in case the person is indicted, the court will have to determine whether the accused person is guilty or not guilty 'beyond reasonable doubt'. If a person is found guilty under a Criminal Court, he or she could be sentenced to a fine or imprisonment. Examples of criminal laws are the Health and Safety at Work

(HSW) Act and the Road Traffic Act. The HSW Act was adopted following the results of the Roben's Report (1972) (Sato, 2009). Back in 1970, Lord Roben was asked to conduct a review on workplace health and safety. His report, which produced certain conclusions and recommendations, was then the basis of the HSW Act 1974. The principal recommendations of the Act were: a single Act to cover all employees and such Act should entail general duties that should influence the attitudes of people; the Act should emphasise health and safety management and development of workplace safe systems; enforcement of the Act should be focusing on 'self-regulation' by the employers rather than enforcement by the court; and the Act should include all those aspects that are influenced by the activities of an employed, like contractors, visitors and public. Hence, such recommendations resulted in the introduction of the HSW Act in 1974. The HSW Act is enforced by either the Local Authority Environmental Health Officers (EHOs) or the HSE. However, the processes consisting of criminal cases are generally different from those consisting of health and safety matters. In a criminal case, as mentioned above, any prosecution must be proven beyond reasonable doubt. This kind of responsibility is not completely eliminated in health and safety cases; however, section 40 of the HSW Act 1974 asserts that in any duty to carry out a particular act or perform something 'so far as is practicable' or 'so far as is reasonably practicable' or 'use the best practicable means', the accused has the burden of proof to show that he/she could not perform his/her duty in any better way. However, when the burden of proof rests on the accused, only the court needs to be convinced on a balance of probabilities that the proof they are trying to give has actually been done.

1.1.3 Overview of the construction industry

The issue of OHS in the construction industry has become more important in recent years. According to Levine and Haar (2013) about 2 million people work in the UK's construction industry today, making it the UK's largest industry. Over the last few years, the number of construction projects has also grown, contributing to a change in the UK's labour force, including an increase in migrant workers - for instance, back in 2010 about 8% of workers in the UK's construction industry were migrant workers (Levine and Haar, 2013). With regards to this, injuries and fatalities to the construction industry's workforce are increasing, making the fatal accident rate in the construction industry to be over four times the average for all other industries, and contributes the largest amount of work related fatalities for

any industry (Levine and Haar, 2013). Consequently, the UK government alongside the HSE, employers, and trade unions, have agreed a framework of action for the construction industry (Donaghy, 2009). Moreover, both the regulators and the industry itself are facing a major challenge due to shortage of skilled workers and the peripatetic and fragmented nature of the industry (Allen, 2014). The scope of the UK's construction industry is very broad, to including activities such as domestic, commercial and industrial building projects. Such projects may involve new building projects, renovations, refurbishment, repair and maintenance, alterations, etc. Construction projects may commence with the partial or complete demolition of a particular structure, and this may be particularly hazardous to the workers involved in the operation. Some larger construction projects may include the construction of roads and bridges, water supply, sewage, canal, and river schemes. Some of the activities involved in construction projects include site clearance, the dismantling and demolition of building structures, the felling of trees, the dismantling of plant and equipment, and the disposal of waste. Also, construction may include the use of woodworking machines and their related hazards. As mentioned above, some of the construction work may be hazardous, such as decoration, fabrication, cleaning, excavation, roof work, contact with dangerous materials, and the installation, maintenance or removal of certain services like water, gas, electricity, and telecommunications. And some hazards may arise from site operations, such as loading and unloading of materials, storage of these materials and the movement of pedestrians and vehicles. There are certain issues to be taken into account when discussing the construction industry. A majority of the sites normally used for construction work are temporary in nature, and during the ongoing construction work these sites face constant changes. Moreover, even the workforce involved in the work on the site is transient in nature, and most of the time there are less skilled workers receiving on-site training on various construction related issues. Such trainings need to be structured and supervised. According to Hughes and Ferrett (2012) due to the level of literacy among some of the workers involved in construction, the communication of OHS information may be difficult. Also, ongoing work on sites can be affected by poor weather conditions that may lead to the possibilities of the contractor facing construction penalties. Moreover, clients may be keen in seeing projects completed as soon as possible. Hence, contractors may be experiencing additional pressure. All of these issues may lead to the temptation of the contractor compromising on OHS, such as the safe re-routing of traffic on site or providing adequate welfare facilities.

1.1.4 Definition of key terms

Health

Health is the process of protecting the minds and bodies of people against illness as a result of the mishandling of materials, procedures and processes involved in the workplace.

Safety

Safety involves the process of protecting people against physical injury. Health and safety are normally used together to show worry for the mental and physical health of the individuals at work

Accident

The HSE asserts that an accident refers to any unforeseen event that injures people or damages their health. It also refers to any damage or loss to property, materials, business prospect or the environment (HSE, 2014)

Risk

Risk can be generally defined as the likelihood of losing something valuable. Such valuable things may include social status, wealth, or physical wellbeing and health. Such values can be gained or lost depending on the type of risk taken by a person. Risk can also be referred to as the intentional approach to dealing with uncertainty.

Hazard

A Hazard refers to the likelihood of an activity, substance, process or person causing harm to another person, or anything of value. It is also critical to distinguish between a risk and a hazard. Although these two terms are often used interchangeably, however as far as the aspect of construction is concerned, they are frequently being confused - for instance the reference to construction work being high-risk rather than high hazard activities. And most times in construction there is a tendency for the reduction of risks as controls are implemented or improved, despite the continued presence of high hazard. When various controls have been implemented, the level of risk that remains is normally referred to as residual risk. Residual risk is normally high when there are inadequate control measures in place or poor management of health and safety.

Near Miss

The term 'near miss' refers to any incident or occurrence that could have led to an accident.

Dangerous Occurrence

A dangerous occurrence is a grave form of near miss that could have resulted in a serious injury or death. For instance, it may involve the downfall of a crane or scaffold or the breakdown of passenger carrying equipment.

1.2 Problem Statement.

As mentioned previously, the issue of OHS is crucial across all organisations and all industries. In addition, several studies have been carried out with respect to the importance of OHS, such as Ridley and Channing (2003), Taylor (2005), Grigg (2010), Hughes and Ferrett (2012), and the House of Commons, Business and Enterprise Committee (2012). Strategic approaches to dealing with OHS are necessary for both employers' as well as employees' well being. For instance, considering the case of hazards, these normally include dangerous behaviours and substances that can lead to injury or even death to workers. According to Taylor (2005), there are many hazards that employees can be exposed to, such as infectious diseases, poisonous chemicals, and dangerous gases. Hence, organisations across industries, such as construction, that experience these forms of hazards, must design, and follow specific strategies in the event of any occurrence of these hazards. In addition, health and safety plays an important role in ensuring that illness and injury in the workplace and at construction sites are avoided. Such strategies will assist both employers as well as employees in the understanding of the potential hazards they can be exposed to at work or construction site on a daily basis. It has been asserted by Channing (2003) that when organizations typically comprehend how injuries influence their 'bottom line', they have a tendency to try and execute strategies to make sure of their employees' health and safety. In addition, acts of violence and employee misbehaviours within the organisation are cause for concern due to the threat they have on the wellbeing of an entire organisation, industry and even the national workforce. OHS strategies are important in preventing violence within the organisation and assist in raising employee awareness of the potential dangers they encounter in the workplace. Furthermore, there are various problems faced by the construction industry in the UK today that underline the significance of a strategic approach to dealing with the issue of OHS in the construction

industry. In addition, the aforementioned is an important factor when dealing with procurement methods, legal and financial implications and the scrutiny of a bidder by a contractor when dealing with OHS strategies. This typically could dictate a decision by either parties, typically to potentially ignore the relevant health and safety issues and decide to choose a supplier or customer that will result in cost savings, or indeed choosing the highest bidder irrespective of tendering rules or OHS concerns. Hence, there is a risk management concern to be dealt with in such cases. Also, the type of strategic decisions and responsibilities of both the contractor and client in dealing with OHS, to help reduce accidents and fatalities from statistics mentioned throughout. The UK construction industry contributes about £90 billion to the UK economy (which is about 7% of gross domestic product) and employs about 3 million people (Department for Business Innovation & Skills, 2013). Hence, the construction industry has broad significance to the national economy. For many years, there has been much effort involved both in the academic world as well as in practice as an attempt to reduce the rate of fatality, injury and ill-health due to construction work. There have been a lot of initiatives across the industry which have contributed to a long-term benefit in decreasing the number of fatalities, injuries and ill-health; however, in recent years the effects of such initiatives have diminished and the number of injuries and deaths in the construction industry have risen (Department for Business Innovation & Skills, 2013). Moreover, there is limited success in dealing with the causes of workplace ill-health, accounting for the majority of workers' disability and fatality in the construction industry. This research is expected to contribute to the discussion of the various strategies needed in revitalizing the construction industry's approach to dealing with OHS.

1.3 Research Hypothesis.

The UK Government, and the International Labour Organisation (ILO) have for many years been encouraging organisations operating in the construction industry to introduce policies and strategies that will help in the improvement of OHS (Department for Business Innovation & Skills, 2013). Such strategies include improved legislation and policies and the wider availability of OHS services. The UK Government has also been encouraging organisations in construction to introduce various strategies that will improve training and skills, recording and notification of accidents and the introduction of OHS management systems. However, little attention has been received to date with regards to using

procurement, costs, liabilities to the client and stakeholder as a measure in the promotion of improved OHS practices. Although the government on this regard has issued several guidelines, most of these guidelines are not enough in helping organizations in the construction industry to improve their procurement standards that will help in the further improvement of OHS - hence the need for a strategic project by such organisations in dealing with how to improve such standard. There are certain key reasons why OHS should be a serious issue as far as procurement in construction is concerned. One of the issues pertains to health and safety laws in the UK in addition to several other countries across the globe. In several countries like the UK, laws on OHS put responsibility on the client for ensuring the health and safety of all those who are part of their projects. Although to some extent this responsibility may be passed on to a third party such as a consultant or subcontractor, the terms on which this responsibility is passed on are critical in order to ensure that all the parties involved seriously consider such responsibility. Hence, this study attempts to explore how the various parties involved in the procurement process handle such responsibility of OHS. Also, it is a wider conception that the monitoring and enforcement of OHS regulations is the responsibility of government authorities. However, given the huge number of dispersion of construction projects and construction sites, this makes it practically impossible to conduct inspections on all projects and sites by government authorities. Therefore, the process of procurement and the agreement of contractual terms and conditions of a construction project can both be considered as aligning mechanisms in the compliance of any legislation, to include legislation on OHS. This study also attempts to explore the extent to which contractors and clients to a construction contract agree on terms and conditions of a construction contract during the procurement process, and how such terms and conditions are part of the mechanisms that ensure that the project and the work that is involved is in line with legislation on OHS. Therefore, the study explores the possibility of how procurement procedure can either improve or inhibit good practices of OHS. It is a popularly held belief that money is what drives OHS - both contractors, clients and employees believe in this. Hence this study also considers the economic forces that work in the construction industry in order to improve OHS. Some of the economic considerations include the pressure to keep wages as low as possible, however not compromise the improvement of OHS; compensation packages that are align with initiatives to improve OHS; and claim for work related injuries. Although there are various economic incentives in place in UK in particular - as discussed

above - that help in the improvement of OHS, however the research also looks into the aspect of various other economic incentives that work better in terms of improving OHS. Hence the study attempts to propose a number of solutions that makes OHS a higher economic priority for all the parties and stakeholders involved in construction. In making strategic decisions for the improvement of OHS, like any other organisation, organisations in the construction industry normally take into account the various parties involved in a particular construction contract, especially the contractor and the client. In view of all the aforementioned, the thesis will not only give an overview of health and safety in the construction industry, it will evaluate and consider the monitoring of procurement. For instance, there has been a strong belief in the construction industry that any organisational culture of any bidder chosen for a particular project will have an influence on the entire project. Also, there is an issue of financial and legal liability with regards to indemnity of any insurance consideration of any industrial accidents. At the start of the chapter and throughout, statistics have been given to identify and support, thus giving a cause and reason for an investigation into this area. What would be the likelihood for a client or contractor being held accountable for an accident. What type of accidents that would happen on a project would the client or contractor be responsible for? Also, the issue of cost-effectiveness in construction projects and how OHS is dealt with. For instance, in the process of choosing a bidder, sometimes contractors may tend to ignore health and safety issues and decide to choose a client that will result in cost savings, or choosing the highest bidder irrespective of OHS concerns. Hence, there is a risk management concern to be dealt with in such cases and also a consideration will be given to the type of strategic decisions and the responsibilities of both the contractor as well as the client in terms of dealing with OHS with regards to construction projects.

1.4 Aim & Objectives.

1.4.1 Research aim

The principle aim of this research is to give a general overview of the current state of health and safety in the construction industry, and to discuss the procurement, monitoring, cost effectiveness and strategy. It will explore methods used by stakeholders in the construction industry in terms of improving OHS, it will look into various aspects of these strategies, to include those to improve OHS through procurement, the economic priority of these strategies and the various responsibilities and duties of the

stakeholders involved in the industry in terms of designing and implementing strategies that improve OHS.

1.4.2 Research objectives

In order to achieve the above mentioned aim, the following objectives were set:

- Assessing health and safety in the construction industry, a description of general occurrences which have taken place, events and incidents that have allowed accidents to take place and any lessons to be learned,
- An overview of health and safety in the construction industry,
- Monitoring of procurement,
- Vetting bidders for contracts,
- Strategic decisions in construction projects,
- Financial and legal implications with construction accidents,
- Cost effectiveness.

The above objectives, coupled with the following three areas, within a general overview of the current state of health and safety in the construction industry, will be analysed. The first objective in this study is to explore the strategic process of improving OHS through the proper control and management of procurement in construction projects. This includes, finding out the impact that the organisational culture of the parties involved in construction contracts has on a particular project involved; and how this impact will affect the improvement or hindrance of OHS. The study also finds out the steps taken by organisations in selecting bidders for a particular project given that such bidders may influence how OHS is dealt with in the organisation. Second, the project explores the process of organisations in the construction industry attempting to balance or trade-off cost and OHS; which is, finding out the key economic considerations in terms of improving OHS, and why OHS should be an economic priority for organisations in construction. It finds out the significance of economic factors in influencing contractors towards improving OHS strategies. This includes looking into how contractors acknowledge the underlying idea that making money should be the bottom line, in that they should also pay attention to the improvement of human values in an attempt to improve OHS. For many contractors this is not an

easy approach. Therefore the research attempts to find out the extent to which they can deal with such a 'dilemma'. Third, the research explores the process of strategic decision-making in terms of OHS. It attempts to find out the various strategies that organisations consider in terms of dealing with OHS and how these strategies may affect the duties and responsibilities of stakeholders such as the contractor, the client and workers. In such, the thesis attempts to identify who these various stakeholders are and what are their responsibilities. For instance, in the case of a contractor, the study attempts to find out the nature of a contractor, what is to be expected from the contractor in terms of dealing with OHS, etc. In terms of the client, the research explores the level of the client's safety expertise, the reasons and the benefits of the client's involvement in OHS. In meeting the above areas and objectives, an extensive literature review, questionnaires and interviews were carried out and critically analysed.

1.4.3 Scope of the study

As mentioned previously, the problems of health and safety in the construction industry can be addressed simultaneously, with regards to the objectives set out. The scope of this research, based on information retrieval throughout the period of the study, will introduce a foundation in which further exploration can be carried out, with a view to increased awareness of client-contractor relationships in any supply chain/procurement procedure, within a carefully managed health and safety environment. This can be seen as follows;

- To improve general health and safety standards in the UK construction industry,
- To improve better relationships between client, contractor and stakeholder,
- To understand and increase better knowledge of construction procurement,
- To understand and increase better knowledge of strategic decision making in construction projects,
- To understand and increase better knowledge of financial and legal implications with construction accidents,
- To understand and increase better knowledge of cost effectiveness.

1.4.4 Significance of the study

The importance of this research stems primarily from an underlying theme regarding health and safety, to develop an understanding of its structure within a construction environment, and to establish cause and effect regarding procurement.

1.5 Thesis outline and structure.

This thesis is structured into eight chapters, as shown in fig 1

Chapter 1: Introduction - a general insight is given to the study as a whole. It includes a research background that explores the significance of the subject matter of the research and explains and describes various key concepts and terminologies involved in the research. It also defines the problem, aims and objectives of the research and its scope.

Chapter 2: An overview of health and safety - a general overview is given to highlight the background and history of health and safety within the construction industry, identifying examples of accidents and associated typical traits.

Chapter 3: Literature review - provides a literature review of various literature written on the aspect of OHS that are relevant to the topic and the objectives stated in this research, and also includes a discussion of various concepts and terminologies relevant to the aim and objectives of this research.

Chapter 4: The law and legislation - provides a general overview of the law and legislation within the construction industry.

Chapter 5: Research methodology - explains the methodology employed in conducting the research. As a qualitative/quantitative research approach will be adopted, it will discuss the meaning and significance of using this approach. It will also explain the hypotheses and questions asked and to be answered within the research.

Chapter 6: Research questionnaire design - provides a review of the process adopted in designing the research questionnaire.

Chapter 7: Information collection, results and discussion - presents data, results, analysis and furthermore deliberates on the survey findings from questions asked and results obtained from the industry.

Chapter 8: Conclusion and recommendations - a summary of conclusions and recommendations from the research work undertaken.

1.5.1 Outline of Thesis.

A general outline of the thesis is shown in fig.1.

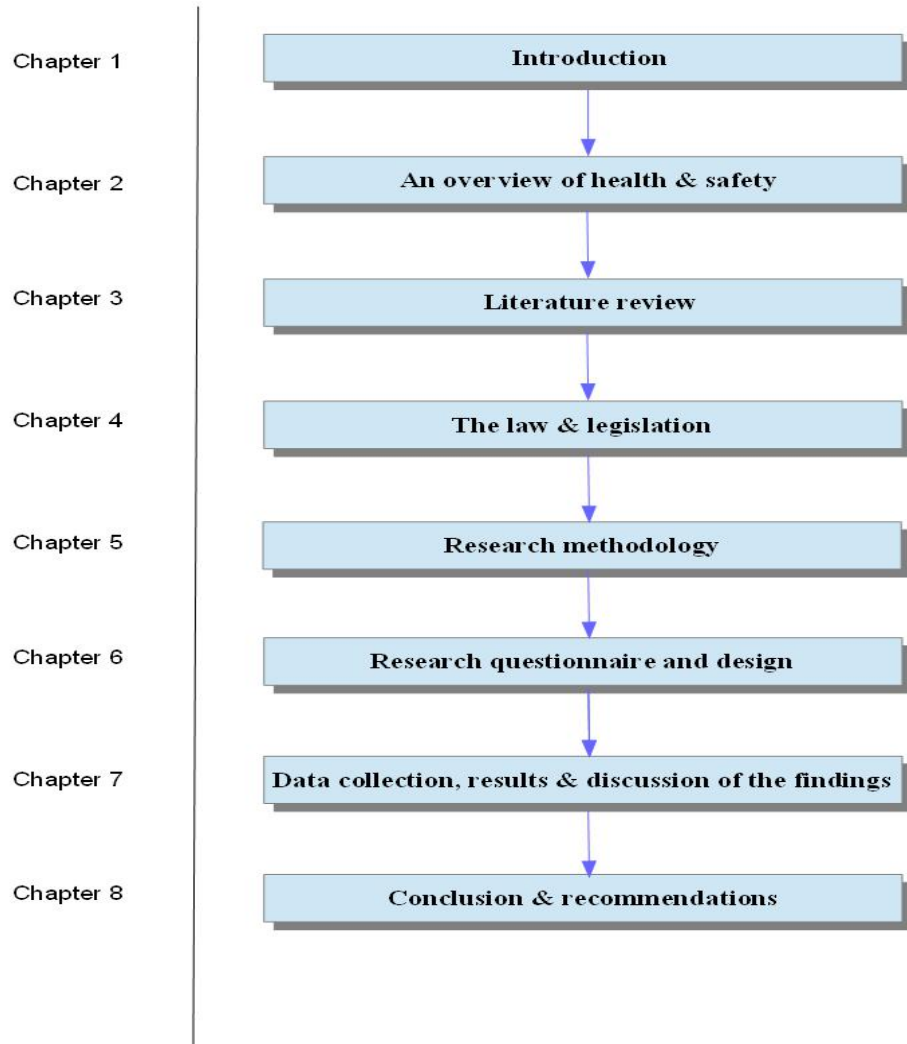


Figure 1 Outline of thesis.

1.6 Summary of chapter.

This chapter has presented and discussed the introductory aspect of this thesis. It includes a background of the topic to be explored – to include the description and significance of the topic and definition of key terms. The key issues surrounding the topic for this thesis are clearly shown in the form of a problem statement, underlining the significance of the topic. The research hypothesis has also been included which shows the reasons and need for undertaking a research on this topic. The aim and objective of the study were stated, showing how the thesis is structured. In the subsequent chapter, the aim of the thesis is to provide an outline of health and safety issues in the construction business, after which a review of different studies written on the theme of this project is carried out .

CHAPTER 2.

AN OVERVIEW OF HEALTH AND SAFETY.

2.1 Introduction.

Health and safety issues have been the subject of study since the development of a construction site and other related work settings. The adverse effects of an unhealthy workplace on the workers were discussed by Hippocrates (460-377 BC). It was known that Caesar (100-40 BC) employed an official for taking care of the safety of his troops (Pease, 1985, Weaver, 1980). The field of health and safety is quite extensive and varied; hence, it is not possible to carry out a detailed discussion of these aspects in this thesis, or in any thesis for that matter, as has been stressed by Geller (1996); Guarnieri (1992); Heinrich (1959); Heinrich, Petersen, & Roos (1980); Margolis & Kroes (1975); Weindling, and others. A conceptual methodology is going to be adopted by the OHS theme. The concepts are abstract and so, it is possible for health and safety experts to create a framework for the concepts. For this purpose, Figure 2 has been developed to explain the impact and flow of health and safety within an organization.

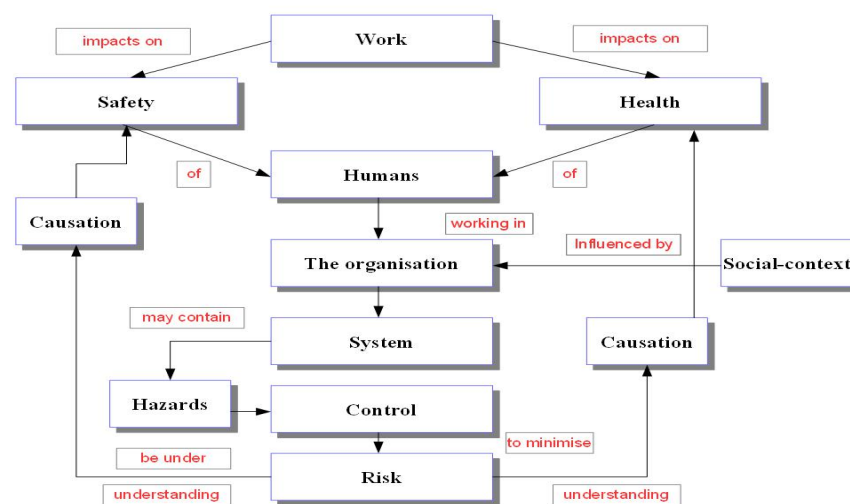


Figure 2 Overview of a health and safety framework.

This chapter presents a generic and observational overview of health and safety, within the construction industry, giving an account of its history, history of accidents, management, health and safety management, risks, motivation, overview of accidents, causation and its effects, legal fundamentals and summary. It will build up a discussion to give an insight of developing a conceptual framework identified as an essential base of a practitioner within OHS. This overview would be seen as a background and basis to develop and use this information to implement, in later chapters, the identification of the three main areas to be discussed within this thesis, thus being the problem of how to improve organisational health and safety within the monitoring of procurement in construction, its cost effectiveness and the responsibility of the contractor.

In light of this, health and safety legislation deals with accidents, and ways to prevent such matters. To lead on, this chapter will identify and highlight accidents, by examining existing literature on health and safety with a view to defining what an accident is, its major causes and associated costs. It also will discuss health and safety systems and how it can help in reducing the rates and fatalities of accidents and ill health in organisations. Also, this chapter identifies the phrases ‘health and safety management system (HSMS)’, ‘safety management system (SMS)’ and occupational health and safety (OHS)’ which are used interchangeably. An emphasis will be placed on the identification of the essential elements of health and safety, with a view to identify and deduce safety standards in organisations within the construction industry. To minimize the confusion between structured and non-structured efforts to minimize accidents, it is important to distinguish between those activities which are seen to have been undertaken by an organisation and the actual existence of health and safety within construction. First, a system defines a “set of things considered as a connected whole; a plan of action; a method of procedure; method of organization” (Brookes et al., 2003). Thus, a system as used in health and safety literature refers to the composition of humans, machines and the environment which interact in order to achieve a defined goal (Sanders and McCormick, 1993). Systems can also be purposive and hierarchical (that is, considered as being or forming parts of larger systems) or a nesting of systems within a set system boundary (Sanders and McCormick, 1993). The inference from these is that a system operates in an environment which ensures the interaction of its various parts. Subsequently, the primary aim of occupational health and safety (OHS) is not only to ensure the maintenance of the working ability of the

labour force, but also to ensure that hazards within the working environment are identified, assessed and prevented (Ahasan, 2002). It also ensures that workers carry out their jobs in safe environments, by establishing mechanisms that help to correct unsafe actions and eradicate unsafe conditions.

The argument by Scipioni et al. (2001) that accidents at work and occupational injuries are unintended consequences of production that are inextricably linked to the relationship of the worker to the plant, machinery, materials and substances present in the workplace, suggests that there is a relationship between work and work environment/facility. Subsequently, it becomes essential that activities which not only ensure safe conditions for work but also instil safe attitude to work are identified, developed and implemented. This argument suggests that health and safety interventions should be concerned not only with making the environment and equipment safe for use, but also with changing the perception and attitude of workers for whom these facilities have been provided for. Thus, workplace safety involves technical interventions as well as the adoption of management, organisational, and training instruments that can influence risk behaviour (Scipioni et al., 2001), through targeted intervention aimed at changing how things are done (Robson et al., 2001).

This intervention may be in the form of a new program, practice, or initiative intended to improve safety (e.g., engineering intervention, training program, administrative procedure). Interventions to improve organisational health and safety management or performance could be focused on activities aimed at improving the technical sub-system or the human sub-system as shown in Figure 2.1 (adapted from Robson et al., 2001), as shown.

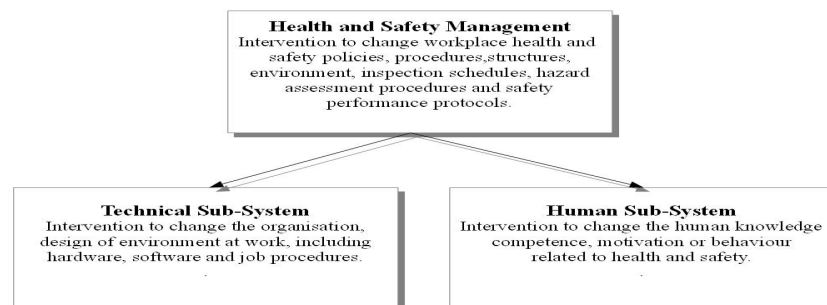


Figure 2.1 Different aspects of a workplace health and safety environment.

[adaptation from Robson et al, 2001]

2.1.1 History.

Perhaps the earliest well documented application of accident causation knowledge is that of the Du Pont company which was founded in 1802 with a strong emphasis on accident prevention and mitigation. Klein (2009), in a paper entitled “Two Centuries of Process Safety at DuPont” reported that the company founder E.I. Du Pont (1772 – 1834) had once noted “we must seek to understand the hazards we live with”. The design and operation of Du Pont explosives factories, over the next 120 years, were gradually improved as a result of a consistent effort to understand how catastrophic explosions were caused and prevented. In that period many of the principles of modern accident prevention theory were formulated. By 1891, safe operations for management was identified as a need to such an extent that the original DuPont design included a consideration for the director’s house, in which Du Pont, his partner and children lived, to be built within the plant environment, a powerful incentive indeed to gain an understanding of accident causation. As described by DeBlois (1915), the first head of DuPont’s safety division, elimination of hazards was recognised as the priority in 1915 and a goal of zero injuries was also established at that time. Amongst a list of other safety management initiatives which would still be considered appropriate in today’s company’s safety programs, the Du Pont safety division was established in their engineering department in 1915 and carried out plant inspections, conducted special investigations and analysed accidents.

Accident research was also reported as being part of the work of the British Industrial Health Board between the two World Wars (Surry, 1969). Surry cited ‘Greenwood and Woods’ (1919) statistical analysis of injuries in a munitions factory and Newbold’s (1926) study of thirteen factories which also reviewed injuries purported to be the first research work into industrial accidents. Various other studies around the time (Osborne, Vernon & Muscio 1922; Vernon 1919;1920; Vernon, Bedford & Warner 1928) examined previously un-researched areas of working conditions such as humidity, work hours, workers age, experience and absenteeism rates. Surry also reported that the appearance of applied psychologists influenced research studies to focus on ‘human output’ and during the 1930s attention was directed towards the study of individual accident proneness. Surry noted that “pure accident research declined after 1940 while the study of performance influencing factors has flourished”.

At the point when asked to characterize the capacities from a healthy individual, Sigmund Freud reacted

"To work and to love." Although much of his work has not held up to support for the association between work and intimate connection between work and mental health is consistent with a vast wealth of known literature. Unquestionably, the verifiable record distinguishes paid occupation as a focal part of human experience all through the improvement of human advancement and civilisation, (Applebaum, 1984, 1992; Pahl, 1989), the absence of paid employment has led to some serious issues regarding health since the beginning of the Industrial Revolution (Burnett 1994, (Feather, 1990); (Jahoda, 1980).

2.1.2 Importance of health and safety.

It is perceived that there is a requirement for the reaffirmation of the fact that an effective health and safety administration would contribute to enhancing the stature of a firm, demonstrated by a decreased incidence of accidents and damage to property in the company (Confederation of British Industry, 1990). After an extensive review and summarization of existing and available literature in this regard, the researcher is of the conclusion that most companies seem to consider health and safety measures as contributing to the cost of doing business, and do not necessarily view the same as enhancing the competitiveness of the business. It is perceived that there is a requirement for the reaffirmation of the fact that an effective health and safety administration would contribute to enhancing the stature of a firm, demonstrated by a decreased incidence of accidents and damage to property in the company (Confederation of British Industry, 1990). After an extensive review and summarization of existing and available literature in this regard, the researcher is of the conclusion that most companies seem to consider health and safety measures as contributing to the cost of doing business, and do not necessarily view the same as enhancing the competitiveness of the business.

In any event, the majority of firms and businesses do seem to follow and implement health and safety standards, even while it is clear that organizations need to be encouraged to adopt the same through their own free will so that they accrue greater associated financial benefits, and are therefore able to transfer part of the benefits to the general public too (European Agency for Health and Safety at Work, 2002). Elgstrand (1985) is of the perspective that increased standards and levels of safety and health standards implemented would ensure more productivity and increased profits for the firm in the long run. Correspondingly, the European Agency for Health and Safety at Work (1999) has seemingly highlighted and identified some of the possible benefits in this regard, while White and Benjamin (2003)

have emphasized how implementing the standards would contribute towards greater prosperity within the organization and increase worker productivity since there would be lower rate of absences due to injuries and illness. This would enhance the stature of the organization and contribute to greater profit and turnover. Because of lower expenses connected with work environment accidents, a superior relationship with builders and contractors, has an additional minimized probability of prosecution and ensuing penalties. Despite the advantages resulting from the usage of an effective health and safety administration framework in any case, there are still questions about the utilization of economic advantages as an avocation for setting out on health and safety improvement activities. In such cases, organizations have ceaselessly re-composed to reduce costs, due to mishap and ill health. Moreover, health and safety management being a key component of successful manufacturing associations and organisations (Basu and Wright, 1997), has been recognized as having the capacity to enhance the aggressiveness and competition of an organization. Regardless of the advantages logically from the execution of a viable health and safety administration framework in any case, there are still questions about the utilization of financial advantages as a defence for embarking on health and safety change activities. However, organizations have consistently re-sorted out so as to cut costs due to mishap and ill health. Beach (1980), states that an accident is an unexpected event that interferes with the consistent advancement of an action, and could occur without an injury occurring. Whilst this definition appears to have considered each part of an accident, it is still insufficient as it neglects to consider both the circumstances and end results of such accidents. This insufficiency is further highlighted by the perception that injuries at work and work related diseases, as results of the generation cycle, are inseparably connected to the relationship of the specialist, i.e, the operator of plant, machinery, materials and substances show in the working environment (Scipioni et al., 2001). As a result of these perspectives, a superior portrayal of an accident or injury, maybe, is that given in Bamber (2003) which characterizes an accident as a sudden, impromptu, occasion in a succession of events, that happens through a variety of reasons; results in a physical damage (harm or malady) to an individual, harm to property, a close miss, a misfortune, or any blend of these impacts.

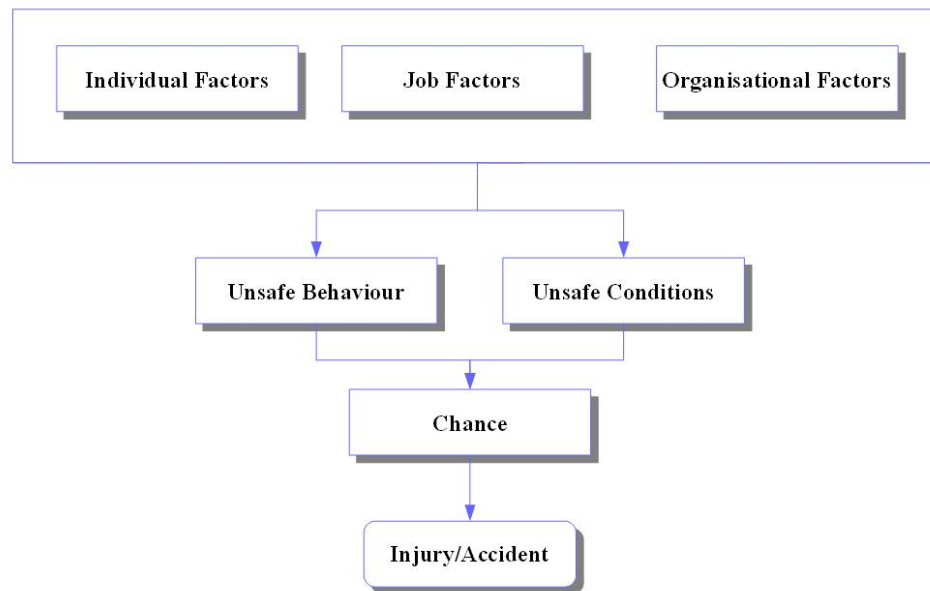


Figure 2.2 Accident contributory factors.

[adaptation from Burnett, 2005]

These views suggest that within a working environment, health and safety does include specialized, technical interventions as well as obligations for the appropriation of management, authoritative and training which could impact "risk behaviour" (Scipioni et al., 2001). This perspective gives an impression that injuries result from chance elements that are unavoidable; a feeling that appears to be misinformed, as it has been noted that in about every example of an injury, there are measures that could have been taken to deflect the injury (Beach, 1980). Factors that can bring about an accident are extensively arranged into unsafe conditions and unsafe actions as demonstrated in Figure 2.2. (adjusted from Burnett, 2005). While Stranks (2000) accepts that accidents are results of specialized and human errors, Mill (1992) contends that accidents and sickness are, by and large, results of carelessness, that if not legitimately distinguished and tended to through a health and danger evaluation process. It is observed that a range of health and safety inputs in this regard seemingly relate to how there could be further improvements within existing policies and processes already implemented. Thus, a concerted

effort is made towards ensuring that existing policies are formulated with a focus on enhancing administrative and management processes so as to incorporate and accommodate health and safety aspects, instead of implementing organization wide processes (Health and Safety Executive, 1997). If accidents somehow managed to be stayed away from, or indeed avoided, it is basic that supervisors, group leaders, administrators, and workers must co-work and join in the arranging, association, execution, and control of operational exercises. These administration controls or protections that have been put in place and set up with an intention to diminishing the re-occurrence or effect of accidents ought to be in view of prevailing hypotheses, if they have a desired impact. This is on account of they help in an efficient identification, detachment and possible removal of those components that can bring about accident(s).

2.1.3 What causes accidents.

Two mainstream accident hypotheses about such causes are the Domino theory and the systems theory. While accident examination models that are in view of the "framework" or "theory" have a tendency to inspect all potential contributory elements to any accident, those that are in light of the "customary" theory focus their investigation and examination on the people concerned, and on the most immediate causes for an accident. Thompsons Solicitors (2001), indicated that the conventional approach is supported by associations and organisations which recommend that numerous such bodies do not operate a framework that would empower them to separate adequately the underlying or basic reasons for accidents amid the investigation of accidents. Despite the complexity quality of any theories or hypotheses behind accident causation, these must be comprehended if there are to be any imperative updates in incident avoidance techniques. Notwithstanding the way that these theories can be seen as speculative in nature, and perhaps of obliged use in the repulsiveness and control of accidents, it ought to be seen that no single theory or hypothesis could be seen as right or legitimate, with a far reaching attestation. In like way, these hypotheses and speculations, yet essential, are not adequate for adding to a packaging of reference for discernment of accident events (Raouf, 1998). Notwithstanding the way that the Domino (or standard setback approach) speculation (Figure 2.3) considers incidents as aftereffects of threat bearing goes about furthermore dangerous conditions, these perilous and risky conditions, don't however contribute in equivalent measures to accidents. For example, it has been

fought that around 88% of all incidents are made by dangerous human acts, 10% by hazardous activities and the remaining 2% by "shows of God" (Heinrich, 1959). In this manner, the obliteration of these surprising human acts which prescribes well over more than 80% of all accidents identifies with an essential step towards the suspicion of setbacks (Sznajder, 2000).

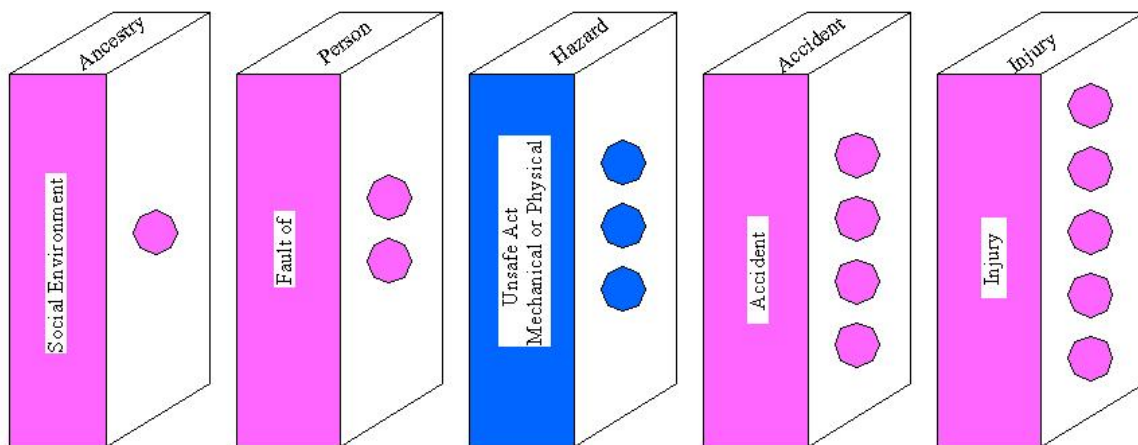


Figure 2.3. Causes of an accident - the Domino sequence.

[adaptation from Heinrich, 1959]

Critics of this model contend that by embracing an intolerant perspective of accidents, this model neglects to perceive that accidents result from various reasons. In this way, the chance of distinguishing and explaining the underlying causes of accidents get to be extraordinarily decreased (Petersen, 1971). This is however by all account not the only criticism of this model. For example, (Wright et al), noticed that in the domino theory of accident causation, there is not just a wrong concentration on what happened and how it happened as opposed to on why it happened, there is likewise a limitation of an incident investigation to just a restricted arrangement of reasons. Also, Wright and his associates, proceed with this theory to be inciting a supposition that the aversion of future events could just be

accomplished through disciplinary or procedural methods and a culture of distributing and finding fault to those most immediately included. Additionally, intercessions taking into account of this model are often short term and incapable, on the grounds that they are not able to address the remote conditions brought on by an accident. The framework theory or the various causation hypothesis is a branch of the domino theory. It however varies from it by perceiving and enhancing the way that accidents are frequently results of a few contributory elements happening in the meantime, and in this manner expects to dispose of these contributory variables. The system based approach is to deal with accident examination, and perceives that people have inherent vulnerabilities and tries to comprehend the full scope of elements that add to an incident. Because of this, organisations that are agreeable to this framework are receptive about the reasons for hazardous conduct and behaviour. This attitude, and indeed state of mind is induced by the perspective that people frequently work in accident actuating circumstances. This approach addresses the fundamental reasons i.e. hierarchical and organisational strategies, of these conditions by first distinguishing the prompt reasons for an incident e.g. inability to hold down methods and procedure. Leverage of this approach is deduced by distinguishing the immediate and remote reasons for an incident, it is proactively handling the conditions that could prompt future occurrences. Another model of accident causation theory is the loss causation model (Bird, 1974), which is shown in Figure 2.4 (Source: Bird and Germain, 1990).

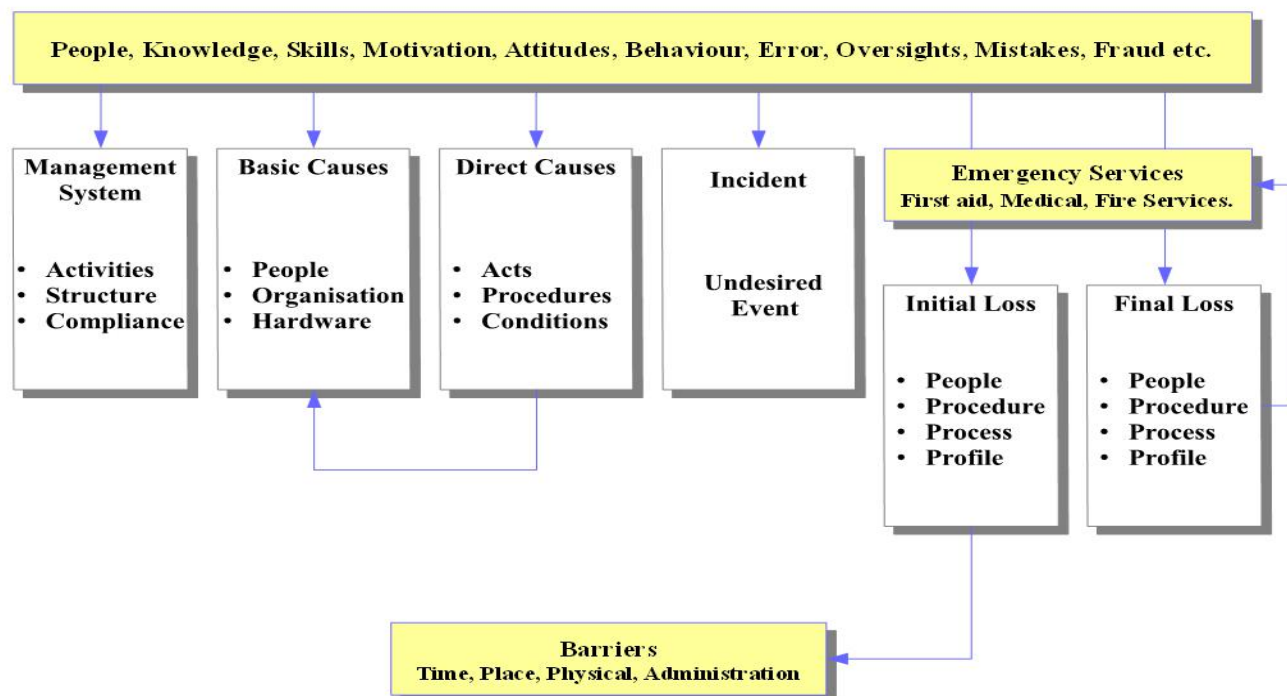


Figure 2.4. Loss causation model.

The loss causation model is a practical and effective comprehended accident investigation framework which shows what could be utilized by all levels of an organisation, from first line administrators upwards. It is a basic, however exhaustive model which dependably looks for, and gets information about accident causation. It also represents the planning, management and control of such accidents. A significant supposition in this model is that absence of legitimate control is frequently the underlying driver of real accidents endured by the organisation. A loss for the reasons of this work is characterized as a production issue, natural contamination, property damage, individual damage, deterioration of workers' health and so forth.

2.1.4. The evolution of models of accident causes.

Herbert.W. Heinrich, was the first individual to understand and assemble models of mishaps. His work, depicted in his book " Industrial Accident Prevention", conveyed in 1931, was a basic generation as to

understand incidents. The benchmarks in which he outlined, regarding the utilization of science to accidents, portrays, (1) "through the creation and upkeep of a dynamic excitement for security; (2), be assurance finding; and (3) lead to medicinal movement in perspective of the facts", (Heinrich, 1931).

Heinrich's book, now in its fifth edition, goes on and highlights the consecutive variables inciting an incident and declared what can be termed a period of fundamental progressive sequential modelling.

2.2 Cost of work related accidents, injuries and ill health.

Accidents at work, in addition to having prominent impacts on a workforce health and organization performance, likewise represent a considerable economic weight. These expenses are either visible or invisible (Mossink and De Greef, 2002), self-evident (direct cost) or hidden (indirect costs) (Confederation of British Industry, 1990). Cases of these incorporate property harms, protection and additionally lawful/legal expenses, restorative costs, wages and profitability misfortunes and losses. These expenses are not generally transparent and organisations are not regularly mindful of the amount they spend as an after effect of work based accidents and ill health. For instance, it was noted in Curran (2003) that the expense connected with health and safety incidents are up 300% to 400% higher than those recorded in organization records. Figure 2.5 (Source-Estimating the Cost of Accidents and ill Health at Work, EU-OSHA, 2014) condenses and generalises an applied system of work related accidents and sick health outcomes/ monetary expense of accidents at work.

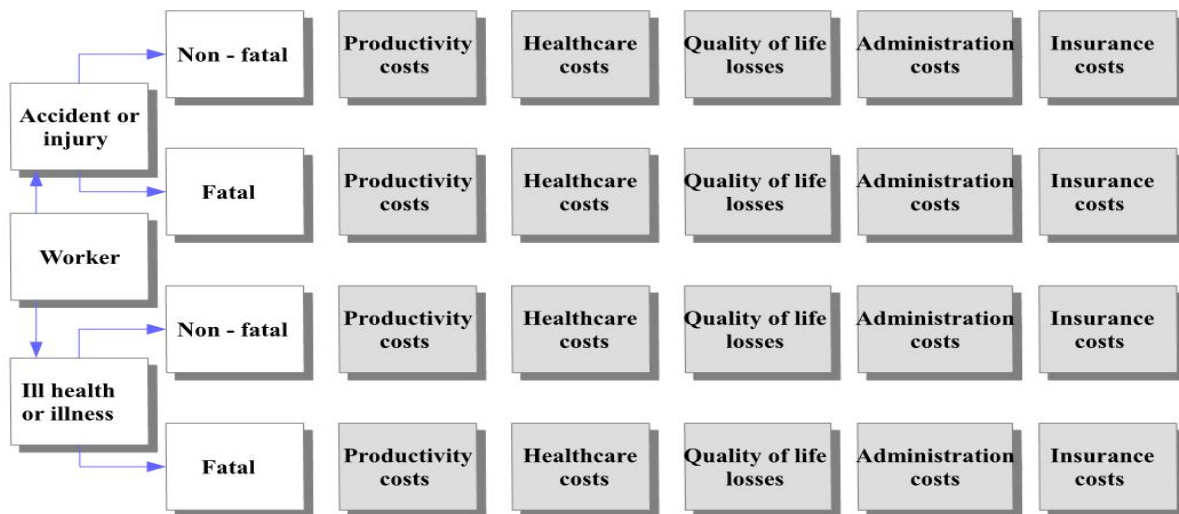


Figure 2.5. Estimating the cost of accidents and ill health at work a review of methodologies.

[European agency for health & safety at work - EU - OSHA]

A comparable perspective to the above had been expressed by Heinrich (1959) and also Bird and Germain (1966). Without doubt, organisations will unavoidably be influenced by the results of these health and accidents if there are no satisfactory organisational controls put up to prevent accidents from happening. There is a view that the expense of cost related injuries and sick health to the general public and society is totally underestimated (Loewenson, 1998; Pantry, 1999). This outcome from the propensity avoids the expense brought about as a consequence of brand value harm and damage, loss of consumer certainty and identity, and preoccupation of management time, disturbance in the production network activity, loss of worker assurance and morale, and loss of human lives (Baldwin and Anderson, 2002), during the calculation of damages. The basic legal framework establishing health and safety standards within the United Kingdom is the Health and Safety at Work Act (HSW Act), enacted in 1974

2.3 The fundamentals of health and safety law.

In the United Kingdom, the prevailing health and safety legislation is the Health and Safety at Work Act (HSW Act) of 1974. This is a framework act that;

“Provides for goal setting law, taking account of levels of risk and what is “reasonably practicable,” with the overriding aim of delivering good regulations that secures decent standards and protection for everyone.”(Department Of the Environment Transport and the Regions, 2000, p.8).

This establishes the basic standards to be met in this regard, identifying what constitutes risks and what is acceptable.).Although the HSW Act seemingly encourages firms to proactively consider necessary regulations towards ensuring workplace safety (Gadd et al.,2000), it nevertheless does provide the minimum guidelines to ensure that employers do provide a basic measure of safety for workers and employees engaged within the place of business so that they are able to function unhindered in a safe workplace. Moreover, it guarantees that anybody coming into contact with the working environment/workplace (e.g. clients, suppliers, sub-contractors) can do so as such without danger to their health. It is acknowledged however that variables, for example, the nature and requirement of health and safety legislations and regulation are huge determinants of health and safety standards in organisations (Smallman, 2001). There are, in any case, reservations about their adequacy. It is commonly assumed that regulatory stipulations coupled with the directives periodically issued by regulatory agencies ensure that health and safety aspects are adequately addressed within the organization (Walters,1998) To represent, the British Health and Safety Executive is of the point of view that aspects requiring the consideration of businesses and representatives as to issues identified with industrial relations should be tended to without anyone else's input, barring accepting formal assessors, unless the prerequisite for the last is really supported (Walters and Gourlay, 1990).

Accordingly, while the part that inspectors play in an informal consolation of the utilization of the administrative provisions may be noteworthy or necessary, its extent is unclear (Walters, 1998). The second is the errors in the prerequisites of certain health and safety regulations.To illustrate, the Safety Representatives and Safety Committees Regulations 1977 (SRSC) and the British Health and Safety at Work Act of 1974 both agree that trade unions certainly have the right to demand making some contributions on appointing workplace health and safety professionals.The Health and Safety at Work Act 1974 in the United Kingdom expresses that just recognised trade unions have the right and privilege

to delegate health and safety appointees. This however negates the EU Framework Directive 89/391, which requires the negotiation and spread of pertinent data to specialists and their agents over matters influencing their health and safety. Notwithstanding, certain measures have been taken to correct these issues. AA. In situations where it is observed that the existing Safety Representatives and Safety Committees Regulations 1977 are not necessarily fulfilling the requirements, the Health and Safety (Consultation of Employees) (HSCE) Regulations 1996 ensures to dictate the modalities towards enabling employees and employers to discuss the issues and nominate mutually acceptable individuals to work out the challenges. Therefore, even when there are small non-unionized organizations, the existing legal framework ensures that aspects of safety and security are adequately addressed. In this regard, Section 2 within the Health and Safety at Work Act 1974 dictates that every individual employee is legally bound to have signed individual health and safety policy statements, published by the employer having five or more employees (Health and Safety Executive, 2002a) It could be contended that the HSW Act 1974 was declared keeping in mind the end goal to right any omissions, for example, the presence of too much legislation or discontinuity of authoritative jurisdiction, of the pre HSW 1974 Act. An opposite perspective could be that the declaration of this Act was affected and influenced by both philanthropic and financial reasons as a method for decreasing the excessively high rate of accidents which created human disaster, lost production and redirected assets. Part of the reason could be attributed to the fact that the earlier UK regulations formulated were piecemeal and were more reactive in nature, responding to specific situations (Floyd and Footitt, (1999). This, continued with Floyd and Footitt, was with a point of view to making a more self controlled plan of wellbeing and security associations, as opposed to an extremely overseen system maintained by outside associations. Consequently, in spite of watched errors, the HSW Act corrects an extensive segment of the defects (for occasion contrasting association, uneven security of laborers, inadequate approval powers, etc of earlier Factories Acts (Watts, 2003). Additionally, the HSW Act 1974 does not simply put wide commitments for upkeep of sensible well being and security norms on officials, delegates, makers of mechanical goods, autonomously utilized and occupiers of structures where people and safety legislations, what's more, not as a matter of course the establishment of these. Despite the fact that wellbeing and security regulations are placed set up to lessen, and/or moderate the impacts of mishaps at work, these regulations could likewise influence the capacity of a few organizations to viably deal with

the event of working environment mishaps and sick health. Subsequently, these have neither enhanced the wellbeing and security records of organizations, nor tended to those dangers radiating from the connections between interconnected or neighboring segments, or disappointment of framework interfaces (for instance, human factors).(Johnson, 2002). Once more, the failure of some national wellbeing and security laws to force the full expenses of work related mishaps and sick well being on the business has been referred to as a limitation to wellbeing and wellbeing change in numerous foundations. Some recommended instruments that can be used viably in making associations and organizations feel the effect of working environment mishaps and injuries can be found (Mossink and De Greef 2002).

2.4 Health and safety management.

A health and safety management framework can be seen as a coordinated arrangement of work practices, beliefs and techniques for observing and enhancing health and safety of all parts of the operations of an organisation (Civil Aviation Safety Authority, 2002). According to the European Union (1997);

“The safety management system should include the part of the general management system which includes the organizational structure, responsibilities, practices, procedures, processes and resources for determining and implementing the major-accident prevention policy.”

(OJ No L10, 14.1.97, p. 30).

A health and safety administration framework encourages hazard and risk evaluation through the recognizable proof, arrangement and administration of risks, in this way giving a structure to sound business. The principle goal of a safety management framework is to either decrease (or eradicate) the likelihood that a specific danger will happen or to mitigate its effects on the off chance that it does happen. It has been perceived that change of health and safety standards is a long term challenge that requires the awareness, involvement and commitment of all personnel (Civil Aviation Safety Authority, 2002). Moreover, considering health and safety as an important issue not just guarantees the satisfaction of moral and lawful commitments, it additionally saves money by preventing the noticeable and undetectable valuable asset when promoting connections with potential customers/partners. Whilst poor health management has been recognized as a prime reason for major disasters (Johnson, 2002), there is

solid evidence that a powerful health administration framework gives budgetary advantages to an organization by diminishing the expense connected with lost-time accidents and shutdowns. Be that as it may, to profit from such occurrences, organisations ought to adjust existing administration frameworks to suit their individual circumstances (OECD, 1999). It is becoming progressively evident that the improvement of a viable safety administration framework, whose capacity is to give a system of dealing with all components of an organisation can have an effect on health and danger, representing a move towards a proactive and pragmatic way to deal with risk management and control (Johnson, 2002). In this manner, numerous national laws are clear in their prerequisite that organisations and establishments set up a proficient framework for health and safety administration at work, risk identification and aversion. In the European Union, this prerequisite is contained in the EU Council Directive 89/391. While organisations are urged to create and actualize a health and safety management framework, they are likewise reminded that a good health management framework perceives that human activities and conduct have incredible impacts on how health and safety is overseen. It additionally recognizes the commitment of authoritative conduct and culture to a protected and safe working regime (McLeod, 2004). The significance of this acknowledgment can't be overemphasized as the level of health in an organisation is affected by the interrelated activities of individuals who plan and create the organisation, oversee, and manage it (Santos-Reyes and Beard, 2002). The input from these distinctive sources can only contribute positively to the advancement of the organisation in the event that they are coordinated using a framework. (non-insurable) expense of accidents and incidents.

A safety management framework helps organisations to recognize conceivable lapses, shortcomings or failures in the administration structure, which has been referred to as being responsible for an extent of reported significant accidents in Europe (Loupasis et al., 1999; Kawka and Kirchsteiger, 1999). Albeit there are unique perspectives on what constitutes an administration failure (regularly referred to as reasons for some accidents). A health management framework gives a solution for these failings by guaranteeing the improvement and development of successful and effective approaches aimed for using the qualities of employees, in minimizing the commitment of human limits and fallibilities, by looking at how the organisation is organized and how occupations and frameworks are outlined and designed (Health and Safety Executive 1997). Furthermore, senior management's dedication to health and safety has a significant effect on the accomplishment of health management frameworks, to such an extent that

that it has been seen, for instance by Dejoy (1985), that the safety execution of an organisation is an impression of how it's senior managers see the reasons for health performance and its execution. The views mentioned and specified don't in any case neglect the commitment of employees to accidents. For example, Nishgaki, (1994) notes that the demeanor both employers and employees to health contribute equally to the safety performance of an organisation. A typical occurrence of this is the perception that employees sometimes decline to comply with the safety rule/guideline of an organisation as laid down by its management (Harper and Koehn, 1998; Holmes, 1999). Likewise, in Taylor (2006) it was seen that in spite of the fact that a change in a Dutch organization was at first opposed, a continued effort to include employees and their agents realized a far reaching backing of the change in the organization. A safety management framework additionally connects any gap that may exist in the attention to an on-site location health and safety circumstance by senior staff and administration. This is seen especially in cases where the desire by high level management to actively pursue good health and safety management practices in their organisations may be hampered by their limited experiences of on-site safety issues, which often make it difficult for them to relate adequately to the needs of the workers (Dejoy, 1985). In circumstances like this, the presence of designated safety persons help in coordinating the consideration of high level administration to on-site health and safety issues (Jaselskis, 1996). Despite the fact that a health and safety management framework assumes an imperative part in controlling risks, in any case, for it to be effective, organisations must embrace a proactive way to deal with a health and safety administration, so dangers are distinguished before a noteworthy occurrence happens. The accomplishment of this objective requires the integration and reinforcing of the organisational structures, and also the complex standards and methods that guide an organization (Zani and Riva, 1999), through the improvement and development of a system that would help in the assessment of a health and safety management method. (Gallagher et al.,2001), notes that the successful usage and implementation of a powerful occupational related health and safety management framework can be influenced either by an inability to customise these frameworks to suit the needs of an organization, or the placement of this management framework on the organisation without due consultation. It is critical to note that any type of placement is fit for debilitating senior management responsibility and prompts poor employee support. Other variables, as indicated by the Australian Civil Aviation Authority, incorporate inappropriate audit tools (Civil Aviation Safety Authority, 2002). There is a view that the opportunity

given to the administration of organisations to characterize what is sensibly practicable, as practiced in the UK, empowers an abuse and/or control of health and safety regulations.

Even though, McLeod (2002) observes that establishing what is reasonable and practical is a subjective issue and as such prone to varying interpretations, a risk is judged to be reasonably practicable if and only if the time, effort and expense needed to avert it significantly outweighs the risk itself (Health and Safety Executive, 1997). Consequently, a business will undoubtedly take measures to maintain a strategic distance from or decrease the danger in the event that they are in fact unimaginable or if the time, inconvenience or cost of measures would be unbalanced to the danger (Health and Safety Executive, 2003). In spite of the fact that there is by all accounts no accord on the source of health and security administration frameworks, a famous however is that wellbeing and wellbeing administration frameworks developed in the mid 1980's as a key mischance avoidance system. Case in point, there is a perception that the Bhopal debacle in December 1984 turned into a noteworthy impetus to the present level of consideration paid to wellbeing and security administration frameworks, particularly in the process commercial ventures (Sweeney, 1992). There are perspectives that the developmental time of wellbeing and security administration projects was somewhere around 1950s and the 1960s, a period which was described by the combination of ideas and methods from different controls into security administration (Petersen, 1988). This perspective is in accordance with a prior perception that the idea of a frameworks way to deal with wellbeing and security administration had been apparent since the 1960s (Lees, 1980). These perspectives recommend that wellbeing and security administration frameworks couldn't have developed in the structure in which it is presently.

A health and safety management system could be reactive (or the traditional) or proactive (Bottomley, 1999) in its approach to the containment of accidents and ill health at work. Major differences between these two approaches are that while the traditional approach makes use of safety programmes which are focused on compliance with standards and regulations to bring about better health and safety management, the systems approach looks at four factors – the input, the process, the output and the feedback, and how to influence workplace health and safety. Secondly, while the pro-proactive approach has a very good feedback mechanism, the feedback mechanism in the traditional approach is either inadequate or non-existent. Again, in the reactive approach, because there is no link between risk control measures, risks are reviewed and control measures put in place only after an incidence had

occurred. In contrast, in the proactive approach, hazards are identified and risk control and remediation measures put in place as a good management practice. Also, in the reactive approach, there are no clearly defined roles and responsibilities whereas in the proactive approach, roles and responsibilities are clearly defined. Although there has been a shift from a reactive to a proactive attitude to safety management (Weibye, 1996; Crawley, 1999), there is still no unmistakably characterized and all around acknowledged criteria that might help associations to set up an effective safety management system (Santos-Reyes and Beard, 2002), despite the fact that there is a perspective that a proactive state of mind to health and safety management helps in counteracting mishaps that could have happened (Gupta, 2002). Again, a proactive attitude to health and safety management saves many lives and substantial amount of money in potential accident damage (Kletz, 1998; Sutton, 1999). The effectiveness of a proactive approach in actually controlling the actions and behaviours of those involved in a company's operations depends on the consistency of efforts to define and document a clear safety policy and responsibilities. It also depends on the level of acknowledgement of the interconnection between various departments, as well as a clearly defined system of norms, incentives, and procedures agreed with those working in the company (Zani and Riva, 1999). The business benefits of a positive and proactive approach to tackling risk at work include: enhancement of corporate reputation in business dealings; improvement in quality and reliability as a result of a reduction in errors, accidental damages and losses; encouragement of workforce participation, innovation, as well as a boost to the morale of the workforce (Bibbings, 2003). Most health and safety management systems are based on either the British Standard (BS 8800), figure 2.6 as shown, or the Occupational Health and Safety Assessment Series (OHSAS 18001).

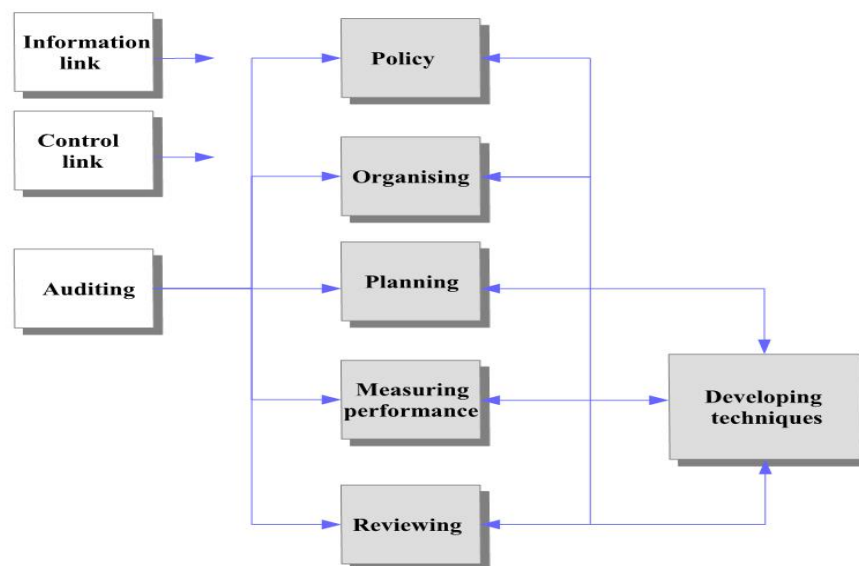


Figure 2.6. A health and safety management system based on the British Standard (BS 8800).

A major difference between these standards is that while the BS 8800 standard is a guide, the OHSAS standard is a specification. As a result, the OHSAS 18001 is more emphatic in its requirements and uses the word ‘shall’ in ensuring that these are adhered to.

2.5. Elements of safety management.

The European Agency for Safety and Health at Work (European Agency for Health and Safety at Work, 2001) contends that any successful mishap counteractive action system is taking into account a solid administration responsibility, a greater employee inclusion, in an all around organized administration and management framework. While Gilkey et al. (2003), accepts that "the support of good management is crucial to the accomplishment of any health and safety system". Quinlan and Bohle (1991), contend that any system for the usage of a successful health administration framework involves the improvement and dispersal of an OHS strategy, an unmistakable meaning of health and safety obligations of all employees, the advancement and support of an obviously characterized approach making and advisory channels, and an all around characterized procedure technique to obtain and collate information. The International Labour Organization (2001) further expresses that a health and safety strategy is a succinct

and unmistakably composed and date records supported by the most senior responsible individual in an organisation. This report lays and highlights the general health and safety administration expectation of an association/organisation, determines obligations and frameworks heirarchy of leadership, and also the systems for guaranteeing that proper health and safety guidelines are looked after (Stranks, 2003). The different components that make up a health and safety administration framework have been examined and discussed in earlier works by (International Labour Office, 2001). They incorporate hierarchical policy and arrangement, authoritative structure, correspondence, choice making procedure, hazard appraisal, decrease and control, and are examined briefly as follows;

Policy: Policy making as noted by Drucker (1994), is one of the three crucial assignments of management. The British Standards Institution (British Standards Institution, 2004) gives a rundown of what a successful related health and safety arrangement ought to contain and illustrate. Cox and Cox (1996) depict strategy as the path in which an organisation adjusts itself to the difficulties and opportunities inside of its safety area and regularly portrays the standards supporting its conduct. This procedure of health and safety arrangement advancement ought to however be recognized from the need by organisations to fulfill the legitimate prerequisite to deliver a composed organization health and safety strategy.

Organising: This is the foundation of structures specifying obligations, connections and relationships such that would advance, and guarantee the execution and improvement of the safety approach. The viability of this component of a health and safety administration framework relies upon a synergy among administration and management control, level of collaboration, productivity and adequacy of correspondence and communication, and the level of competency by staff and administration. Additional information on this is accessible from Health and Safety Executive (1997).

Planning and implementing: Cox and Cox (1996), contend that arranging and execution are the two components at the heart of a successful management and administration. The British Standards Institution (2004) went further to note that planning and arranging is a necessary part of all components of an occupational health and safety administration framework and alludes unequivocally to the planning of arrangement for consistent change and the outline, improvement and execution of risk appraisal and control. Effective prevention goes for aversion through identification, end and control of hazards. Thus, it ought to be a shared effort including individuals at all levels of the organisation, henceforth showing

and picking up a duty to a continuing improvement as well as advancing a constructive health and safety environment. Arranging an occupational related health and safety administration framework includes planning, creating and introducing suitable administration plans, work environment precautionary measures and their related danger control frameworks proportionate to the needs, perils and dangers of the organisation. It additionally involves operating, maintaining and enhancing the framework to suit changing needs and procedure perils and dangers. Implementation, on the other hand then is concerned with guaranteeing that working environment safeguards, danger control frameworks and organisational plans are very much outlined and formed looking into existing business practices and partner needs. This is especially imperative as it has been noticed that the long term achievement of any organisation is, as it were, affected by the degree to which it endeavors to coordinate and balance the needs and prerequisites of various stakeholders without any compromise (partial or total), to anyone (Nickols, 2000). In this manner, an effective and successful health and safety planning and execution method is one which not just satisfies the business needs of the various stakeholders, (for example, a simultaneous accomplishment in expense minimization, benefit amplification and a high health and safety standard), it additionally guarantees that expenses, benefits, profits health and safety principles and long term objectives are analyzed and addressed to as a method for further enhancing the viability of the whole process (Madu, 1996). Arranging likewise guarantees that the parts of the administration and organisational framework are sufficiently reviewed, maintained and observed to guarantee continued effectiveness. Three major areas identified in both BS8800 and OHSAS 18001 standards that need to be addressed during the planning stage are as follows;

- Risk Assessment and Management, which ensures that an organisation, through the process of risk management, identifies and appreciates all significant occupational health and safety hazards facing it;
- Legal requirements, whereby a careful study of the business operations of an organisation is carried out, with a subsequent identification of not only the legal requirements applicable to it but also any other industry or company specific requirements to which it subscribes;
- Health and safety objectives and programmes, detailing the measurable health and safety performance goals which an organisation set for itself to achieve.

In any case, it would be hard to build up sufficient and adequate health and safety goals and quantifiable without first conducting an extensive needs appraisal/assessment. A needs appraisal/assessment is characterized by an orderly investigation of the way things are and the way they ought to be (Stout, 1995). A needs appraisal is an important instrument which serves to highlight change needs in view of its capacity to gauge the degree and nature of the needs of a specific target populace, clarifies what the issue is and why it exists, and along these lines gives organisations to react to these needs (Hooper 1999). While it might be enticing to contrast and contrast recognized needs with a list of skills to figure out whether appropriate skills are covered, the Center for Effective Performance however contends that while this procedure is credited as being time proficient, it neither overcomes a specific performance problem nor improves the overall performance(CEP, 2006). It would be extremely difficult for a needs assessment to yield the desired level of improvement in performance if it does not:

- perform a "gap" investigation to distinguish the present skills, knowledge, information, capacities, and in addition organisational and individual needs (Rouda and Kusy, 1995). These needs must however be agreed by all stakeholders (CEP, 2006);
- recognize the significance of possible exercises and put into a priority these activities as per their importance (Rouda and Kusy, 1995);
- distinguish the reasons for the gap in execution and/or opportunities (Rouda and Kusy, 1995).
- conceivable reasons could be absence of abilities or information, or motivational obstacles preventing desired performance (CEP, 2006);
- identify possible solutions and growth opportunities (Rouda and Kusy, 1995) while ensuring that proposed solutions are both realistic and relevant (CEP, 2006).

It is normal that an organized way to deal with administration and management would guarantee that dangers are completely evaluated, and that safe strategies for work are presented and followed (European Agency for Health and Safety at Work, 2001). The truth may be a long way from the ideal if the group in charge of the appraisal does exclude the individuals who know and think about the needs

of the objective, (for example, representatives from the objective populace), or those individuals who can impact changes, for example, managers of appropriate partner organisations (Hooper and Longworth, 2002).

Measuring performance: As per the British Standards Institution (2004), the primary role of measuring health and safety performance and execution is to judge the level of usage and viability of the courses of action that have been incorporated for controlling risk. Cox and Cox (1996), contend that by empowering managers to guarantee that principles accomplished in practice are in accordance with the key goals effectively settled, execution estimation hence turns into a vital part of keeping up and enhancing safety performance. It should give data on both the advancement made and also the present status of arrangements, (techniques, procedures and activities) utilized by an organisation to control risks to health and safety. In this way, this component of a safety administration framework controls the risk by providing and giving data on how the framework works in practice, distinguishing areas where restorative activity and action is vital, giving a premise to continual improvement, and giving criticism, inspiration and motivation. Performance can be measured proactively by observing the accomplishments of arrangements as well as the level of consistence with standards, or responsively by monitoring accidents, occupational related ill-health and near miss information (Health and Safety Executive, 1997).

Reviewing performance: The period status survey and the complementary management/administration survey together contribute to ensure that there is continuous improvement in the processes. Therefore, although there are occasional status audits within the organisation at multiple levels, it is the administration surveys which conclude the process to the satisfaction of the management. The periodic status surveys undertake a generalized overview of how the safety aspects are being catered to and contribute towards finally deciding on specific choices which would complete the processes within the organization. In turn, it contributes towards fulfilling any shortcomings observed and allows for necessary actions to be undertaken in the event of discrepancies observed. The executive management undertakes periodic reviews towards ensuring that the safety standards are maintained and sustained over the long term and should there be any shortcomings identified, necessary corrective and remedial action is undertaken to erase the anomalies observed at the earliest. The final policy implemented and concluded would ensure that aspects of occupational health and safety are appropriately addressed so

that the stated objective of the entire exercise is adequately met towards ensuring continual improvement in the systems.

Auditing: The British Standards Institution (2004) is of the perspective that besides the periodic OH&S and associated status reviews, there also needs to be multiple status reviews in the form of periodic audits which would contribute to ensure that the OH&S management system is functioning at optimum levels. Further, the audit program should be designed after keeping in perspective, and in consideration of the extent of risks and hazards within the organization, with the surveys being conducted by professionals to ensure that the entire process and the effort invested is truly meaningful. Cox and Cox (1993) therefore seemingly differentiate between an audit initiative and routine monitoring in that the former follows formal documented reviews of the system under observation. It is further stated that audits are safety management systems conducted to ensure that the workplace hazards are optimized to ensure minimum fatalities and accidents. Indeed, the entire process can be quite complex and it is important that there is a systematic process towards implementing the standards. Challenges in correctly interpreting the various OHSMS perhaps do contribute to degrade the effectiveness of HSMS to a certain extent at various times. However, KPMG Consulting (2001) is of the perspective that safety audits contribute to perceiving the extent to which the management is committed in ensuring OHS practices, certifying that the same are implemented throughout the organization and ensuring that everyone is unified in their approach and perspective. The KPMG Consulting (2001) is also of the perspective that an effective safety audit paradigm should be systematic and should validate processes in an organized manner, benchmarking, and ensuring that there is specific ownership of individual processes within the firm, besides tracking the performance standards over a period of time.

2.5.1 Motivations for implementing health and safety

There are multiple reasons determining the impetus for organizations to monitor their health and safety standards (Wright, 1998). They are in turn summarized as being either intrinsic or extrinsic. The former is related to aspects of cost reduction, morale improvement, and reducing the frequency of accidents, while the latter relates to compliance with regulatory requirements, countering a loss in the credibility, and fulfilling client requirements. Each of these requirements would make the organization undertake multiple initiatives as depicted in Figure 2.7 (adapted from Holt and Kockelberg, 2003).

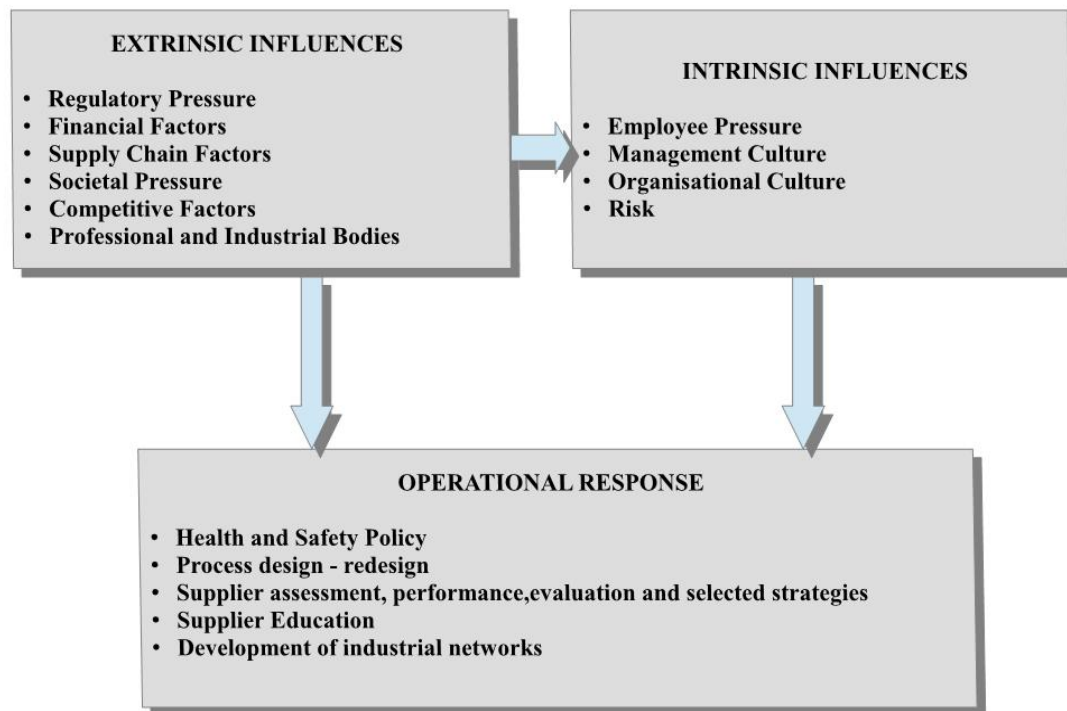


Figure 2.7 : Factors driving health and safety management

(adapted from Holt and Kockelbergh, 2003)

There are indeed seemingly multiple proponents encouraging businesses to be cognizant of employee welfare and safety aspects. Smallman (2001) is of the recommendation that there is a valid and justified case supporting revitalizing health and safety management issues although the actual effectiveness of such initiatives in the context of small businesses still begs satisfactory answers (Bibbings, 2002; Wright, 1998). It is further concluded in the existing and available literature that there is seemingly much to be done yet towards concluding an effective and sustainable business case compelling and motivating business owners to wholeheartedly embrace concepts associated with employee welfare and safety. In this regard, it could be perhaps pertinent to try focussing on the psychological after-effects of a workplace accident, and how businesses could be motivated to undertake minor changes in their work

regimen to contribute effectively towards ensuring more effective occupational health and safety management systems (OHSMS) (Bibbings (2003). Hopkins (1999) has been critical of the “safety pays” slogan, and is of the perspective that the same has not actually towards increasing safety standards, except perhaps resulting in added expenses for managers and health industry professionals. Nevertheless, there is not much compelling evidence available in this regard (Smallman, 2001). A lack of direct evidence indicating that managers and safety professionals actually benefitting from instituting enhanced safety standards weakens the argument propounded by detractors of the “safety pays” slogan (Smallman, 2001).

It is also to be noted that in consideration of limitations associated within organizations in terms of their ability to promote health and safety aspects, it is doubly important towards ensuring that preventative measures are duly undertaken, instead of considering the “Business Case” related to campaigning and awareness activities presented (Bibbings 2003). Although there may be differences of opinion with regard to the extent to which business cases, morality or ethics play in firms undertaking safety measures, it is universally recognized that businesses are certainly better off proactively undertake preventive measures. Correspondingly, in complying with legislation advocating health and safety measures, it would pre-empt the fallout and negative publicity associated with unforeseen and adverse happenings within an organization. A related aspect encouraging businesses to adopt health and safety measures could be related towards ensuring the wellbeing of their clients and workers, so that they are shielded to the extent possible from any negative initiative undertaken by suppliers and related contractors (Rimington, 1998; Tamarelli, 1995). Thus, organizations are interested in projecting a flawless image of themselves, and pressurize their vendors and contractors to be cognizant of safety issues. This is amply demonstrated in the proceeding text, accrued from Zeneca’s motivation in ensuring the presence of an adequate safety measures. Zeneca tries to ensure that its suppliers follow and implement the highest standards of safety. This is correspondingly manifested in the firm conducting regular audits of the production processes, procedures and systems at the suppliers end, contributing towards ensuring that the vendor is following due processes and procedures agreed upon. This in turn would contribute towards ultimately ensuring the reputation of Zeneca in the long run (Rimington, 1998). Consequently, the “ethical case” for health and safety seems a preferable option, while the “Business Case” becomes a secondary and supporting argument. There is also a view that because of the

noticeable short term financial burdens on the budget of organisations, health and safety promoters “must continue to advance the ethical case for prevention and not allow supporting arguments such as the ‘Business Case’ to assume a wholly dominant position in campaigning and awareness raising activities” (Bibbings, 2003).

In spite of the differences in opinion on whether compliance is based on business case, moral or ethical grounds, there seems to be a consensus on the need for adequate health and safety management by organisations. For instance, the need to comply with health and safety legislation, the avoidance of bad publicity resulting from breach of health and safety laws, are but some of the major motivators for implementing health and safety management system. It has also been observed that a major incentive for better health and safety management by companies is the desire to forestall the importation of risks and liabilities to their own workforce and customers, from the activities of their suppliers/contractors (Rimington, 1998; Tamarelli, 1995). In this regard, the protection of corporate image becomes a major driver, and companies make sure that the activities of their suppliers or contractors do not affect their image in any way. A practical example of this is contained in the following account of Zeneca’s motivation for implementing a health and safety management system as follows;

“Zeneca therefore drives very hard to ensure that its bought in supplies met highest standards... Among other things, this involves auditing production suppliers to make sure that they are scrupulously well managed and that nothing they can do is likely to taint Zeneca’s own reputation” (Rimington, 1998).

2.6 Management of health and safety risks in organisations.

A major pre-emptive initiative in conducting safety management procedures relates to identifying related hazards in the vicinity (Cox and Cox, 1996). Floyd and Footitt, (1999) are of the opinion that adequate risk assessment processes is perhaps the driving force and factor in relation to implementing the Management of Health and Safety at Work Regulations (MHSWR), 1992 so as to ensure that risks and perceived dangers are controlled and prevented to the extent possible. This would make employers and organizations to be in conformity with the HSW Act and the associated statutory provisions of the Health and Safety Executive, 1997. This is relevant in consideration of the fact that organisational risk management processes relate to firms proactively working on resolving the risk factors perceived (Bamber, 2003). Risk management processes contribute towards ensuring that the firm is cognizant of

the dangers perceived by the actions of the enterprise, so that whenever and wherever adverse situations are foreseen and identified, corresponding preventive actions are undertaken in reducing the impact of the situation (Carter and Doherty, 1974). There could therefore be multiple sources of risks and problems, including external sources in terms of political, natural, social, industry/market risks; internal sources, including perhaps a striking labour force hindering regular production, or the halting of production processes after an unscheduled breakdown in the machinery; or the risks could also be accrued from associated activities and functions conducted on a day to day basis within the organizational supply chain paradigm; or could perhaps be attributed to shortcomings and difficulties in communication within the various layers of staff and personnel associated with the processes (Juttner et al., 2002).

Increased efficiencies in risk management paradigms and processes enable organizations to proactively deal with challenges hindering smooth operations, which ultimately contribute to smoother operations within the firm and in the associated production processes. Thus, Cox and Tait (1998) are of the perspective that risk management theories contribute towards identifying, estimating, evaluating, reducing, and ultimately controlling risks. From a supply chain perspective, Norman and Jansson (2004) have observed how improvements within the operational processes of a firm significantly contribute to reducing risks and associated hindrances in day-to-day operations and processes, in conjunction with the necessary alignments with vendors and suppliers. Manos (2001) recommends that this enables the effective deployment and employment of adequate risk management processes towards ensuring higher levels of satisfaction amongst the associated workforce and customers, besides contributing to enhancing the overall image of the firm. Multiple risk management processes are reflected in Figure 2.8 (Source: Cox and Cox, 1996), and discussed.

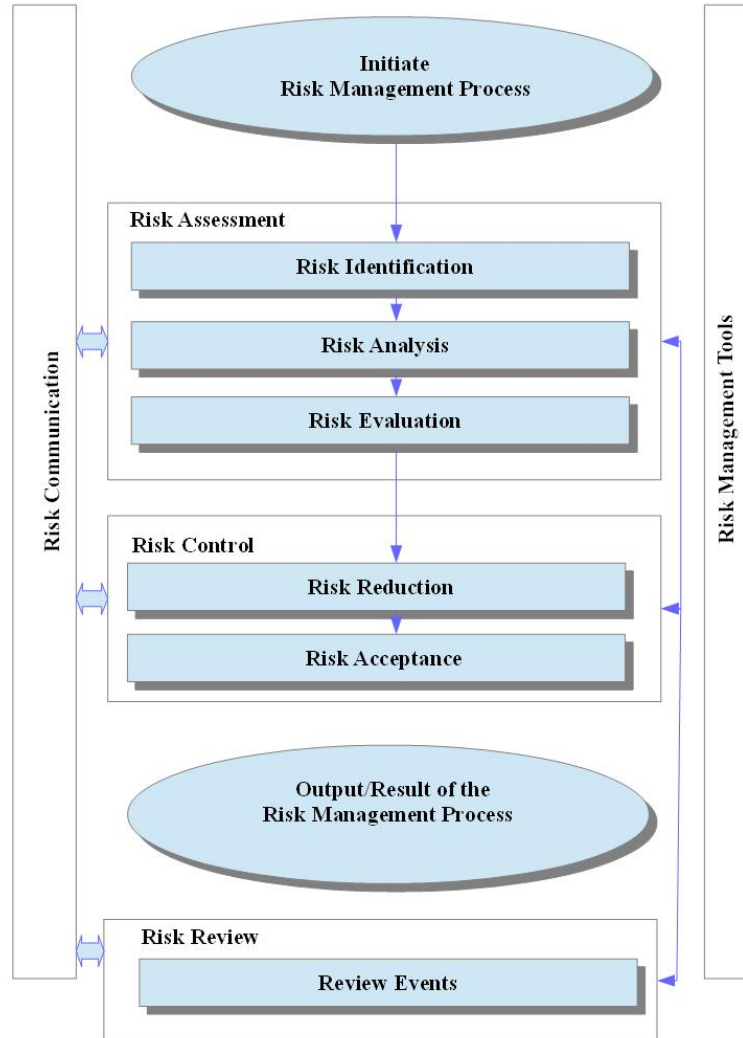


Figure 2.8 : Model of risk management (Source: Cox and Cox, 1996)

1. Risk evaluation involves a judgement of the significance of the assessed, public perceptions of risks, and risk acceptability, etc (Cox and Tait, 1998). Some schools of thought view risk evaluation as a subjective process, which is highly dependent on the assessor (Hale, 1986), as well as on the perception and knowledge of the hazard in question (Cox and Tait, 1998).

2. Risk control specifies risk control measures are aimed at avoiding or minimising the impact of risk to an organisation and the society. This process is preceded by the risk identification and evaluations stages of risk management (Bamber, 2003).

2.7 Health and safety procurement - overview

2.7.1 The monitoring of procurement

Unlike many other industries that are involved in mass production, the construction industry tends to focus on one-prototype projects (Sabol, 2007). However, according to Lenzen and Lundie (2012) there are certain comparisons to be made between construction and mass products: cases where a prototype from construction emerges as a model, and this model in turn is then replicated. Also, unlike the case of mass production, in construction the client is normally the one that takes the initiative in having the constructions designed and build (More and Joshi, 2014). In such as a case, the client pays for the construction and remains the actor (More and Joshi, 2014). The client is the one that places the order for the construction - hence he may sell or even let the construction for a later period (More and Joshi, 2014). And in all construction projects, there are different types of clients: those involved in one-off requirements (Takim, 2008), organisations involved in a regular process of development, as well those with huge development programmes that tend to employ technically skilled staff (International Labour Organisation, 2001)

2.7.2 Vetting bidders for contracts.

The vetting of bidders, or otherwise contractors in the construction industry is a very complex one. The client has to be aware of the many areas in which prospective builders, or whatever service is needed by the contractor, may indulge to be awarded such a contract, by breaching health and safety legislation, and cutting corners to increase a financial gain. However, the issue of overseeing contractual worker execution is an increasing concern among associations of all commercial enterprises, regularly in light of the fact that temporary workers might be performing non-routine work at destinations that are not specifically regulated by a supervisor, or any director by any means. Much research has as of now been done to decide why security can be adversely affected through temporary workers and how much (or little) consideration is paid to overseeing contractual worker wellbeing, how and why the

management and administration must oversee temporary workers on location from prequalification to post-work assessment, general investigating cross-industry best practices for contractual worker administration. The US Department of Labor suggests a 25% unemployment rate in the construction and development business. Reuters refers to nonresidential development spending has dropped more than 20% in 2011. Office development is down 29%, lodgings, 43% and the recuperation is relied upon to be moderate and small. Construction, being a mainly adult industry in the U.S., has dependably been focused yet there is another crucial movement in all temporary workers' business sector viewpoints. Specialists concur, this is "another typical" with littler volumes, with tighter margins and much more wary proprietors.

2.7.3 Financial and legal implications with construction accidents

There are several pieces of legislation relevant to workplace injuries and accidents in the UK. The first concerns reporting and is called the Reporting of Injuries, Diseases and Dangerous Occurrences Regulation (RIDDOR) and was enacted in 2013. The regulations state that employers and people in control of the workplace are responsible to report the included accidents, diseases and any dangerous occurrences. In the UK, the health and safety executive monitors and enforces health and safety laws and regulations. The construction sector plays a major role in the economic development of almost every country in the world. That being said, the work involved in construction is regarded as the most hazardous as compared to other industrial activities. Injuries incurred while performing construction work is about 50% higher as compared to all other work (Schneider, 2001). The risk of musculo-skeletal injury is especially higher among construction workers. Accidents and mishaps at the construction sites results in injury and/or death of many worker every years. That is why it is of fundamental importance for the construction company to assess the risk at the work site, and take effective measures to minimize the risk. Through continuous monitoring and surveillance, the work related injury risk can be minimized (Odetoyinbo, 1986). According to Lucy et al (1999), work related accidents are unexpected and unplanned occurrences that results in loss of productivity due to disturbance in the planned work sequence, injury, and damage to the plant and equipment that interrupts normal flow of production. O.S.H.A (2005) reports that about 60,000 deaths occur every year around the world due to mishaps at the construction sites, and the rate of fatalities in the sector is much higher

as compared to others. A study conducted by Jaselskis and Suazo (1994) showed that most of these accidents occur due lack of commitment to workplace safety.

2.7.4 Cost effectiveness in construction projects

According to Baccarini (1999), the success of a project is synonym to effectiveness. In other words the degree of achievement of project goals determines its effectiveness. Project team is formed to achieve and accomplish goals and the success of the project is determine how well those goals have been achieved. The top project priorities include completing the project on time, within the budget, and meeting technical specifications and mission. This corroborates with findings of De wit (1988) who found that that success of the project depends on the achievement of project objectives relating to quality, cost, time, and mission. According to a number of researchers the success factor in the construction industry relates to effectiveness and efficiency measures (Atkinson, 1999; Belout, 1998; Crawford and Bryce, 2003; De Wit, 1988; Brudney and England, 1982; Pinto and Slevin, 1988:1989; and Smith, 1998).

2.7.5 Contractor and stakeholder strategic decisions in construction

Contractors undertake the construction project using a team comprising of different department. Most of the contributors make decisions that affect health and safety at the worksite. In some cases, the project team consists of external members such as advocacy groups or regulatory agencies. It is important that the construction company identify health and safety issues relates to the sector during the decision making process.

CHAPTER 3.

LITERATURE REVIEW.

3.1 Introduction.

Undertaking a review of the literature is an important part of any research project. The researcher both maps and assesses the relevant intellectual territory in order to specify a research question which will further develop the knowledge base, (Tranfield et al., 2003). It underlines all underpinning knowledge that can be used and correlated to the project, to establish an understanding of the problem or gap being considered, and informs the reader of the topic under review. This review will look at and give a background to health and safety definitions and discuss generally events within such an environment, and then move on to develop current research and work undertaken to identify and give justification to the three health and safety areas to be discussed and outlined regarding the monitoring of the procurement process, cost effectiveness within the construction process and decisions made regarding OHS.

3.2 Health and safety definitions

Prior to initiating a debate and discussion regarding occupational health and safety issues, a few definitions need to be clarified, and the associated legal framework discussed. It is important towards having a clear perspective on the specific nature of the sector and the associated working conditions normally encountered within the construction sector. This would contribute towards enhancing the existing health and safety standards prevailing therein.

Health relates to the processes employed towards protecting people from the adverse effects of all the operations concluded within a construction and work site.

Safety relates to how individuals are protected from physical harm in the course of executing their duties and responsibilities. In general, the distinction between health and safety is hazy, with both words often used interchangeably towards indicating the physical and mental conditions of individuals in the workplace.

Welfare relates to the provision of facilities towards ensuring the continued health and well-being of workers employed at a location.

Environmental protection relates to specific activities conducted within the workplace impacting the surrounding environment including the soil, air, flora, water and the fauna. The health and safety of the associated workers are also included herein. Activities and processes related to effluent and waste disposal are fall under the preview of this aspect.

The Health and safety Executive (HSE, 2003) concludes accidents to be unplanned and un-forecasted events which end up harming individuals, groups of people or cause minor or major damage to the environment, material, plant or property within the business under consideration. The UK Health and Safety Executive (HSE) has the responsibility for the input of provisions of the Health and Safety at Work (HSW) Act that ensures all the necessary legislation implementation of the provisions therein towards the recommendations of the Health and Safety Commission (HSS). The latter is tasked with promoting the HSW Act besides providing related advisory services and conducting associated research and training. Although related authorities conclude an accident to include events and instances of specific injury, the current treatise would focus on the Health and Safety Executive definitions.

Hazard and risk (Keng, 2004) relates to defining the extent to which a specific activity or process could cause damage. Thus, there are multiple forms of hazards including chemical, electrical hazards and so many other associated forms which could be ranked in consideration of their propensity to materialize in actual form. A risk relates to how easily a hazard could end up causing actual harm on the site. Effective and efficient management processes could contribute towards reducing hazards and it is important to be clear on the distinctions related to the two terms since they are often interchangeably used within the construction industry. Thus, a major hazard could also be a high risk. However, it is possible to ensure that a major hazard could turn to be a low risk by ensuring efficient and effective controls of the aspects related therein. Despite the implementation of adequate controls, a certain degree and level of risk is still retained known as residual risk. The latter continues to be at high levels if the management is unable to ensure adequate controls with regard to effective health and safety management. It could be demonstrated that health and safety aspects in construction sites are not just limited to wearing a safety helmet. Instead, it refers to an entire philosophy which ensures the resolution and deletion of all hazards in the workplace through a formal process. It therefore relates to a philosophy discouraging working practices which have the potential to place an individual within harm's way to any extent in concluding the day to day activities. Correspondingly, risk is perceived in various

ways, with the health and safety executive concluding the same to be related to how often an individual could be exposed to an adverse situation in relation to a hazard (HSE, 1998). Hertz and Thomas (1983) consider risk in the context of the Random House College Dictionary as the propensity to be exposed to injury and losses. In connection to this, the health and safety commission (1995) considers danger to be connected on how regularly there destructive and harmful circumstances could emerge in the setting (Jannadi and Bu-Khamsin, 2002), while Lim (2003) considers danger to be related regarding a blend of undesirable occasions and events, numerous and capricious risks, the likelihood of results finished up to vary from what is required, misfortune vulnerability and the likelihood of a mix of the same. Nevertheless, the present context risk refers to and highlights the high or low probability of losses being accrued. All stages of the construction cycle have a degree of risk associated therein (Perry and Hayes, 1985). Safety and health risks are considered paramount in this regard and call for promoting an environment where the construction industry seems to strive to reduce the risks associated with regard to health and safety aspects.

Within the construction industry, it is suggested that a clear understanding of some basic occupational health and safety definitions could be defined. For a legal framework, it could be seen that it is essential to have an efficient tool for health and safety issue. Prior to carrying out a detailed discussion on health and safety issue, the basic occupational health and safety definitions follow.

Health- is considered as a protection from processes, procedures or materials of workplace that can cause illness to the minds and bodies of people.

Safety- there is a fine line between health and safety. Therefore, in a border perspective, both the terms are causally used together for indicating the concern for the mental and physical wellbeing of the people working in an organization. At a specific level, safety is protecting people from physical injury.

Welfare - is responsible to give facilities to the people to ensure their well-being and health at the workplace.

Environmental protection – This relates to aspects covering the fauna, flora, soil and air surrounding a workplace, and how it is impacted by activities undertaken in the course of performing a work or job within the area. Correspondingly, the impact on the overall environment is assessed. This includes atmospheric pollution and effluent disposal.

Accident – a damage or loss to property, material, plant or the environment, or injury or ill health of

people, or loss of a business opportunity that is faced after any unplanned event is labelled as accident by Health and safety Executive (HSE, 2003). The proper implementation of the Health and Safety at Work (HSW) Act within the United Kingdom is assigned to the Health and Safety Executive (HSE). They are also in charge of carrying out day to day work and functions of Health and Safety Commission (HSS). The HSC is accountable for promoting health and safety at work and encourage trainings, researches and offering advisory services and information. Accident is quite narrowly defined by other authorities who do not consider those events that do not bring about any injury or ill-health. However, the Health and Safety Executive definition will be used in this study. Hazard and Risk: Hazard can be given a rank relative to other hazards or to a possible level of danger. It is a possible activity or process that may bring about harm. They take many forms, including working from a ladder, chemicals and electricity (Keng, 2004).

Hazard and risks are the two terms that are often confused with each other; construction sites that are often at high risk are usually at high hazard. Therefore, it is very important to distinguish between the two of these. A risk is a possibility of an activity, substance or process to cause harm. It can be reduced with the help of controls by good management. However, even in such cases, the probability of hazards remains high. The remaining level of risk when the controls have been adopted is called residual risk. When the control measures are inadequate and display poor health and safety, then there is high residual risk. There are various definitions of risk. The Health and Safety Executive (1998) is of the perspective that risk is related to the probability of someone being harmed bodily in a work environment. According to Hertz and Thomas (1983), it is exposure to the likelihood of loss or injury; this definition is taken from the Random House College Dictionary. According to Jannadi and Bu-Khamsin, (2002), in 1995, the Health and Safety Commission declared risk as the prospect that harm will occur. Lim (2003) talks about risk as a possibility of grouping of hazards, undesirable events and partiality of actual result differing from expected result, probability of loss or loss uncertainty. According to the study, Perry and Hayes (1985), communicate risk is as a chance of harm, either high or low, that is actually being done. It will be ostensible at all stages of the construction project: sanction, construction, operation, and appraisal. The most severe risk that is faced by the construction company is in the safety and health aspect, it suggests a philosophy that helps to point out and eliminate the job hazards from the job site. Furthermore, it highlights and develops a scenario in which each person in the project construction

hierarchy has a responsibility and role towards health and safety.

3.3 Scope of construction industry and general problem description

According to Coble and Haupt (1999), the construction industry is the integration of multiple organizations which have an impact on the construction process directly or indirectly. These organizations consist of specialist trades, architects, engineers, management contractor, quantity surveyors, labourers, civil engineering contractors, accountants, engineering contractors, lawyers, civil engineering architects, subcontractors and property developers. Its importance has been highlighted by several studies, and suggests it plays a vital role in the socio- economic development of a country. It has a broader scope ranging from building, roads and bridges, to sewerage schemes, water supply, canal work, rivers and others. It has various classifications: housing, commercial, industrial, infrastructure work and utilities. It is also highly demanded in the sectors of industry, education, agriculture, health and other service industries.

The most common nature of work in construction is building a project that is used for domestic, industrial or commercial purposes. Here, the prospects are different the project could be starting a new building, or working on the extension of the existing building, it could also be the refurbishment, repairing or maintaining of the existing building. In such cases, there is a possibility that the building might be occupied with people or otherwise. Reconstruction projects can be considered as highly hazardous projects, this could be because such projects might include partial or complete demolition. Throughout the world, construction is considered to be as one of the most hazardous industries. It is generally noted that though the level of occupational accidents are high, the safety and health measures and precautions on the site are not adequate when compared to other industries. Construction projects mainly cover range of activities including site clearance, felling of trees, dismantling or demolishing of building plants, equipment or structure and the safe disposal of waste materials. Activities at site may include unloading, loading, site movement of pedestrians and vehicles and storage of material. This also includes the work that revolves around hazardous activities such as working on the roof top or being in contact with harmful substances such as lead or asbestos. The work during construction usually takes place in confined places, for instance, underground chamber and excavation. During the construction of the building, working with woodworking machines, painting and decorating uses heavy machinery which

itself is associated with hazards. By the end of most projects, the landscape turns out to be another hazard of its kind. One can come across similar level of complexity at workplaces. Within construction sites, there are multiple risks associated. Thus, they may include the likes of having to perform at a height, exposure to toxic materials, handling heavy loads, breaking up things, erecting frames and scaffoldings, ground works, and operating and moving heavy equipment and loads. Moreover, consistent changing of the worksites is also a hazard.

The construction sites are temporary in nature and during the process of construction, they change constantly. This leads to the urge to not give adequate consideration to safety and health issues, like the safe re-routing of site traffic and the availability of sufficient welfare facilities. The segment is divided into multiple small companies, each trying to chalk out an independent strategy. In the building sector, such organizations usually make the management assignments quite complex and challenging. The general contractor, architects, consulting engineers and various subcontractors together construct the building. The presence of increasing number of sub-contractors impact the quality of work delivered since aligning the interests and functions of all the stakeholders is a real challenge towards ensuring efficiency. Other than that, few trainees are required for structured training programmes and supervision at site, and young people receive training in different construction activities on the site. According to Hinze (1997) and Levitt & Samelson (1993), the highly unfavourable supervisor-worker ratio makes this sector more unfavourable. It has correspondingly been observed that supervisors who are able to maintain more conducive relationships with their charges are able to ensure lesser accidents amongst their employees.

Smallwood (2000), suggests that if the ratio is high, this relationship is hard to develop. Factors associated with how construction projects are prototypes, the tendency to subcontract, inadequate educational standards, and the related aspects which hinder enhancing safety standards within the global construction segment.

To conclude, it could be summarized that contractors and their subcontractors are not particularly enthusiastic in implementing safety standards within the majority of construction sites. Thus, this treatise could provide valuable input in this regard on how occupational health and safety standards could be successfully implemented. Further, associated industry professionals could also benefit from the conclusions derived.

3.4 Problems encountered in the construction industry

The construction business assumes a key part in deciding the advancement and prosperity of a country, and fundamentally adds to upgrading the stability and security of a nation. This could be attributed to the fact that the industry encompasses almost all aspects within the country be that related to irrigation, concrete structures, communication networks and all related civil engineering projects and initiatives. It therefore has wide applicability in such diverse sectors as health, education, agriculture, housing, commercial, utilities etc., all of which are related to infrastructural development and associated progress. It can therefore be concluded that the construction sector is an amalgamation of diverse organisations, impacting the construction process in varied ways. The stakeholders therefore include diverse segments including but not necessarily limited to the likes of subcontractors, labourers, contractors, engineers, lawyers, accountants, quantity surveyors, architects, property developers etc. to name just a few. This surely testifies to the importance of the construction industry (Coble and Haupt, 1999). Common projects undertaken in the context of the construction industry normally relate to domestic, commercial and the industrial sectors. Such activities could be related to aspects of repairing and maintaining existing structures, refurbishing them, constructing extensions and annexes, or erecting new construction activity. In this regard, the initiative could be observed to be undertaken by either totally and completely razing down existing structures or starting anew, or they could relate to continuing from existing buildings. The former is perhaps the more dangerous of the operations, and requires proactive measures to ensure the safety of the individuals involved therein. In undertaking a construction initiative, there are multiple processes involved including clearing the construction site, demolishing or dismantling the associated structures in terms of fixtures within the structure, removing and selling off associated equipment therein, felling trees and shrubs and ensuring that all harmful and toxic material are disposed off in a safe manner. This is so since breaking down an existing structure could relate to multiple hazards in terms of having to deal with various hazardous material including asbestos and lead. Related on-site activities could be associated with having to handle and transport the same or could also involve storing them within secure sites for long stretches. The construction process itself is also something not to be taken lightly since aspects related to activities associated with installation, cleaning, decorating, fabricating and maintaining services entail significant risks. Hazards related to dealing with woodwork and related machinery and processes has its own sets of risks since painting and decorating them often utilizes heavy machinery

within confined spaces and underground locations. Landscaping activities concluded towards signing off on projects entail its own sets of challenges in this regard. It can therefore be reasonably concluded that the construction industry has more than its fair share of risks for both skilled and semi-skilled personnel associated therein. In executing the actual construction process, it often involves the personnel to work at significant heights, handle things manually, deal with toxic products, lift loads, coordinate scaffolding and associated groundwork, and arrange to move and rotate workers through multiple sites and locations. Since construction sites are a hive of activity requiring constant changes, there is always the possibility of workers compromising on health and safety elements, including acts of welfare facilities and in how internal traffic is handled therein.

The construction industry also has a fairly fragmented structure in how the entire process is executed, encompassing various independent stakeholders which entail significant and major complexities. This often sees multiple stakeholders working on a single aspect in tandem with others and at times raises serious questions on the authority to be exercised in efficiently executing the project since seemingly no specific partner is answerable to the other. Therefore, such situations frequently see multiple subcontractors, architects, engineers coordinating their activities and ensuring that no one gets in the way of the other. Further, notwithstanding the presence of industry experts, it is likewise essential to consider the presence of various students and trainees who should be facilitated. The skewed specialist: director ratio is likewise a noteworthy test which makes it vital for the supervisor or line manager to endeavor towards keeping up amicability and coordination inside of huge gatherings or groups, which contributes altogether towards decreasing occasions of working environment accidents (Hinze, 1997; Levitt and Samelson, 1993). However, in cases where there are too many workers, it is certainly a challenge for the supervisor to get down on a personal level with all workers (Smallwood, 2000). Rowlinson and Lingard (1996) are of the perspective that considering most construction activities to be related to prototypes, the ever-changing locations, limitations in educational levels, tendency to subcontract duties and responsibilities, etc., all contribute to lowering safety standards within the global construction industry.

To effectively conclude, it is easily observable that the majority of contractors and their associated sub-contractors are all seemingly not inclined to implement adequate health and safety standards within their construction sites. The current study could therefore hopefully contribute much towards

encouraging the implementation of proper and formal occupational health and safety initiatives which would contribute to ensuring the interests of all associated stakeholders. Some of the problems and issues observed in this regard may relate to;

- Overall, the construction industry is observed to have a poor safety record;
- This necessitates instituting major reforms;
- The causes of specific accidents could be determined to be complex but should nevertheless be properly investigated;
- This ensures the safety and health of the stakeholders;
- Present safety standards have much room for improvement.

3.5 What is occupational health and safety

Since the beginning of the second half of the 20th century, both the World Health Organisation (WHO and the International Labour Organisation (ILO)), have adopted and shared a common definition of OHS (WHO,2014). According to such definition, the main aims of OHS include promoting and maintaining the highest degree of physical, mental and the social well-being of employees in all occupations; protecting employees against risks as a result of adverse factors of health; and ensuring that employees are placed in occupational environments that are adaptable to their physiological and psychological capabilities (WHO, 2014). With reference to the WHO/ILO meaning of word related health and safety in closer detail, it can be seen that such a definition has three key objectives that incorporate the support and advancement of the working limit of employees, the improvement of the work related environment with the end goal, it should be helpful for the advancement of OHS and the improvement of working culture and structures that support OHS (Shehu and Akintoye, 2010). Looking at the WHO/ILO definition of occupational health and safety in detail, it can be noticed that such a definition has three key objectives that include the maintenance and promotion of the working capacity of employees, the enhancement of the occupational environment in order for it to be conducive for the promotion of OHS and the development of working culture and structures that favour OHS (Shehu and Akintoye, 2010). According to Hofmann and Tetrick (2003), the development of working cultures and structures that favour OHS may promote a healthy social climate and may ensure the smooth running of operations and the enhancing of productivity. Shehu and Akintoye (2010) believes

that the aspect of working culture in the WHO/ILO definition is intended as a means of trying to reflect on the crucial value systems that are in place in an organisation. And conversely, such a culture is being reflected in the organisational operations and managerial systems and practices (Shehu and Akintoye, 2010). According to the House of Commons, Business and Enterprise Committee (2012) OHS refers to all aspects that deal with workplace related health and safety issues, focusing primarily on the prevention of hazards.

OHS is a multidisciplinary healthcare field that enables a worker to undertake his occupation in such a way that limits harm or risk to their health (Burke, Clarke and Cooper, 2011). Those involved in OHS come from a variety of professions and disciplines, such as psychology, medicine, rehabilitation, and occupational therapy (Alli, 2008). According to Alli (2008) the main goals of OHS programmes include the development of a healthy and safe work environment. Clarke and Cooper (2011), suggest that the administration of an organisation has an initiative part to play as far as managing OHS related issues. Burke, Clarke and Cooper (2011) in their study, they emphasise that management must not only ensure commitment to OHS but they must also demonstrate such commitment in the form of providing a priority to OHS issues. This is to say that management must demonstrate that they place a high value on OHS, and its effective management and that they can respond promptly to workplace related hazards. In addition to management's commitment to OHS, according to European Commission (2014) employees also have a role to play. And such a role, as the European Commission (2014) states, it is crucial to the success of OHS programmes. This view is echoed by Grigg (2010) who states that without the commitment of employees, it will be very difficult to have an OHS programme. In addition, Grigg (2010) trusts and suggests that so as to guarantee that workers assume their part successfully to the extent OHS is concerned, the administration must guarantee their backing. In such, management could take a lead and must have the ultimate responsibility for ensuring that the working environment is safe and healthy.

3.6 OHS risk factors

Although work, as it is, provides a lot of economic and financial benefits; however there are many workplace and work related risks to the health and safety of individual at work. Some of these risks include physical factors, mishandling of chemicals, biological agents and materials, and allergens (Zeng,

Tam, and Tam, 2010). Dangers, for example, physical hazards are a regular type of injury in numerous workplaces (Weiner, Schmitt and Highhouse, 2012). According to Weiner, Schmitt and Highhouse, (2012) some of these risks may be unavoidable in some industries, such as construction. However, according to Sato (2009) over the past decades many industries have managed to develop certain procedures and methods for managing risks such as physical hazards. Other common causes of workplace injuries and fatalities are falls. Some of these falls happen in extraction, transportation and construction. According to Phil, Hughes and Ferrett (2012) the use of machines also pose a significant risk to OHS. Such machines are common in many industrial settings, such as mining, manufacturing and construction (Phil, Hughes and Ferrett, 2012). Many of these machines, according to (Phil, Hughes and Ferrett, 2012) involve movable parts, hot surfaces and sharp edges; and, such machines may pose risks such as cuts, burns, wound, or stabbing.

There are various other OHS related risk factors. For example, workplace spaces with limited openings and ventilation (Hofmann, D.A. and Tetrick, 2003). Hofmann, D.A. and Tetrick (2003) suggest that such a risk is not just limited to employees but also to rescue workers. Noise can also pose a risk to OHS. For example in the case of the USA occupational hearing loss is one of the major work related injury (Kirchner et al., 2012). In addition to hearing loss that may be caused by noise, according to Kirchner et al. (2012) the exposure to certain chemicals such as metals (arsenic, lead and mercury) can also result in loss of hearing. Furthermore, extremes in temperatures can also pose a serious threat to OHS (Burke, Clarke and Cooper, 2011). For example, stress from heat stroke, cramps, exhaustion, and rashes, can all lead to OHS risks (Burke, Clarke and Cooper, 2011). Employees who work close to hot surfaces also face risks of burns and dehydration (Burke, Clarke and Cooper, 2011). Another OHS hazard variable is being exposed to very cool temperatures, for example, overexposure to cold climate conditions which can prompt hypothermia (Carter and Smith, 2006) trench foot, frostbite or chilblains (Carter and Smith, 2006). Electricity can likewise represent a genuine danger to OHS, for example, danger of electrical wounds (electric stun, blazes, falls, and electric shock) (Carter and Smith, 2006) According to Carter and Smith (2006) work related injury and illness can be caused by lighting, wire pressure and vibrating machinery.

3.6.1 OHS risk factors in construction

According to Choudhry and Fang (2008), OHS risk factors vary according to the specific industry or

sector. For the sake of this project, we will focus on OHS risk factors in the construction industry. Construction work is among the most dangerous occupations in the world. It accounts for more work related fatalities than any other industry in the European Union (European Commission, 2014). In the UK, the construction industry alone accounts for up to 40% of total reported work related fatalities among the UK's four major industries Hughes and Ferrett (2012). According to Hughes and Ferrett (2012) the problem for the construction industry being the most dangerous industry is not an issue of failing to identify hazards and risks, but instead such hazards and risk cannot be easily controlled in a working environment that changes all the time.

Some of the major OHS risk factors in construction include crashes involving motor vehicles, excavation accidents, machines, electrocution, and when someone is struck by an object falling down (Hughes and Ferrett, 2012). The leading causes of injuries in constructions are falls from high nights (Hughes and Ferrett, 2012). According to Chi, Yang and Chen (2009) fall protection are needed in activities and areas such as walkways, ramps, holes, formwork, and hoist areas, sides and edges that are unprotected, roofing, wall openings, residential area construction, and precast erections. Many regulations don't characterize stature limit for the use fall protection, however Chi, Yang and Chen (2009) suggest it ought to be any height that might prompt harm from a fall. (Chi, Yang and Chen, 2009). Personal fall arrest, guardrail, safety net, positioning device, and warning systems can be used for fall protection (Chi, Yang and Chen, 2009). Employees should be properly trained on how to identify risk and understand the appropriate way of using such systems (Chi, Yang and Chen, 2009). Depending on the contractual terms of employment, either the employee or the employer will be responsible for the identification of hazards and the provision of fall protection systems (Chi, Yang and Chen, 2009). According to Aneziris et al. (2008) on-site construction workers must be aware of risks on the ground. There is also a risk with regards to cables that run across roadways. In any case, after the development of cable ramp equipment that secure hoses and other hardware that used to be scarcely laid out, such hazard have been decreased (Aneziris et al. 2008). Another major OHS risk factor in construction invokes motor vehicle crashes.. All motor vehicles must have an emergency brake mechanism, a service and parking brake systems (Chi, Yang and Chen, 2009). Also vehicles must have audible warning systems should the operator decides to use it (Chi, Yang and Chen, 2009). Moreover, vehicles must also have doors and windows and windshield wipers (Chi, Yang and Chen, 2009). If

equipment on the site are intended to be used during the night, they must have lights and reflectors (Chi, Yang and Chen, 2009). And there must be a safety glass on the cab of the equipment (Chi, Yang and Chen, 2009). According to Hofmann and Tetrick (2003) and equipment must only be present on the site if it is intended to be used for a task, otherwise it must not be on the site.

Road construction also poses a huge risk to workers as well as non-workers. According to Phil Hughes and Ferrett (2012) employees working in highway areas are exposed to series of risk and most especially that of injury and death resulting from equipment and passing motor vehicles. Those workers on foot can be exposed to often-high speed passing traffic (Hughes and Ferrett, 2012). Those working construction vehicles are typically at a danger of damage as a consequence of impact, or being caught in running machinery (Phil Hughes and Ferrett, 2012). A noteworthy concern as expressed by Phil Hughes and Ferrett (2012) is that, regardless of the kind of work most development workers work in conditions of poor lighting and visibility, climate conditions, poor lighting, high volume movement, speed, and congested work areas. Some of the causes of road construction injuries include falls or slips; being stuck objects, trucks or moving equipment; transportation incidents; and exposure to harmful environments or substances (Phil Hughes and Ferrett, 2012). And those factors that may normally lead to fatality include getting hit by moving machinery, motor vehicles and trucks (Kirchner et al., 2012). The fact that many construction sites cannot completely prevent the presence of non-workers, poses some amount of threat to such non-workers. Normally, sites are blocked during construction work, and traffic is normally redirected, protecting the vehicles and sites by barricades and signs (Phil Hughes and Ferrett, 2012). However, as Phil Hughes and Ferrett (2012) noted sometimes even such barricades and signs can pose a significant amount of risk to vehicle traffic. As stated by Phil Hughes and Ferrett (2012) as a majority of fatalities in construction results from construction related activities, however some of the fatalities arise as a result of activities that are not related to construction activities, for example electrical hazards. In a study carried by Sawacha, Naoum and Fong (1999) titled "Factors Affecting Safety Performance on Construction Sites" which was published in the International Journal of Project Management, they focused on the historical, psychological, economical, procedural, organisational, and environmental factors that influence the level of construction site safety. The researchers used a methodology based on reviewing relevant literature relating to the subject matter of the research followed by primary data collection in the form of interviews. According to their findings,

the specific variables or factors that relate to the policies of an organisation are the dominating factors that have an influence on safety performance in the UK construction industry in particular. The study identified five key issues relating to construction site safety: management discussions on safety, the provision of booklets about safety, the provision of safety equipment, the provision of safety environment, and the appointment and training of people to act as on-site safety representatives. OHS is a very complex issue, and aspects of safety attitudes and performance in construction is even more of a major concern, according to Sawacha, Naoum and Fong (1999). Most accidents at work happen as a result of a lack of proper training or knowledge, or a lack of supervision (Sawacha, Naoum and Fong, 1999).

3.7 The monitoring of procurement

Unlike many other industries that are involved in mass production, the construction industry tends to focus on one-prototype projects (Sabol, 2007). However, according to Lenzen and Lundie (2012) there are certain comparisons to be made between construction and mass products: cases where a prototype from construction emerges as a model, and this model in turn is then replicated. Also, unlike the case of mass production, in construction the client is normally the one that takes the initiative in having the constructions designed and build (More and Joshi, 2014). In such as a case, the client pays for the construction and remains the actor (More and Joshi, 2014). The client is the one that places the order for the construction - hence he may sell or even let the construction for a later period (More and Joshi, 2014). And in all construction projects, there are different types of clients: those involved in one-off requirements (Takim, 2008), organisations involved in a regular process of development, as well those with huge development programmes that tend to employ technically skilled staff (International Labour Organisation, 2001). So, as the clients take the initiative in placing an order for a construction project, the contractors and other industry consultants on the other hand work on the continuous process of developing markets for their products and services (Rundquist et al., 2013). This comes with the development of certain private to public partnership models that involve a process of pre-financing the initial costs of construction to the client. Contractors and consultants are also often involved in trying to convince potential clients through the provision of feasibility studies for upcoming projects as well free costs (Vadnjal, 2011; Stroe, 2013). Some studies have tried to identify a procurement path, for example, (Smith et al., 2004; Babatunde, Opawole and Ujaddughe, 2010). Such a path involves the client trying

to engage the private sector for various construction activities, such as conducting feasibility studies, design, building, operation, and maintenance (Smith et al., 2004). The client therefore has the onus of defining a procurement path. Hence according to Miller et al. (2009) depending on the in-house capabilities, knowledge and understanding of the construction process itself, as well as the client's demands, the client must define a procurement path. However, Janak (2010) states that the most common form of procurement for all construction contracts is general contracting. In this regard, the client engages a team of designers; such a team designs the product to be built; and then the design team, on behalf of the client, engages the services of the contractor who only has a relationship with the design team. However, Hagstedt and Thideman (2013) in their Master's thesis, they state that such a model is only useful in the case of simple and straightforward construction projects. Nowadays, many construction projects require multidisciplinary skills during the design phase. The design team often needs the support of specialists. Hence, the design team may have to procure the services of specialists such as subcontractors and advisors. This kind of model is one recommended by O'Brien, Soibelman and Elvin (2003). However, according to Sacks et al. (2015) the problem with such a model is that the design team will have to coordinate the inputs of the various advisors to the construction project. Therefore, as Sacks et al. (2015) state a lack of coordination will often lead to a mismatching of design inputs and that of construction inputs. Most often the contractor has a responsibility of filling in or adjusting the design that was provided by the design team. In addition to this, according to Sacks et al. (2015) the contractor will also have to plan delivery of inputs. The procurement time of some specialist equipment may normally take a long time - such as the entire construction process. Hence there is a need to procure the services of subcontractors well ahead of the commencement of the project (Clegg, Kornberger and Pitsis, 2011).

3.7.1 Strategic procurement.

A strategic point of view of an inventory network idea was developed in the 1980s which in this way advanced into strategic procurement (Porter, 1985; Christopher, 1992; Lamming, 1992; Lamming and Cox, 1995; Ross, 1998). Regularly this included situating such a method intensely in the commercial area by creating proper sourcing and administration methodologies for suppliers. Porter (1985) built up the idea of a "value chain" as an apparatus to enhance aggressive advantage in an industry. In addition,

the idea of key acquirement organization, which is the progression of an outside sourcing and supply method planned to keep up a reasonable position for that organisation, in regards to procurement Lamming (1995), identified the significance of supplier advancement through united business associates and vital strategic community oriented organizations to empower an enhanced production within the company to occur. He termed this lean supply. Lamming likewise suggested that fulfilling a lean method technique is a matter in perspective of the method for competition in business areas, in light of the way that the suppliers are incorporated in the meantime in a couple of other distinctive chains Strategic procurement is much more extensive than the lean development. It is an idea relevant to architectural, engineering and construction disciplines. An important part of strategic procurement can be seen with the co-operation of multiple companies, and as such has developed since the 1980's as such collaborations have indeed developed in one business after another (Gomes-Casseres, 1996).

Ross (1998), recognized and suggests two levels in conceptualizing production network administration, to be specific the strategic and tactical, his examination focused on the rising vital abilities of the production network administration idea. He states that, quote - "Procurement management is a continuously evolving management philosophy that seeks to unify the collective productive competencies and resources of the business functions found both within the enterprise and outside in the allied business partners located along intersecting supply channels into a highly competitive, customer-enriching supply system focused on developing innovative solutions and synchronizing the of marketplace products, services and information to create unique, individualized sources of customer value". However, procurement issues, within the AEC area, does lead and can produce traits for the unscrupulous, to obtain an advantage over other rival companies in the need to seek contracts.

3.8 Vetting bidders for contracts

Under the current Health and Safety laws in the UK, both the client and the contractor have responsibilities to reduce the risk of work-related injuries and illness. Clients need to develop and deliver a clear policy in regards to the HS standards they expect from contractors. This policy needs to be well publicised so that agents on the client side like procuring officers and contractor side like the tendering officers understand the priorities of the client (Wells and Hawkins, 2013). The clients should also have realistic expectations in terms of health and safety and this can be achieved with a survey of

the market and making sure that the criteria they are setting can be met by the available market. This analysis of the market should include the OHS regulatory framework already set in the market and a study of the common OHS strategies used by contractors in the market

In the past few years, there has been an increase in the risk models that contractors can use during the bidding process to allocate risk contingencies. Some of the risk models that have been introduced for assessing risks include influence diagramming based technique (Al-Bahar and Crandall, 1990), fuzzy set model (Tah et al., 1993; Paek et al., 1993; and Zeng et al., 2007), and logic based ANN model (Liu and Lang, 2005). However, most of the recent research studies have shed light to the fact that the risk assessment tools are not commonly used by the contractors. Only seven contractors in UK were found by Tah et al. (1994) to have used risk assessment tools to assess the risks during the bidding process. Moreover, Akintoye and MacLeod (1997) and Akintoye and Fitzgerald (2000) found only 30 and 84 contractors in the UK used the risk assessing models. Smith and Bohn (1999) had found 12 contractors in the US utilized the risk models, while only 60 contractors in Hong Kong were found to have used risk assessment model to assess the risks by Chan and Au (2007). That said, Laryea and Hughes (2008) state that the use of risk and price during the bidding process is not articulated well in any of the recently published literature.

In the construction industry, pricing of the work is quoted during the bidding phase. A basic knowledge of the tender process is required to determine how contractors determine the bidding price. Additionally, there is a need to determine how the price is influenced by risk factors, and also under what circumstances this takes place. At the moment, there seems to be very little empirical research works have been conducted that examined the entire process of bidding used by the construction workers. Without a basic knowledge on how the bidding process takes place while taking account the process, it is difficult to know the right analytical models for assessing risk in the real world situations. Assessment of risks has a significant impact on the pricing strategy of the contractor. But there are other factors that also influence the pricing decisions. Price that the customers will be willing to pay depends on the resources allocated for the work as well as the price that the competitors are willing to pay for the same project (Lipsey, 1979). This suggests that the bidding price is dependent on the competitive and the market environment at a particular moment in time. According to Brook (2004), the bidding process consists of two stages. The first stage is the estimating stage where the costs of the project is

considered. Pricing at this level depends on the estimating department's skill in determining the cost. Second stage of bidding pricing is the adjudication that refers to the stage where the directors estimate the cost taking into account commercial factors in the context of risks, market conditions, and specific circumstances. In the end the management will try to set the final bidding price between the value and cost in order to win the bidding (Murdoch and Hughes, 2008). The problem is that the existing literature do not clearly shed light on the approach taken by the contractors to accommodate for risks inherent in the process of estimating the bidding price while taking account of the market factors. A number of analytical methods have been proposed by scholars to deal with risks during the bidding process. In order to conceptualize the analytical models that align with the contractor's actual performance, it is important to understand the actual process of the bidding process taking into account the market risks. However, Skitmore and Wilcock (1994) have stated it is difficult to get contractors to take part in studies to understand the bidding process as it involves commercially confidential data. Risk is an inherent part of any business endeavour (Fisher and Jordan, 1996; Flanagan and Norman, 1993). Capital market and portfolio theories state that there are two types of risks present in the market (Fisher and Jordan, 1996). The first is the systematic risk that is outside the control of the organizations such as interest rate and market risk, purchasing power risk, and natural calamities. The second type of risk is the unsystematic risk that is inherent to organization and can be controlled. It includes financial and business risk. Both these risks are also relevant to the construction sector according to Dorfam (2002) and Tah et al. (1993).

Fisher and Jordan (1996) state that one way of estimating the price that meets the profit target is through quantifying the risk and setting a required rate of return. The rate of return takes into account a risk free rate and also compensation of the individual risk factors. Connolly (2006) said that the risk element contains costs that in some cases can be catastrophic. But estimating the price risk is not that easy as has been revealed in a survey of 400 top contractors in the US (Mochtar and Arditi, 2001). Mulholland and Christian (1999) conducted a conceptual study in which an analytical approach was taken to assess the risk in the construction projects. It was found that projects that are undertaken in dynamic and multifaceted environment results in high risks and uncertainty that is compounded by the time constraints. Flanagan and Norman (1993) say that every construction project has some unique features and risks. On the other hand, Wright and Ayton (1994) are of the view that risks are not

unique in the sector. Hughes and Hillebrand (1985), state that there are a number of factors that makes the construction industry unique. They are of the view that there are a number of factors that are contractual, economic, environment, and political in nature all affect how construction work is awarded, reported, and described. Some of the factors outlined by the authors that affect construction sector include competitive tendering, production, preliminary expenses, low fixed capital requirements, tendency to operate with low working capital, delays to cash inflow, government interventions, seasonal fluctuations and effects, and uncertain weather conditions, unpredictable ground conditions, and no long term guarantees or performance liability. The same factors have been explained by Kwakye (1997) and Calvert et al. (1995) who say that the construction work is mostly complex consisting of multiple market participants and long production cycle. A number of scholars such as Liu and Ling (2005), Paek et al. (1993), Tah et al. (1993), and Kangari and Riggs (1989) have introduced models that the contractors can use to determine risks inherent in the bidding process. Kangari and Riggs (1989) introduced a fuzzy set model to assess the risks that can help contractors a more rational and logical basis to make bid pricing decisions. The authors demonstrated how to calculate risk value taking into account of fuzzy set principles that include a risk premium. That said, no reference has been made to any research on how contractors actually calculate the risks.

A conceptual model was developed by Tah et al. (1993) that help contractors to assess the risks during the preparation of the bid process that took into account contingencies using the fuzzy set model logic. In addition, Liu and Lang (2005) proposed a based ANN (artificial neural network) model, as mentioned earlier, that can assist contractors in estimating the price markup in an uncertain and constantly changing market environment.

Any model development method that a contractor uses to assess the risks and set prices should be based on ground realities. The process of negotiating prices with the clients is a complex process that is not well elucidated in the current literature. A number of research studies have identified the process of estimating and bidding the prices (Willis, 1929; Hall, 1972; Wainwright and Wood, 1977; Enterkin and Reynolds, 1978; Wood, 1982; Wood, 1982; Smith, 1986; Skitmore, 1989; Harrison, 1991; Hinze, 1993; Buchan et al., 2003; and Brook, 2004). That being said most of the literature conceptualised what ought to be and not how contractors actually estimate and bid the prices. Up till now, no detailed research work has been conducted that fully explains the actual bidding process, and especially on how

the risk is assessed by the contractors. Without having in depth knowledge about the actual bidding process, it is hard to make effective recommendations for improvements. Moreover, the validity of any suggested improvements without taking into account the actual process seems to be questionable.

3.9 Financial and legal implications with construction accidents

3.9.1 Introduction

There are several pieces of legislation relevant to workplace injuries and accidents in the UK. The first concerns reporting and is called the Reporting of Injuries, Diseases and Dangerous Occurrences Regulation (RIDDOR) and was enacted in 2013. The regulations state that employers and people in control of the workplace are responsible to report the included accidents, diseases and any dangerous occurrences. In the UK, the Health and Safety Executive monitors and enforces health and safety laws and regulations. The construction sector plays a major role in the economic development of almost every country in the world. That being said, the work involved in construction is regarded as the most hazardous as compared to other industrial activities. Injuries incurred while performing construction work is about 50% higher as compared to all other work (Schneider, 2001). The risk of musculo-skeletal injury is especially higher among construction workers. Accidents and mishaps at the construction sites results in injury and/or death of many worker every years. That is why it is of fundamental importance for the construction company to assess the risk at the work site, and take effective measures to minimize the risk. Through continuous monitoring and surveillance, the work related injury risk can be minimized (Odetoyinbo, 1986). According to Lucy et al (1999), work related accidents are unexpected and unplanned occurrences that results in loss of productivity due to disturbance in the planned work sequence, injury, and damage to the plant and equipment that interrupts normal flow of production. O.S.H.A (2005) reports that about 60,000 deaths occur every year around the world due to mishaps at the construction sites, and the rate of fatalities in the sector is much higher as compared to others. A study conducted by Jaselskis and Suazo (1994) showed that most of these accidents occur due lack of commitment to workplace safety.

Up until now, various scholars have examined safety measures in place at the workplace as well as the cost of accidents to the construction employers (Laufer and Ledbetter, 1986; Leopold and Leonard, 1987; and Levitt and Samelson, 1993). This study is undertaken with the hindsight that accident

prevention is a major concern in the construction industry. Any effort undertaken to assess construction work related risks and explore practical actions to minimize those risks will have a great bearing in the sector. Accidents at the construction work site occur due to many reasons. It is the duty of the supervisor or manager to assess the causes and take measures to minimize the risks. Siri Wardena et al (2006) say that natural disasters are one of the major causes of damage to the processes, products, and stakeholders at the construction site. Some of the common natural events that results in casualties at the work site include flooding, earthquake, wind, rain and landslides.

According to Adeniye (2001) the task of carrying construction work during wet season is much difficult as compared conducting work during the dry season as there is increased risk of the worker losing balance on the scaffold and slid off the plank resulting in injury or death. Sotoire (1992) also is of the view that construction work is dangerous during adverse weather conditions and therefore should be avoided. Apart from physical harm, Sotoire (1992) says that working in adverse conditions increases general discomfort of the workers and exposes them to illnesses. Another reason for physical injury at work seems to include exposure to high level of noise produced by construction equipment such as pumps, welding equipment, compressors, dozers, and on site explosives produce a lot of noise that may lead to hearing impairment (Adeniye, 2001). Lucy et al (1999) says that a common cause for injuries at the workplace is human error or undesirable actions that compromise workplace safety systems. The undesirable action can be due to lack of awareness about the danger associated with the activity as well as lack of focus or concentration. That's why it is vital that safety training be provided to worker at the construction site about the importance of following safety procedures and rules. Scaffold accidents are another major reason for injuries and death at the construction site that have been identified by various scholars (O.S.H.A., 2005; HSE, 2006; Mccann and Paine, 2002, and U.S Dept. of Labour, 2005). Other reasons for construction related accidents that have been identified by scholars include crane accidents (Skinner et al, 2006; and Neitzel 2001), trips, slips and falls Tappin et al, 2004; electrical accidents (Crowley & Homce, 2001; and Taylor et al, 2002), and ladder accidents (Mitra et al, 2007, O.S.H.A 2005).

3.9.2 Comparisons.

During the past decades, the construction industry has increased its efforts in improving workplace safety and health standards. That being said, most of the efforts have focused on preventive measures to avoid workplace accidents instead of monitoring safety performance. At the present the performance of the workplace safety system the construction site remains a glaring challenge for companies all over the world. Ikechukwu A. D & Dorothy L. B (2013) suggests that a country such as Nigeria is one of those countries that do not have any adaptive workplace safety and health rules and regulations. Companies in the country do not allocate enough resources to address issues that relates to workplace safety and health. Very few companies monitor, report, or divulge reports relating to accidents and injuries at the workplace that further aggravates the problem. The author further suggests that a number of factors contribute to effective management of safety and health issues at the workplace. These include direct and indirect cost of accidents (financial and economic factor), consideration for human life (humanitarian and social factor), and the need to abide by government rules and regulations relating to workplace safety. Talking about government legislations and rules, Kheni, N A, Dainty, A R J and Gibb, A G F (2007) suggest that although workplace safety and health are endorsed by the conventions of International Labour Organization (ILO) as well as the parliament, they are not properly implemented by local government bodies. In a developing country, the construction sector rarely provides the best value for taxpayers. Moreover, the sector does not fully meet the needs of modern competitive businesses. As a result, construction sector in most of the developing countries show poor safety and health performance as not much focus is given to the sector that is reflected by lack of rigid safety laws pertaining to the construction sector, Datta .M (2000)

3.9.3 Performance costs implied within health & safety

Health and safety performance costs are an important part of the company expenses that are required for maintaining a healthy and safe work environment at the workplace. These costs include expense incurred for complying with legal laws relating to workplace health and safety, executing plans to avoid accidents during the work as well as to improve safety and work conditions in all areas of the construction work. The cost of health and safety performance is considered as an important and necessary expense by many companies (Okoye, P. U. & Okolie, K. C. (2014). Haefeli, K., Haslam, C.

& Hsalam, R. (2005) suggests that avoiding work related injury costs does not seem to be the major motivating factor for implementing a workplace safety program. Nonetheless, Haefeli, K., Haslam, C. & Hsalam, R. (2005) acknowledges the fact that accidents and injuries at the workplace was perceived to have an impact on the financial position of the company due to such factors as customer dissatisfaction, decreased employee morale, and reduced efficiency, productivity, and service delivery. Guha, H. and Biswas, P. (2013) is of the opinion that investment in safety procedures at the workplace cannot be absolute. He says that a rational and logical justification of the costs related to implementation of safety parameters in the developing countries cannot be justified due to economic reasons, and that the company cannot bear the costs of implementing safety standards at the workplace. And this is especially the case when the cost of accidents at the workplace is low in the country. Keep in mind that the cost of implementing Safety and Health systems is generally 0.5% to 3% of the total costs of the project, according to Smallwood, J. (2004).

3.10 Cost effectiveness in construction projects

3.10.1 Efficiency and cost effectiveness in the industry

According to Baccarini (1999), the success of a project is synonym to effectiveness. In other words the degree of achievement of project goals determines its effectiveness. Project team is formed to achieve and accomplish goals and the success of the project is determine how well those goals have been achieved. The top project priorities include completing the project on time, within the budget, and meeting technical specifications and mission. This corroborates with findings of De wit (1988) who found that that success of the project depends on the achievement of project objectives relating to quality, cost, time, and mission. According to a number of researchers the success factor in the construction industry relates to effectiveness and efficiency measures (Atkinson, 1999; Belout, 1998; Crawford and Bryce, 2003; De Wit, 1988; Brudney and England, 1982; Pinto and Slevin, 1988:1989; and Smith, 1998).

The term efficiency refers to maximum output obtained by utilizing a given level of resources, while effectiveness refers to achievement of objects and goals relating to the project. Pinto and Slevin (1988:1989) say that both the effectiveness and efficiency measures determine success of the project. Efficiency measures relate to internal organizational structures and strong management such as

adherence to budget and schedules, basic expectation regarding performance, etc. It can also be said that efficiency of a project relates to user satisfaction, meeting project goals and objectives. All the factors jointly play an important part in success of the project. A project that is completed within the budget, delivered on time, but does not conform to user's requirement will not be considered a success. Project efficiency can only be achieved when the a standard methodology and system are out in place by the company management (George, 1968). This aligns with the findings of Nyhan and Martin (1999) and Smith (1998) who says that the efficiency of the project relates to effective utilization of human resource and equipment, while effectiveness relates to outcome of the project. Maloney (1990) suggests that the efficiency of projects in the construction sector depends on the effective utilization of resources. This may be represented by the ratio of resources required divided by the resources consumed. Effectiveness of the project, on the other hand, depends on the achievement of organization's objectives. Cameron and Whetton (1993) contributed to the knowledge of product effectiveness and efficiency by demonstrating that a system is effective only when the objectives of the project are achieved. Since most of the construction projects focus on client's needs, an effective project is one that effectively meets the needs of the client. Crawford and Bryce (2003) state that the success of the project is determined by evaluating effectiveness and efficacy of the project. Project efficiency or 'doing the things right' relates to process and cost efficiency. In other words, it refers to efficient conversion of inputs to the output while remaining within the schedule and budget. Efficiency also relate to evaluating project success based on the effectiveness and efficient utilization of financial, human, and natural resources. Effectiveness on the other hand refers to 'doing the right thing' is related with development of appropriateness and worthiness of the chosen project goal. A project may be executed efficiently or implemented ahead of cost and time schedules , but if the goals are not set right or that does not address the core vulnerabilities of the project it will not be considered a success. For this reason it is important to conduct a strong initial development problem analysis to ensure that the project goal address all the factors that will have a great bearing on the success of the project.

Atkinson (1999), suggests that measuring efficiency requires assessing project success based on project management process criteria. On the other hand, effectiveness means assessing the results or outcome of the system in terms of organizational benefits and achieving project goals. In lighting of the above discussion, it could be concluded that the success of the project depends on both the efficiency (project

output) and effectiveness (project outcomes) that covers a wide area (Abdel-Razek, 1997; Atkinson, 1999; Cameron and Whetten, 1993; Maloney, 1990; Mbugua, 2000; Nyhan and Martin 1999; Pinto and Slevin 1988:89; and Smith 1998). In view of this, the paper discusses and documents the analysis of factors that relate to effectiveness of a project in the construction sector in the eyes of four project stakeholders namely private clients, contractors, Government, and consultants. In the first stage of the study, we examined mean values of the responses and ranked them on the basis of importance. Afterwards a detailed comparison of ranking order was made between the different groups. The second stage of the study consisted of testing the hypothesis by using nonparametric testing method known as Kruskal-Wallis One-Way ANOVA (Analysis of Variance) test for an independent sample.

The purpose of the study was to analyze difference in the individual opinions relating to the individual factors among the four groups at a significance level of 5%. The mean ranking technique showed that all the variables were significant. However, this result is meaningless and superfluous. Therefore, we conducted Factor analysis technique using principal component analysis (PCA) to test the effectiveness of the variables and identify main factors so as to gain deeper understanding of the factor group that underpin success of the project.

3.11. Overview of efficiency and cost effectiveness development in the industry

Based on literature review, the effectiveness of project is found to be associated with project 'results' in terms of meeting core business and project objectives, user satisfaction and use of the project as identified by Pinto and Slevin (1988; 1989) and Cooke Davies (2002). We have compiled and reviewed ten possible indicators that help measure project results. These include client and user satisfaction, effectiveness of project, project functionality, defect free, offer value for money, profitable, absence of legal claims, learning and exploitation and generation of positive image.

3.12 Project effectiveness measures

3.12.1 Client and user satisfaction

The level of 'happiness' of an individual affected by performance of a project is known as client satisfaction (Chan et al, 2002). Client is said to be satisfied when the project is delivered on time and according to the quality and cost specification of the customer (Bititici, 1994). Atkinson (1999) says that

there are two possible set of criteria that can be used to gauge the success of the project: the resultant system and customer benefits. The resultant system or outcome of the project should meet customer satisfaction. Moreover, the outcome of the project highlights benefits to the stakeholders and especially the end users. The end users will not be happy in case the project outcome does not meet quality and functionality requirements. Liu and Walker (1998) opine that satisfaction of the client reflects success of the project. On the other hand, Torbica and Stroh (2001) suggest that the project can be regarded as completed successfully only when the *end-users* are satisfied.

3.12.2 Effectiveness level

According to Maloney (1990) effectiveness reflects achievement of objectives of the organization. And this is true both at the project and corporate level. Abdel-Razek (1997) and Cameron and Whetten (1983) are of the view that effectiveness of the project can be measured by comparing it against the objectives specified by the client Pinto and Slevin (1994) suggest that a project effectiveness depends of satisfaction of the user as well as utility of the project outcome. Cameron and Whetten (1983) are of the view that a project cannot be effective unless all the objectives are met. The reason for this is that the projects are employee oriented in the construction sector. As a result if the construction project do not meet the objectives, it will not be considered as effective.

3.12.3 Project functionality

Another important factor of project success is project functionality. A number of authors have considered 'functionality' of the project as an important measure of success (Chan et al, 2002 and Chan, 2000). This is especially true in the case of post construction phase when the project is completed and delivered to the client. The authors are of the view that functionality of the project relates with project expectations of the participants of the project. This can be best measured through the degree to which it conforms to technical specifications. Another point made by scholars is that both technical and financial aspects that are implemented according to technical specifications need to be considered. This is important in ensuring fitness for purpose goal of the organization. According to Kometa et al (1995) apart from project functionality, client satisfaction is related to flexibility, quality, time, and safety criteria. In addition, Chinyio et al (1998) states that the functionality of the project in the

context of construction sector refers to a building structure that is operationally efficient, suitable for the required purpose, and lasts for a long time due to being structurally sound and stable. Operationally efficient means that the building should be the operational during construction work. In more than 73% of renovation and alteration, the authors find that people are interested in keeping the existing facilities operational. These factors are of great importance in determining the effectiveness of the project

3.12.4 Free from defects

A valid measurement of project effectiveness that has been identified by a number of authors is that the project outcome must be free from any defect. According to Prahl (2002) a defect means that the work falls below expected standard of the client. The term is a broad term that can be used for a variety of conditions such as windows that are not installed properly, leaky windows, or even the presence of toxic mold (Mazier, 2001). Atkinson (1999) had divided and suggests the causes of defects into four groups being a lack of knowledge or care of site operatives, lack of skill, missing information about the project, or low design. Moreover, the defects occur due to a mixture of managerial inaptitude, technical errors, and deficient skill of the operative. This suggests that construction companies impose quality control in each and every phase of the project to avoid defects.

3.12.5 Value for money

Value for money is another critical factor that has been identified by scholars as a determinant of project effectiveness and success. It is basically a relative term that can be expressed in monetary value, exchange, effort, as well as on a comparative scale that represents the desire of the individual or client to retain a service or item (Liu and Leung, 2002 and Hamilton, 2002). According to Kloot and Martin (2000) the term 'value for money' is defined as the provision of acceptable services without wasting resources and ensuring that it remains affordable. Generally, the value refers to benefits that the party receive from the product outcome. Hamilton (2002) had equated value for money to high quality and reduced costs thresholds that lead to client satisfaction. Value for money is the most efficient combination of project quality and whole life costs that meets the need and expectation of the client. Contrarily, value management refers to maximizing the functional value of the project outcome for the client. Both these measures are effective measures of customer success.

3.12.6 Profitability

A fundamental measure of project success is profitability or financial success. Parfitt and Sanvido (1993) are of the view that the project must be managed properly to be profitable. The term profit, according to Norris (1990) refers to the extent by which costs are below the revenues. Maloney (1990) states that profitability is the revenue earned by the firm that is above the cost of producing that revenue. It suggests, profitability is the total net revenue divided by the total costs.

3.12.7 Legal undertakings and proceedings

The final measure of project effectiveness and success according to scholars is absence of legal claims and proceeding against the project. Claims can relate to the breach of contract or some other local laws, extra ex-gratia request for settlement, and assertion for merit. Note that some the construction claims are important or unavoidable and occur due to unforeseen and unexpected changes in the conditions surrounding the project or the clients requirements (Kumaraswamy, 1997). Savido et al (1990) say that the lack of any claims by any party whatsoever is a critical criteria of project success for all the parties including designer, client, and the contractor. When a project is completed without any claim and conflict, it can be said to be completed efficiently. The claim managers need to focus their attention on not only explicit claim categories, but avoidable one as well to minimize any claim for damage or otherwise. In some cases this criterion is considered to be the primary one for determining project success.

3.13 Contractor and stakeholder strategic decisions in construction health and safety.

3.13.1 The decision making process

Contractors undertake the construction project using a team comprising of different department. Most of the contributors make decisions that affect health and safety at the worksite. In some cases, the project team consists of external members such as advocacy groups or regulatory agencies. It is important that the construction company identify health and safety issues relates to the sector during the decision making process.

3.13.2 Stakeholder and client decision making

A construction company should understand interests of all the stakeholders and establish proper processes while complying with the highest quality health and safety standards that are specific to the sector. The company should make sure that decisions made in response to interests of the stakeholders are consistent with the OHS standards.

3.13.3 Decision making within the construction industry

The supply chain in the construction industry is fragmented with very little communication taking place between the individuals that initiate, manufacture, design, utilize, and/or maintain the facilities. Lack of communication between different team members can prevent establishment of shared goals and objectives that will negatively affect health and safety at the organization level. Poor communication and the formal distance between the construction and the design department is especially identified as a major barrier to implementation of effective health and safety procedures within the organization. It has also been linked with higher incidence of fatalities at the construction worksite. As compared to other department, constructors have a deep understanding of the processes mainly due to specialized knowledge, training and expertise of the individuals. Moreover, they are directly responsible for the project outcomes. As a result, they usually have a greater interest and motivation in ensuring the work is performed safely with minimum safety and health risk for the workers. They can provide advice to the decision makers about OHS before the start of the construction process. When they fed knowledge about the construction process 'upstream' at the initial phase of the construction project, it will result in better decision making with greater chances of health and safety risks being reduced eliminated completely at the source.

3.13.4 Stakeholder management

Various scholars have shown the importance of managing stakeholders in context of construction projects (El-Gohary et al., 2006; Olander and Landin, 2005). That said, there has been poor record of handling stakeholders in the construction industry (Loosemore, 2006) mainly due to the uncertainty and complexity of the construction projects. Studies have identified various issues with stakeholder management in the sector, and include inadequate stakeholder engagement, invisible or hidden

stakeholder, having unclear objectives relating to managing stakeholders, and lack of communication between the company and the stakeholders. (Rowlinson and Cheung, 2008; Bourne and Walker, 2006; Loosemore, 2006, and Pouloudi and Whitley, 1997). Cleland and Ireland (2002), suggest and state that the project team members must know the specific requirements for efficiently managing the stakeholders. This will help solve most of the troubles relating to stakeholders management.

3.13.5 Stakeholder identification

A number the studies have placed importance on identification of stakeholders (Jepsen and Eskerod, 2008; Walker et al., 2008; Olander, 2006; and Karlsen, 2002). According to Pinto (1998), stakeholders of a construction project can be divided into different kinds based on a set of criteria. It's important to know who the stakeholders are before managing and categorizing them, suggests (Frooman, 1999).

3.13.6 Stakeholder interests

Companies have to take into account interests of the stakeholders. More complex the construction project, the more diverse will be the stakeholders' interests. In fact, Cleland (1999) identified that the stakeholder interests arise due to the complex nature of the projects. The task of identifying stakeholder interests is important for the construction companies that may include integrity of the financial aspect of the new product or services, safety of the product, and returns on investment (Freeman et al.,2007). Karlsen (2002) has also suggested that companies should assess area of interests of the project stakeholders when making decisions.

3.13.7 Stakeholder influence

Identifying influences of stakeholders is another important consideration that should be taken into account to effectively manage the stakeholders. According to Olander (2007) determining influence of stakeholders is an important part of managing them. Olander and Landin (2005) state proper planning, executing, and implementation of a solid stakeholder management process requires an understanding of stakeholder influence. Olander (2007) introduced a 'stakeholder impact index' that will help contractors in assessing influence of the stakeholders, as well as how they exercise their influence on each other's

position in context of the construction project.

3.13.8 Stakeholder communication

Brunner et al. (1996), are of the view that proper communication with the stakeholders is important for optimum commitment and support from them. Regular, effective, and planned communication with all the relevant stakeholders is essential for the success of the project (Cleland, 1995; and Briner et al. 1996). However, Weaver (2007) states that all the project managers need to be skilled in communicating and negotiating with the stakeholders. This is necessary for managing expectations as well bringing a positive change in the culture of the organization.

3.13.9 Client & stakeholder coordination

The construction sector is highly fragmented that raises the need of rigid coordination to ensure project success. There is an increased need of a high level of coordination both at the demand and the supply side for successful completion of the project. Moreover, close coordination with the suppliers increase the need for greater transparency, cooperation, and information flow. Mastery of these skills is important for project managers to successfully manage relationship with the stakeholders. The traditional criteria of project success such as cost, time, and quality are no longer considered the only means of gauging project success. It's important for the project manager to coordinate closely with the stakeholders to determine their interests, as well as gauge how their influences impact different stages of the project.

3.13.10 Stakeholder theory

The stakeholder theory states that managers need to place importance on the interests of the group and individuals that are affected by activities of the organization, suggests Awodele, O. A. & Ayoola, A. C. (2005). Apart from that, the theory is important for the management in that it helps estimate the link between cause and effect and identify stakeholders irrespective of their varying contribution and influence in the decision making process, suggests Olatunji, O. A. & Aje, O. I. (2007). At the design stage of the construction process, stakeholders can create conflict that may lead to loss in monetary terms due to the claim of time delay variation issue raised by the primary contractor. The relationship

between the interest of the stakeholders and relevant performance is the main aspect of the stakeholder theory especially from the perspective of the management in meeting company objectives.

3.13.11 Stakeholder definition

A stakeholder is defined as any individual or group that can influence or is influenced by achievement of corporate objectives, suggests Awodele, O. A. & Ayoola, A. C. (2005). Olatunji, O. A. & Aje, O. I. (2007) however suggests and presents a broader definition of a stakeholder stating that it includes parties that contribute to or are affected by the decisions relating to the project. A more deeper definition of a stakeholder was given by Kheni, N A, Dainty, A R J and Gibb, A G F (2007), who states that stakeholders are those who have an interest in the organization irrespective of the fact whether they are of any functional interest for the company. It could be noted that here the functional interest means interest of an organization with internal stakeholders similar to the external ones. Moreover, the functional interests has an impact on the social and financial objectives of the individual or the company. The accuracy and quality of the stakeholder definition is important to successfully identify and analyze stakeholders. Project managers need to keep in mind that the organization objectives are set regularly during the strategic planning stage after accurately identifying the needs of the stakeholders. Various scholars have highlighted the importance of differentiating between categorizing and identification of stakeholders. Identification of stakeholders lead to recognition of the stakeholders, while categorizing then involves labelling them. Note that the stakeholders can be categorized as either primary or secondary. Employees, owners, suppliers, and customers are the primary stakeholders, while secondary stakeholders include activists, nongovernmental organizations, public agencies, activists, institutional authorities, and the general public. Primary stakeholders generally coordinate with the company over major activities on a daily basis. Thus, they are able to directly influence the decision making process. Contrarily, interaction with secondary stakeholders is usually unexpected depending on the stage of the project. Moreover, their influence on the construction project related decisions is indirect. A typical project life cycle is shown in fig 3. This summarises in a graphical form all the processes outlined in the literature review.

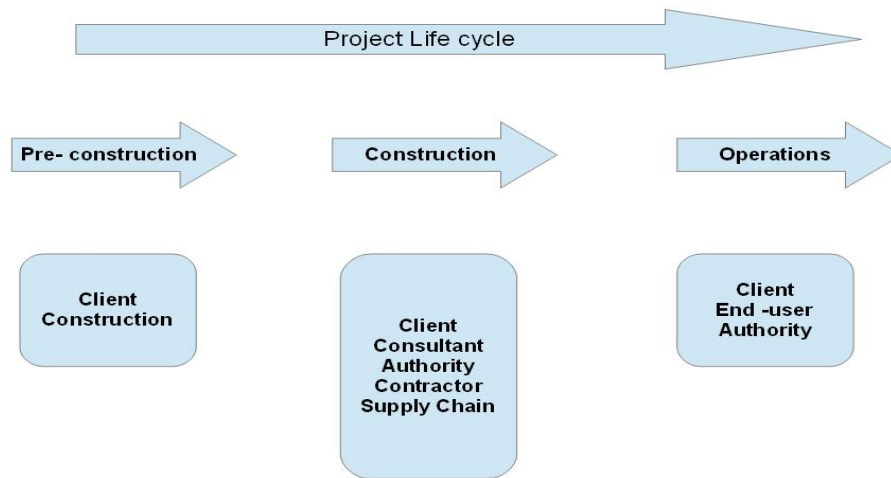


Figure 3. Project life cycle.

3.14. Summary of chapter.

The literature review indicates and reveals the existence of a need for change within the various facets associated with health and safety in the construction industry. It shows the need for a systematic overview of how the industry portrays itself within aspects of vetting procedures, its application of procurement methods and moreover, the need to identify any and all shortcomings as demonstrated in the literature. The focus needs to be on the improvement of how UK companies can learn and adapt to any of the advantages/ disadvantages highlighted, to include a closer understanding of law and legislation and strategic decision making.

CHAPTER 4.

THE LAW & LEGISLATION.

4.1 Introduction.

In this chapter, a general review of the enactment legislating health & safety safety in construction and development sector is looked at. All health and safety enactment obliges that a very high level of administration is required, furthermore, practical judgment skills lead managers to have a look at the risks and dangers in the working environment, and to take measures in order to overcome such risks. The reduction of risk and associated dangers or control measures depend for their adequacy looking into how to reduce such hazards. This ideology alone is insufficient, unless it may be secured by legitimate endorsements such as sanctions or otherwise, in the event of carelessness prompting of damage, danger or ailment. Indeed, most nations have a health & safety system of legislature in place, which includes authorities that protects it's own citizens from other forms of danger, for example criminal and civil law. Furthermore, health & safety legislation generally considers that individuals who are injured at their workplace have a legal right to take their employer to court, within the civil law, the prerogative being on the defendant, or the injured party, to prove negligence and /or damages on the employer. There are numerous ways where health and safety in development commercial enterprises and the construction industry being controlled with a specific end goal to lessen the quantity of mischances in this manner diminishing the quantities of casualty. Furthermore, injuries subjected to the specialists, that is, the workforce and harm to the supplies. Governments worldwide have kept up a continuous responsibility towards setting up a workplace free of harm and illness. This dedication is reflected by setting up an execution based working environment well being and security enactment which sets summed up execution targets and objectives. It also gives an arrangement of unmistakably expressed obligations to support more prominent self control for the development of the business. Many nations depend on its government in controlling regulation at the worksite.

4.2 Health and safety legislation in general

Most countries have a law regarding health and safety at work that protects their workforce from personal harm by intrusive managers, contractors etc, to have a safe level that at least corresponds to an aim that has a good level corresponding to good engineering practice. For example, the practice of health and safety in construction in the USA is regulated by governmental agencies such as the occupational safety and health administration (OSHA), which provides stringent rules and regulations to enforce and enhance health and safety regulations within and on a construction site. The (OSHA) defines the health and safety regulations for the construction industry, in a similar vane to what is expected within the UK. The regulations apply to all that are involved in construction work, including contractors, subcontractors and suppliers. According to general safety and health provisions, it is the responsibility of the employer to initiate and maintain programs for safe working conditions for employees. It further states that any such programs shall provide for frequent and regular inspections of the job sites, materials, and equipment to be made by designated competent persons. The safety training and education regulations create a responsibility for the employer to avail himself of the safety and health training programs and instruct each employee of any unsafe conditions and regulations applicable to employee's work environment to prevent any hazards. Countries such as the United Kingdom, Singapore and Hong Kong have adopted a self regulatory approach to safety, whereby proprietors (including contractors) are required to develop, implement and maintain safety management system (Ng et al., 2005). As regard to the UK, much of the health and safety law originates in Europe. Proposals from the European Commission may be agreed by member states. The member states are then responsible for making them part of their domestic law. The main role of the EU in health and safety is to harmonize workplace and legal standards and remove barriers to trade across member states. A directive from the EU is legally binding on each member state and must be incorporated into the national law of each member state. Directives set out specific minimum aims which must be covered within the national law. Some states incorporate directives more speedily than others. The HSW Act (Health and Safety at Work Act) is the generic regulation that governs all places of work; all of the regulations within the Act are applicable to the construction site. The health and safety at work act 1974 (HSW, 1974) is the basis of British health and safety law. It outlines the lawful requirements of the employers and the other people that many be included. A significant section of the act is the forming of the HSE (Health and Safety Executive) and the (Health and Safety Commission). The purpose of the act was to assure safe and

healthful working conditions for working men and women by authorizing enforcement of the standards developed under the act. The act created by both HSE (Health and Safety Executive) and the HSC (Health and Safety Commission) to attain the above objective. Most countries have adopted laws that require that accidents that have led to serious harm to people or the environment shall be reported to the local authorities. Therefore every construction organisation should have a clear policy for the management of health and safety so that everybody associated with the organisation is aware of its health and safety aims and objectives. For a policy to be effective, it must be honoured in the spirit as well as the letter. A good health and safety policy will also enhance the performance of the organisation in areas other than health and safety, help with the personal development of the workforce and reduce financial losses. It is important that each construction site throughout the organisation is aware of the policy. The Health and Safety Commission's (HSC) strategy for workplace health and safety in Great Britain to 2010 and beyond notes that: "We will find ways to demonstrate the moral, business and economic cases for health and safety. We are committed to achieving higher levels of recognition and respect for health and safety as an integral part of a modern, competitive business and public sector and as a contribution to social justice and inclusion."(HSC, 2007).

4.3 Health and safety legislation in the UK

Management of health and safety risk has traditionally been born by the main contractor supervising site activities. In the UK the high number of injuries and fatalities and cost associated to them led to the evolution of the occupational safety and health Act. It is found that people were confused about the differences between guidance; Approved codes of practice (ACOPs); and regulations and how they relate to each other. The maze of health and safety law indicates the flow and structure of different health and safety legislation that apply to construction project. The health and safety at work act of 1974 places a duty upon employers to provide information, training, instruction, and supervision needed for the protection and health of employees at work. This would include, namely;

- Management of health and safety at work Act 1974, regulations 1992,
- The health and safety commission (HSC) review of health and safety regulation in 1994,
- Construction (health and safety and welfare) regulations 1996,
- The management of health and safety at work regulations 1999 (the management regulations) generally make more explicit what employers are required to do to manage health and safety

- under the health and safety at work Act 1974,
- The construction design and management CDM 1994, and CDM 2007. The introduction of the construction (design and management) regulations 1994 (CDM) explicitly detailed the requirements of those who indirectly influence site health and safety during the pre-construction, or planning stages.

However, the construction (health, safety and welfare) regulations 1996 are constructed site specific, and in the case of this thesis, the more relevant aspects are covered in more detail. Fig 4 gives a general overview of evolution of a health and safety risk management evolutionary process.



Fig 4. Evolution of health and safety risk management.

The health and safety at work Act 1974 as previously mentioned is the foundation of British health and safety law. It describes and enables the general duties that employers have towards their employees and to members of the public, and also the duties that employees have to themselves and to each other. The term “so far as is reasonably practicable”, qualifies the duties in the HSW act. In other words, the degree of risk in a particular job or workplace needs to be balanced against the time, trouble, cost and physical difficulty of taking measures to avoid or reduce the risk. The law simply expects employers to behave in a way that demonstrates good management and common sense. They are required to look at what the hazards are and take sensible measures to tackle them. It must be stated that, although this legislation is dated, it is still enforced in full today. This act will be described very briefly as the regulations below are more detailed for construction sites. The HSW act consists mainly from 8 sections, thus being;

- Introduction - objectives and structure of the act;
- The health and safety commission and the health and safety executive;
- Duties required by the act;
- Enforcing authorities, regulatory bodies, agencies and inspectors;
- Improvement and prohibition notices;
- Offences, penalties and prosecutions;
- Regulations and approved codes of practice;
- Licensing and appeals against decisions regarding licensing.

4.3.1 Management of health and safety at work regulations 1992

The management of health and safety at work regulations are characterised in a total of 17 regulations.

The significant regulations are listed below;

- Risk assessment, regulation 3;
- Health and safety arrangements, regulation 4;
- Health surveillance, regulation 5;
- Health and safety assistance, regulation 6;

- Procedures for serious & imminent danger and for danger areas, regulation 7;
- Information for employees, regulation 8;
- Appointment of health and safety co-ordinator, regulation 9;
- Persons working in host employers' or self employed, regulation 10;
- Capabilities and training, regulation 11;
- Employees' duties, regulation 12;
- Temporary workers, regulation 13.

In a significant part of these regulations, the emphasis is placed on the use of the risk assessment (regulation 3). A risk assessment is where the employer will assess any health and safety risks that his employees are exposed to whilst at work. The employer must also assess any risk to any other person not employed by him, caused any work that he carries out. The approved code of practice (ACOP) for the MHSW regs, states that the "purpose of the risk assessment is to help the employer to determine what measures should be taken to comply with the employer's duties under the relevant statutory provisions". In general terms, the risk assessment is to be used to highlight risks so that actions can be carried out to conform to all relevant regulations. Another major aspect to the MHSW regs is regulation 11, capabilities and training.

4.3.2 The UK construction design and management (CDM) regulations 2007

These regulations apply to all construction work where;

- More than 4 people will be on site one time;
- Any demolition or dismantling is part of the work;
- The duration of the construction phase will exceed 500 working days;
- The construction phase is longer than 30 days.

4.4 Summary of chapter

The desire and perhaps requirements by employers to reduce and control risk within construction health and safety relies for its effectiveness on the knowledge of risk and a willingness to take action to reduce it. This alone can be seen as insufficient, however such legislation is covered by legal sanctions in the

event of negligence leading to injury or illness. In view of this, the UK and most countries have a framework of health and safety law, backed by a system of enforcement, to represent and uphold such legislation, also to include an advancement of procurement, monitoring and cost effectiveness, discussed within this thesis, to those parts of the criminal law and indeed civil law, seeking to protect their business. A number of legislations were reviewed and identified in this chapter, it is clear that there are some similarities between these legislations, although some countries, such as the UK, have a far more established culture and history of legislating and enforcing health and safety measures in the workplace.

CHAPTER 5.

RESEARCH METHODOLOGY AND APPROACH.

5. Research Methodology and Approach

5.1 Introduction

This chapter will introduce the meaning and fundamental elements of a research methodology, and to describe what specific aspect of research will be used to identify, clarify and bring results to a conclusion. It will also indicate and highlight the essential components of qualitative analysis techniques, beginning with a meaning of qualitative research, the difference between a qualitative/quantitative implementation. This will be followed by a discussion on the progress of qualitative analysis techniques, and how it is different from quantitative analysis techniques, henceforth to discuss the significance of moral/ethical concerns within the implementation of such a research pattern. Cresswell (2009), indicates and highlights that the importance of illustrating a research approach as an effective strategy to increase the validity of research is an important one. This statement realises that a method of data collection and its importance to is required at all levels. Firstly, efforts were carried out to identify the areas to be discussed and analyse the procurement monitoring, cost effectiveness and strategy, to be implemented within the construction industry. Secondly, two questionnaires were carried out in order to determine such effect, henceforth to establish a framework of how companies within the construction sector could move forward from results obtained. Thirdly, interviews were carried out to back-up all information obtained and collated. As this research may be able to make a contribution to original knowledge, the literature review has demonstrated the need to discuss and identify the areas under consideration, and gives a grasp of existing knowledge. The literature review has highlighted and given a general overview of the “state of play”, regarding health and safety in the construction industry, moreover, it has identified the purposes of vetting of contractors, monitoring of procurement, the financial and legal implications, cost effectiveness and strategic decisions. With this in mind, firstly, it deals with the problem of how to improve organisational health and safety (OHS) through the monitoring of the process of procurement in construction projects. Secondly, it looks how the issue of cost-effectiveness in construction projects and OHS are dealt with simultaneously. For instance, in the

process of choosing a bidder, sometimes contractors may tend to ignore health and safety issues and decide to choose a client that will result in cost savings, or choosing the highest bidder irrespective of OHS concerns. Thirdly, the review considers what type of strategic decisions and the responsibilities of both the contractor as well as the client in terms of dealing with OHS with regards to construction projects. The literature review, by nature of its cause, also considers similar areas to compare and contrast the areas under review.

5.1.1 Qualitative versus quantitative research

Quantitative research and qualitative research methodologies are two general processes adopted in collecting information during a research initiative. The former process originated in the domain of biology, chemistry, physics, geology, etc., and was credited with being a quantifiable process in a certain manner. The methodology so adopted in this process enables subsequent researchers to replicate the conclusions originally derived. Further to the development of this process, as human thought processes further developed, there was progress in the social sciences and subjects like psychology, sociology, anthropology, etc. came into the forefront and existence which focussed on evaluating how humans behaved in the social context in relation to their surroundings (Morgan, 1983). Considering the improbability of the human mind, it was difficult to precisely predict behavioural aspects in purely quantifiable terms. It was seen to be not possible to precisely predict how the mind would react to specific situations in varied surroundings. Therefore, qualitative research is involved with how individuals react with their surroundings and process information in the social world (Marshall & Rossman, 1999).

Quantitative research is described in concepts related to empiricism (Leach, 1990) and positivism (Duffy, 1985), in relation to the scientific processes adopted in the context of the physical sciences (Cormack, 1991). The corresponding research methodology adopted is therefore an objective and formally systematic initiative involving specific numerical conclusions drawing upon multiple measures related to descriptions, tests and in evaluating the corresponding cause and effect relationships (Burns & Grove, 1987). This is possible in consideration of attaining knowledge utilizing deductive methodologies (Duffy, 1985). While quantitative processes harvest information from existing paradigms by the development of associated hypothesis concluded from current relationships and the proposed

outcomes, qualitative research relates to multiple ideas and perspectives in relation to the topic under consideration (Cormack, 1991). The former therefore differs and varies from the latter primarily with regard to the inductive theories deployed in gaining and summarizing conclusions. There are no explicit quantifiable measures, and instead it is measured and concluded in the course of deriving the conclusions derived through the research process (Leach, 1990). Qualitative research considers the topic from the perspective of the subject itself, and does not necessarily allow the personal likes and dislikes of the researcher to influence the conclusions derived (Duffy, 1987). In further debating upon the topic, Benoliel (1985) has concluded that qualitative research relates to a systematic process evaluating and considering the human perspective and in how they interact within themselves in consideration of their individual perspectives.

Qualitative research methodologies contribute to describing multiple phenomenon with regard to the topic being focussed upon (Cormack, 1991), which is also described in phenomenological terms (Duffy, 1985) as being humanistic and idealistic approaches (Leach, 1990). The origins of the associated theories could be concluded from the disciplines related to history, philosophy, anthropology, sociology and psychology (Cormack, 1991). The historical foundation excluding the domain of physical sciences is considered a major weakness of the qualitative research process. Traditionally, multiple experimentation in relation to a process have contributed to establishing the universality of the knowledge gained, with quantitative processes enabling legitimate conclusions to be derived in consideration of established scientific processes. This in turn contributes to the authenticity of the conclusions so derived (Melia, 1982). Qualitative research processes therefore provide soft data which is correspondingly considered inadequate by multiple researchers in unequivocally concluding multiple phenomenon observed. Further, in classifying conclusions in terms of hard and soft data, it could relate to a personal bias in grading the data and information obtained and concluded (Corner, 1991).

From the sampling perspective, the associated and related procedures involve multiple complexities while also ensuring that they are congruent to established data collection strategies. Therefore, both research processes require specific samples to be measured which should also be simultaneously representative of the overall population in the paradigm. Quantitative research processes therefore entail the multiple study groups to effectively conclude random selection processes from within the population

under consideration (Duffy, 1985). Statistical sampling processes rely on the formulation of generalized processes which would be applicable upon the overall population as a whole. The benefits accrued from the random sampling process relate to the generalization of the conclusions derived through the process. However, associated disadvantages and weaknesses of the process include inefficiencies in terms of the time invested in the process which is at times overcome by utilizing opportunistic sampling strategies (Duffy, 1985). This correspondingly hinders generalization if the sample size is not large enough. In consideration of the thorough and in-depth nature of the studies conducted, qualitative research processes are normally preferred for small selective samples (Cormack, 1991). The weakness associated with the process could be attributed to the fact that individual researchers could be influenced in consideration of their biases, impacting the nature of conclusions derived (Bryman, 1988). It is therefore concluded that qualitative research methodologies are susceptible to low population validity issues, although the corresponding strength and clarity of the same is concluded in smaller sample sizes which would enable the sample to be projected upon larger sizes (Hinton, 1987). Raggucci's (1972) ethnographic organizational study reflects the associated benefits of the approach in the context of minority groups. Quantitative research processes enable researchers to be clinical and objective in their views towards correctly perceiving the truth (Duffy, 1986).

A few methodologies entail minimal contact with the population, aptly demonstrated when circulating questionnaires by the post. Similarly, interviews conducted by hired third-party staff also entail minimal direct contact with the respondents (Bryman, 1988). Such methodologies would contribute to ensuring that researcher bias is not a factor in concluding the studies, and the same are conducted in a completely objective manner. The methodology was successfully adopted during the West Berkshire based perineal management trials by Sleep et al (1984). In this study related to midwives, the actual researchers seldom came into direct contact with the respondents, and the former were primarily involved with randomly assigning mothers within the controlled or experimental episiotomy groups, and in analysing and evaluating the information collected. The objectivity of the conclusions derived in the study was much appreciated. Spencer (1983) is of the perspective that such an impersonal methodology does not necessarily contribute to strengthening the researcher-subject relationship within the healthcare sector. Critics highlight that such processes make the respondents feel like mere objects, with hospitals being perceived to be motor garages. (Cormack, 1991) has also been critical of the

processes, arguing that the participants are not fully integrated within the study and are seemingly minimally affected by the initiative undertaken, although they are expected to implement the conclusions derived in their daily lives. The above illustrate how quantitative methodologies consider people as more like databases, to be harvested for information. Similar to quantitative research, qualitative processes too have certain strengths and weaknesses vis-à-vis how close the relationship is between the researcher and the respondent. Duffy (1986) is of the perspective that amongst the major plus points of this methodology is the fact that the study is conducted in a completely objective manner, and the conclusions derived are not tainted by any sort of researcher or respondent bias. Considering that the researcher and respondent are able to be together over a period of time, it is probable that the latter would disclose information which would not have been otherwise made available so easily (Bryman, 1988). Baruch (1981) supports this contention and agrees that it is necessary for the researcher and the respondent to bond over a period of time to have a true perspective of the challenge being investigated. It is concluded that this is a major plus point of the qualitative approach, which has also been highlighted by Woodhouse & Livingwood (1991) in the course of their study regarding multi-agency substance abuse. It was concluded that due to the interactive methodologies involved, the quality of the study was certainly enhanced much beyond the initial expectations since it contributed much in terms of empowerment, communication and in describing the specific roles of the associated stakeholders.

The corresponding weakness of such a close bond between the researcher and the respondent is the concern that the study could be considered to be pseudotherapeutic which would complicate the processes undertaken, besides adding on to the responsibilities of the researcher (Ramos, 1989). Establishing too close a bond with the respondent makes the researcher being emotionally distracted from the conclusions (Sandelowski, 1986) which could contribute to subjectivity creeping into the initiative undertaken (Cormack, 1991). At the extreme, the phenomenon is labelled “going native”, which is when researchers lose their own identity and consider themselves part of the respondent group (Bryman, 1988). Nevertheless, Oakley (1984) concludes that this could not necessarily be all that negative considering that it would provide more accurate information for the study.

With regards to the methodology adopted, quantitative processes utilize descriptive, correlational, quasi-experimental and experimental research processes (Cormack, 1991). The methodologies benefit in that they enable actual and quasi experimental processes towards summarizing adequate data with

regard to the multiple variables being investigated, which enables to predict and control the subsequent outcomes. This is possible in consideration of the researcher being able to manipulate the independent variable towards evaluating the impact on the corresponding dependent variable. This could also be considered to be a weakness of the quantitative methodology, specifically where organizational research initiatives are concerned. This process considers the subject's experiences as irrelevant, demonstrated in the context of the Bockmon & Rieman study (1987), and considers human actions as being a mere reaction to their specific surrounding environment (Cormack, 1991). This is a challenge in the context of organizational research, considering that organizations perceive individuals and their surrounding environments holistically. Besides, as per Briones & Cecchini (1991) quantitative methodologies seemingly preclude this approach.

The qualitative approach includes the grounded theory and ethnography research (Denzin, 1978). This methodology is considered superior in consideration of its holistic focus, which enables considerable flexibility besides providing a deeper and more valid understanding of the topic, which would not necessarily be possible using a more rigid methodology (Duffy, 1986). It also enables the researcher to highlight issues and topics which would have had to be perhaps excluded in a more structured methodology, enhancing the quality of the information made available. Melia (1982) appropriately displays these strengths, with the conclusions impacting employee perceptions about an organization. The weaknesses associated with qualitative methodologies relate to the extent to which the researcher interacts with the respondents. Significant measures in this regard could impact the quality of the conclusions derived since the findings could be skewed. Specifically, the data associated with quantitative research is hard and numerical. Arranging data numerically enables an ordered system which is an advantage, especially in an organizational context. Therefore, Spencer (1983) demonstrates how preparing an off-duty rota for 5,000 employees in a firm requires the use of quantitative methodologies and also a computer. Kileen (1981) is also in support of the conclusion, and explains that numerical data is required to specify the organizational resources required, the specific number of employees involved, and perceiving their impact on the conclusions derived. The opposing argument propagating the invalidity associated with numerical data, contending that the data is not adequately representative in all its entirety, or the stance that only part of the information is representative while the rest is eclipsed are but seeming exceptions (Cormack, 1991) which only contribute to distorting the

factual picture and situation. In reality, the soft data concluded in qualitative research processes more than accounts for the deviations observed at times (Cormack, 1991). The scope and dimensions of the available data actually presents a fairly comprehensive image of the situation and even explains the associated intricacies involved. This is amply demonstrated in the conclusions derived by the likes of Melia (1982) in quoting employees which explains the situation to the observer. Instead, the weakness of qualitative data is more related to researchers being overwhelmed by the mass of information available which may hinder their ability to sort through the same and correctly conclude the required parameters (Bryman, 1988). This would ultimately impact the quality of the treatise concluded.

Quantitative research conclusions could be considered to be more reliable than qualitative data in consideration of the former controlling the various extraneous variables within the study concluded, which can be evaluated utilizing standardized testing processes (Duffy, 1985). The associated quantitative strength can be easily concluded within comparative analysis paradigms with regard to the perceptions associated with employees and employers regarding the firm's activities. It is possible to explore the validity of quantitative data if the same has been concluded from natural sources, or it is observed that the data mentions out-of-the norm events (Corner, 1991). Qualitative research processes are seemingly degraded in the context of the process being seemingly random at times, relying on the insights and capabilities of the researcher (Duffy, 1985). Hind et al (1990) examined this issue and concluded that the reliability of the data summarized could be enhanced by allowing experts to review the related grounded theory. Nevertheless, the viability of using such an expensive proposition needs to be evaluated since significant time and monetary factors are impacted in the process. Although qualitative methodologies employed may be perceived to be constrained in terms of reliability to a greater extent in comparison to quantitative processes, the issue is seemingly reversed in consideration of the validity paradigm since the weaknesses perceived are constrained within the scope of the study itself which hinder confirming whether the conclusions derived and processes employed are representative of real life situational parameters. Components associated with scientific research requiring adequate control of the associated variables can be concluded to function against perceptions of external validity and generalizability (Sandelowski, 1986). Campell & Stanley (1963) are of the perspective that similar research conclusions help in establishing the validity and the generalizability of the conclusions derived. Corresponding field studies undertaken by Sleep et al (1984) impact the

perceptions associated therein. This can be concluded in consideration of reviews within the context of the firm's environment towards enhancing the validity of the conclusions derived.

It is contended that qualitative research processes offers fewer challenges in validating them since they are conducted within their natural habitat and setting, and exclude the multiple controlling factors generally associated with quantitative research processes (Sandelowski, 1986). This supposedly enables the researchers to be fully involved in the studies undertaken, as ideally observed in the context of Oakley's (1984) antenatal organizational study. However, the fact that the researchers ingratiate themselves so closely with their subjects has its own challenges in that this at times hinders a factual evaluation of the situation being observed within its actual perspective objectively (Hinton, 1987). However, the possibility of the latter scenario arising from the initiative is diminished, and the positives accrued in consideration of the processes is certainly commendable in the context of qualitative methodologies (Duffy, 1985). In consideration of associated ethical issues, the processes are uniform in the context of both quantitative and qualitative research paradigms regarding how aspects of safety and human rights issues are handled with regard to informed consent processes. Incorporating informed consent parameters within quantitative research is a challenge but is simultaneously considered practically impossible to be implemented in qualitative research paradigms since the conclusions to be derived are difficult to predict (Ramos, 1989). Munhall (1988) is of the contention that informed consent could be attained within qualitative research by frankly communicating the same, when a need is perceived and researchers have a responsibility to the respondents in this regard. Therefore, it is important that researchers are effective communicators towards encouraging respondents to provide their consent whenever a request is made in this regard. Quantitative research processes are considered weak in the manner in which hypothesis are drawn up. From an organizational perspective, it is important that respondents are duly informed regarding ethical issues, which specifically holds true in situations where it is initially perceived that there would be improvements from adopting a certain process, but when that subsequently fails to materialize. The qualitative study methodology has been concluded to be very relevant to the current study.

To summarize, all systems and processes are concluded to have certain strengths and weaknesses, which also holds true for both quantitative and qualitative processes. Indeed, it is this dilemma faced by researchers which has made them question the processes (Duffy, 1986) to conclude the adoption of the

ideal process within organizational research processes. Deciding upon and selecting a particular process makes it easier for the researcher who no longer has to personally evaluate the strengths and compatibility of particular methodology (Duffy, 1986). Atwood (1985) has a different perspective in this regard, and recommends that researchers should consider quantitative approaches towards concluding their initiatives undertaken since this would contribute towards ensuring that the research undertaken is imbued with a strong theoretical base before its eventual practical application. It could be perceived that the debate would be advantageous for the propagation of organizational studies. Modern day researchers are having to deal with controversial issues and practices in the context of both the methodologies, which makes it imperative that they have in-depth knowledge of the topic with regard to its epistemology, while the actual methodology being adopted should be left at the discretion of the researcher so long as the conclusions derived are considered to be valid (Duffy, 1985). Preferring one methodology over the other is not necessarily a technical issue, but is perhaps more related to ethical, moral, ideological and political consideration (Moccoa, 1988). The discussions undertaken is therefore valid in both contexts, which would enable the researcher to decide upon the optimum methodology for answering the questions posed and allow for the development of corresponding organizational theories. In consideration of the factual position, it can be reasonably concluded that each methodology has its share of merits and benefits (Duffy, 1987) which then emphasizes that the benefits could be perhaps credited to the specific technicalities involved with each of the processes (Bryman, 1988). An alternative methodology to ensure that the researcher avails the best of both the processes would be to use an amalgamation of the procedures, which would enable the researcher to benefit the most, which is also formally known as triangulation. Triangulation is primarily concerned with aspects of data, the investigator, the actual theory being looked into and the methodology adopted (Murphy, 1989). Morse (1991), is of the perspective that processes related to triangulation enable the researcher to avail the best of both the methodologies, while also ensuring that the associated drawbacks are accounted for, all of which adds to the validity of the conclusions derived and helps develop the theory being investigated. Silva & Rothbart (1984) however perceive the issue differently, stating that employing a compromise of both the theories seemingly ignores the underlying significance of each of the methods, and in how each of them contribute in their own way towards enhancing knowledge levels regarding the topic. The available literature therefore seemingly indicates that researcher are not unified regarding their

perspectives about triangulation which is perhaps to be expected to a certain extent considering the divergence in views associated with the quantitative and qualitative methodologies.

Corner (1991) undertook certain studies in investigating the effects of triangulation, which seemingly focussed upon how new employees perceived their duties and in how the organization correspondingly interacted with their customers. The study reflected the benefits and weaknesses in applying both the methodologies, and provided an in-depth perspective regarding the topic. Employing the two methodologies simultaneously seemingly contributed to enriching the conclusions derived, and certainly removed the weaknesses of the individual processes. Nevertheless, the time and cost implications of running both the processes in parallel was immense, and correspondingly a huge knowledge base was required in this regard, necessitating more manpower than was originally budgeted for. The conclusions derived here were therefore similar to what had been earlier concluded by Murphy (1989) who had also tried employing triangulation methodologies in trying to perceive multiple organizational events. In light of the available evidences, it can be reasonably concluded that the triangulation process cannot be applied to every research conducted, even while this process would have enabled the organization to excuse itself from the bipolar debate and restrictions normally associated in terms of financial constraints. Under normal conditions, amalgamating qualitative and quantitative processes would reflect in the processes being conducted in a sequential manner. Therefore, semi-structured interviews or observational data could be perceived to be employed in exploring the hypothesis and the associated variables towards setting out the processes for a large scale epidemiological study. This would provide for greater sensitivity and accuracy with regard to the questions posed in the survey, and within the statistical processes considered. Herein, qualitative studies could be considered to be the precursor of the scientific process employed. Nevertheless the qualitative methodologies can complement the quantitative methodologies to have a clearer perspective of the studies, while enhanced degrees of creativity can also be credited to triangulation (Miles and Huberman, 1994). The triangulation processes were initially used by land surveyors who employed the methodology within mapping processes. Correspondingly, evaluating a particular situation and event from the perspective of multiple aspects would provide a better understanding of the situation – perhaps similar to how elephants seem different to look at when looked at either from above or below. Similarly, arranging the available data in various ways could enable a deeper understanding of the topic, which is what triangulation intends to do too.

The process therefore does not specifically relate to criteria dependent validation wherein the agreement of the different input received would validate a conclusion. Quantification in terms of phenomenon or the categories involved could be conducted towards having an understating of the nature of the qualitative material, although significant caution needs to be exercised in this regard. Having a quasi-statistical analysis of the available text, analogous to content analysis is gaining wider acceptance, with computer software now available which are able to specify the rate of repetition of particular words in a given text. Nevertheless, aspects of statistics and transferability is not necessarily easily applicable within non-representative samples wherein the respondents may not all be asked the same set of questions. The function of each of the participants is not necessarily the same, nor can the answers concluded from each individual be predicted. Therefore, the prevalence, distribution and diversity in the conclusions derived can hardly be foretold, which makes it doubtful towards trying to generalize the conclusions to be derived.

Pursuant to the above, meta-analysis principles should be employed in simultaneously using qualitative and quantitative methodologies, since is a challenge to efficiently integrating the processes. Within organizational research paradigms, trying to assimilate multiple processes invariably concludes with the qualitative processes being considered as quantitative, and correspondingly considering the available data as being counted and summarized. Meta-analysis processes therefore need to synchronize both qualitative and quantitative methodologies, acknowledging the corresponding differences. The interpretation of texts and theoretical presentations varies from disseminating numerology and associated processes. Secondary analysis can therefore contribute much towards uniting qualitative and quantitative processes, deriving an extended phenomenon with respect to the topic and validating the same from both perspectives. Meta-analysis processes should focus on the results derived, and not on the separate data streams which are each of a different nature. Therefore, at times significantly contradictory conclusions need to be worked upon, without completely discarding any one of the same. In conclusion, while qualitative and quantitative processes significantly vary, they are not necessarily superior to one other. Hence, there is no universal methodology to develop knowledge and being tilted to one process could risk missing out on the benefits of the other. Acknowledging the divergent perspectives regarding qualitative and quantitative processes and trying to find common ground between the processes could contribute to more efficient modes of study within organizational research, which could contribute

towards unifying researchers in their perspectives. In examining the current research trends within organizational studies, qualitative processes are seemingly utilized more towards perceiving the subjective experiences of employees. Quantitative processes conclude quantifiable data. Triangulating the two methodologies provide a richer and deeper perspective of the issue, although time and monetary constraints also need to be considered. Therefore, organizational research could contribute much within organizational paradigms. Employing multiple methodologies would enable knowledge to be equally considered as both a science and an art. This therefore presents both the associated benefits and disadvantages too, and combining the two provides optimum efficiency in relation to the parameters involved. To illustrate, qualitative approaches may conclude the importance of cultural barriers in implementing health and safety aspects in a location, while quantitative processes would summarize the available information in statistical terms. Table 1 presents distinctive differences in how quantitative and qualitative approaches are applied in relation to psychology.

Process	Qualitative	Quantitative
1. Philosophy:	Phenomenology.	Positivism.
2. Goal:	Understand , meaning.	Prediction, test hypothesis.
3. Focus:	Quality (features).	Quantity (how much).
4. Method:	Ethnography/Action research.	Experiments, correlation.
5. Data Collection:	Interviews, observation, documents, artefacts.	Questionnaire, scales, tests, inventories.
6. Research Design:	Flexible, emerging.	Structured, pre-determined.
7. Sample:	Small, purposeful.	Large, random, represented.
8. Generalisation:	Unique case selection.	Generalisation.
9. Analysis:	Inductive (researcher).	Deductive, statistical method.
10. Role of Researcher::	Immersed.	Detached.

Table 1. Differences between quantitative and qualitative research.

[adaptation from Merriam, (1998), Firestone, (1987) & Potter, (1996)]

5.1.2 Justification of the research methodology adopted for the research

From the information gained from the information gained from the literature review, no such research has been previously carried out or conducted upon the investigation of examining the general state of health and safety in the construction industry, primarily regarding procurement, monitoring, cost effectiveness and strategy. Because of this, and by reason of this research, the aims of obtaining data was, and is, based on a reality and substance of how the gathering of more detailed information on why or how to do things better in the field of health and safety in the construction industry. As indicated earlier in this chapter, the research utilises a quantitative and qualitative method for data collection. It was envisaged that these methodologies could be adapted to consist of a triangulation approach to establish where qualitative and quantitative research methods are combined, to indicate the positive attributes to each of the methods, hence taking taking advantage of the strengths of each of the methods and minimising any weaknesses, indeed using this framework to take any taking advantage of the strengths of each of the methods and minimising any weaknesses from such methods.

These methods compliment each other, as to provide very useful data and information regarding this research. Carvalho and White (1997), indicates and suggests three ways used for combining qualitative and quantitative methods in research, thus being, i), integrating methodologies; (ii), confirming, refuting, enriching, and explaining the findings of one approach with those of the other; and (iii), merging the findings of the two approaches into one set of results and recommendations. The two methods will be adapted and utilised to bring the underlying theme of the thesis, thus being the health and safety in the construction industry into place. The primary method uses the questionnaire and survey (quantitative), the secondary method uses interviews in the traditional method, i.e., face on discussions (qualitative), using the same questions as asked on the questionnaire.

5.1.3 Quantitative questionnaire approach

This method required the collation and obtaining information with the use of the internet, thus being the utilisation of survey software, to organisations primarily in the construction industry. With the use of questionnaires, Martin (2006) mentioned and suggests that questionnaires are used to extract reports based on real facts, attitude, and other subjective situations. Two types of questionnaires were designed and distributed to UK organisations. The first one is a preliminary questionnaire intended to give a

general overview of the general health and safety practices involved and carried out within each of the companies investigated, to give, show and indicate procedures that are observed in the workplace. The second (main) questionnaire is intended to look in depth at issues that arose from the preliminary questionnaire, henceforth to develop, discuss and evaluate issues that involve vetting bidders for contracts, the monitoring of procurement, financial and legal implications with construction accidents, cost effectiveness in construction projects, contractor and stakeholder strategic decisions in construction health and safety.

5.1.4 Qualitative questionnaire approach

This method used requires and understands the use of interviews aimed at issues related to health and safety in construction in the UK from companies asked to participate in the research. According to Kvale (1996), the qualitative research interview is primarily concerned with the gathering of information of factual issues regarding the research, and to hence clarify and reinforce information gained to standard questions. In this research, and indicated previously, interviews were conducted. The first one was an initial interview that gathered general information about the company and its health and safety policies, whereas the second interview was more in-depth looking at issues in more detail and covering other aspects that were not covered in the initial questionnaire or interview. McNamara (1999), suggests that interviews can be helpful as follow-up to certain respondents to questionnaires for further examining of their responses.

5.2 Survey planning and design

The requirements set and information obtained by the questionnaires and interviews was to define and fulfil the aims and objectives of the research and to answer the research question. Indeed, the planning, design and overall emphasis was based upon the research objectives guided by the findings from the literature review. From this, the experience gained in the first instance by the writer within the construction industry, within the parameters set and defined, are very important factors that determined the planning and design of such surveys. This experience is shown fig 5.

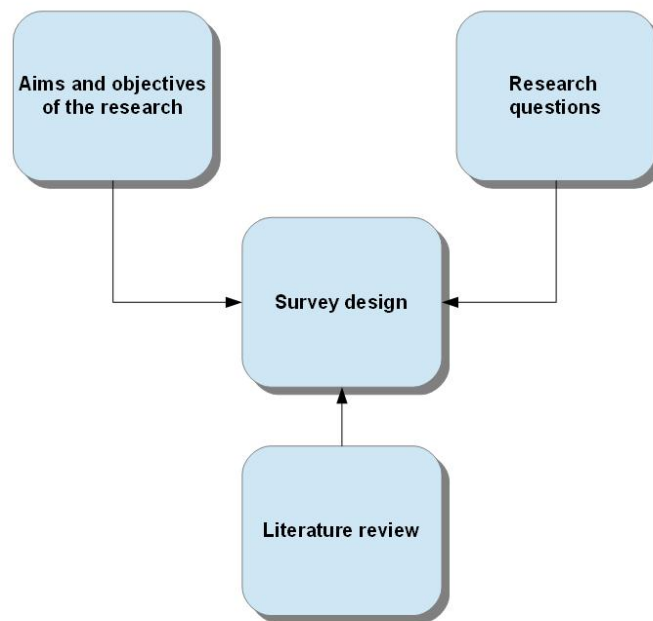


Figure 5. Survey planning and design

Two questionnaires were designed to collect the appropriate data to facilitate a primary indication of the state of health and safety within the construction industry, the first survey asked for information regarding general health and safety. The second questionnaire was specific, although based on the preliminary survey, it asked for information regarding the purpose of this research. However, the questionnaire technique is the most convenient and efficient methodology to obtain all the information needed. Interviews were also carried out and used to inform, but also to complement the questionnaires. The same questions were used at the interview stage as is described in both questionnaires used in this research. Fig 5.1 shows and indicates the approach and method to establish the aims and objectives shown in this research method.

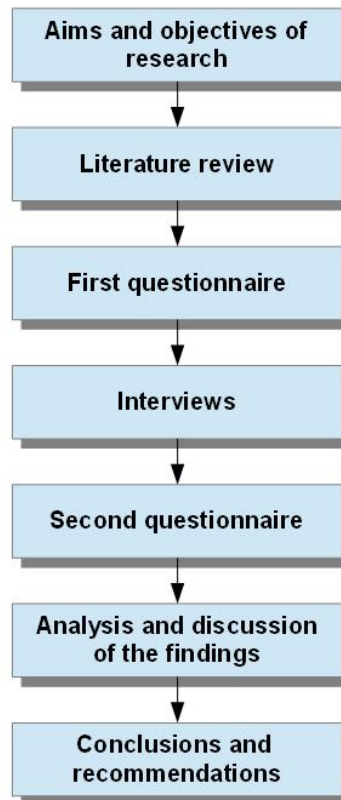


Figure 5.1. Research methodology adopted

In order to obtain information from the questionnaires, the following method and approach were used and adopted in its design;

- Length of the questionnaire: it could be acknowledged that long questionnaires get less response than short questionnaires, however the second survey and results produced, although from a lengthy questionnaire, was successful. In this respect, content and quality do seem to prevail in this part of the research;
- Brief and concise questions with clear aims and objectives, are key to a successful questionnaire. The questions must be and are written in such a way that the respondent can understand the meaning of its intention, hence be able to give an answer be clear and unambiguous.

Furthermore, it has to be clear as to eliminate the possibility that the questions will mean different things to different people, leading to answers that are of no significance and use to the research aims and objectives of the research being carried out. The interviews were planned prior to the design and implementation of the questionnaires, however the questions involved run the same as asked on such questionnaires. Moreover, it is seen to compliment and provide a back-up, designed to cover aspects that were not necessary covered by the questionnaires, and therefore they complement each other in obtaining valuable information and data regarding the health and safety aspect within the construction industry, and to validate, discuss and bring to a conclusion of what is being discussed in the research. The interviews were indeed focused on contractors and companies that the author has had an affiliation to, or was employed, because it is believed that such health and safety problems exist on site, general health and safety practices, vetting of bidders, the monitoring of procurement, financial & legal, cost effectiveness and strategic decision making. these problems were and why they were taking place. The first questionnaire, (Pt.1), consists of 31 questions, to address and give an insight to the current state of health and safety in construction. It is seen to be a platform in which the second questionnaire, (Pt.2), which consists of 46 questions, to address specifically the areas under review in the research as indicated previously above, to be analysed to give and represent the results defined for this thesis. The simple questions asked are shown in the following chapter.

CHAPTER 6.

RESEARCH QUESTIONNAIRE AND DESIGN

6.1 Introduction

This chapter indicates and highlights steps taken to produce the research questionnaire and design. The survey was sent to a specific number of companies, within the construction industry in the United Kingdom. It included a total of ten original designed questionnaires, comprising of top level management, employees, construction workers and consultant organisations. During this period, a series of interviews were conducted, to give a feel of what the main two questionnaires would develop and create. The interviews primarily included speaking to senior employees within their respective establishments. The questionnaires were sent and constructed on-line, using on-line survey methods. A cover letter was sent initially, to ask the establishment concerned if they would be able and agree to participate in the survey, (Appendix B and C). In the questionnaire, respondents were asked to give general information relating to health and safety aspects within the construction industry, and then a further questionnaire was presented to ascertain a more specific outcome, as previously described.

6.1.1 The first questionnaire - general health and safety practices

Very important considerations by the researcher have been taken into account while developing the questionnaire for the purpose of the current research. As described in previous chapters, the design of the questionnaire is based upon the research aims and objectives, coupled with what has been discussed and deduced from the literature review. The preliminary questionnaire consists of 31 questions, which indicates and highlights an overall view of the health and safety situation within the construction industry. It will provide a platform to discuss a further awareness for the second questionnaire. This preliminary questionnaire was sent to a selected small number of companies (10), to discuss and engage in a general health and safety environment. The results are shown graphically and discussed in the next chapter in more detail.

6.1.2 The second questionnaire - vetting bidders for contracts, the monitoring of procurement, financial and legal implications, cost effectiveness and strategic decisions

Very important considerations by the researcher have been taken into account while developing the questionnaire for the purpose of the current research. As described in previous chapters, the design of the questionnaire is based upon the research aims and objectives, coupled with what has been discussed and deduced from the literature review. The second questionnaire consists of 46 questions, which indicates and highlights the vetting bidders for contracts, the monitoring of procurement, financial and legal implications, cost effectiveness and strategic decisions, in conjunction with an overall view of the health and safety situation within the construction industry. This second questionnaire was sent to a selected small number of companies (10), to discuss and engage in a general health and safety environment. The results are shown graphically and discussed in the next chapter in more detail.

6.2 The first questionnaire - general health and safety practices overview

The preliminary questionnaire (Pt.1), consists of 31 questions addressing a general overview of health and safety in the construction industry, namely;

Question 1.

The question asked the name of the business. For the purposes of this study, company names will remain anonymous, as depicted in the questionnaire, see appendix B.

Question 2

The question asked how many employees does the business have. It depicts that of all 10 responses, 40% of respondents had 1-9 employees, 40% of respondents had 10-49 employees, 10% of respondents had between 50-249 and 250 or above.

Question 3

The question asked in what respect would you think a poor or good health and safety record reflect on your company. It depicts that of all 10 responses, 80% of respondents suggested business operations, 20% of respondents suggested business image.

Question 4

The question asked in which industries does your business belong. It depicts that of all 10 responses, 70% of respondents suggested the construction industry, 10% of respondents suggested the manufacturing industry and 20% suggested otherwise.

Question 5

The question asked is there an appointed health and safety representative within the company. It depicts that of all 10 responses, 60% of respondents suggested Yes, 40% of respondents suggested No.

Question 6

The question asked who else is involved in your company's health and safety duties. It depicts that of all 10 responses, 80% of respondents suggested senior management, 10% of respondents suggested health and safety committee and 10% suggested others.

Question 7

The question asked what percentage of the total working week of the person identified in Q.6 is spent on health and safety. It depicts that of all 10 responses, of 0-9% of employees suggested 60% spent time, 10-49% of employees suggested 10%, 50-89% of employees suggested 20% and 90-100% suggested 10%.

Question 8

The question asked who enforces health and safety in your business sector. Fig. 6.6 depicts that of all 10 responses, 30% of respondents suggested the health and safety executive, 40% of respondents suggested local authority and 30% of respondents suggested a don't know.

Question 9

The question asked is has a safety enforcement officer ever visited the company? It depicts that of all 10 responses, 50% of respondents suggested the visit was a routine inspection, 10% of respondents suggested the visit was about a complaint/investigation and 40% of respondents suggested it was for advice.

Question 10

The question asked what was the outcome of the visit? It depicts that of all 10 responses, 30% of respondents suggested the visit was for a routine notice, 10% of respondents suggested the visit was about a formal caution, 10% of respondents suggested it was for a verbal/written notice and 50%

suggested other.

Question 11

The question asked in which health and safety legislation that you are aware of that effects the business? It depicts that of all 10 responses, 50% of respondents suggested the management of health and safety at work regulations, 10% of respondents suggested workplace (health, safety and welfare) regulations, 10% of respondents suggested health and safety information for employees regulations and 10% suggested reporting of injuries,diseases and dangerous occurances regulations.

Question 12

The question asked in which health and safety policy do you have in place for managing such issues in the company? It depicts that of all 10 responses, 10% of respondents suggested a written policy statement, 60% of respondents suggested a risk assessment, 10% of respondents suggested health surveillance and 10% suggested none of these.

Question 13

The question asked how do you keep informed on health and safety issues and regulations? It depicts that of all 10 responses, 10% of respondents suggested trade unions, 20% of respondents suggested health and safety journals, 50% of respondents suggested local authorities and 20% suggested the head office.

Question 14

The question asked does the company have a formal health and safety policy that describes roles and responsibilities?It depicts that of all 10 responses, 80% of respondents suggested Yes and 20% of respondents suggested No.

Question 15

The question asked does the company have a policy that requires written accident/incident reports? It depicts that of all 10 responses, 80% of respondents suggested Yes and 20% of respondents suggested No.

Question 16

The question asked does the company conduct accident/incident investigations? It depicts that of all 10 responses, 50% of respondents suggested Yes and 20% of respondents suggested No.

Question 17

The question asked does the company document, investigate and discuss near miss accidents? It depicts that of all 10 responses, 80% of respondents suggested Yes and 20% of respondents suggested No.

Question 18

The question asked how the following contribute to your motivations to manage health and safety effectively? Fig.6 depicts that of all 10 responses, the following was indicated in the table below;

	Negligible	Small extent	Moderate	Great extent	Very great extent	Total
Influence of UK's current health and safety legislation	40.00% 4	10.00% 1	20.00% 2	30.00% 3	0.00% 0	10
Fear of prosecution for health and safety offences	40.00% 4	20.00% 2	0.00% 0	30.00% 3	10.00% 1	10
To protect the company's/industry's reputation	0.00% 0	20.00% 2	40.00% 4	20.00% 2	20.00% 2	10
To reduce possible health and safety impact posed by the company	10.00% 1	0.00% 0	50.00% 5	0.00% 0	40.00% 4	10
Culture of the organisation promotes health and safety responsibility	0.00% 0	30.00% 3	30.00% 3	10.00% 1	30.00% 3	10
The managers commitment to health and safety improvement	10.00% 1	20.00% 2	10.00% 1	40.00% 4	20.00% 2	10
To improve competitiveness	0.00% 0	11.11% 1	55.56% 5	11.11% 1	22.22% 2	9
Requirements or encouragement from customers	0.00% 0	30.00% 3	20.00% 2	30.00% 3	20.00% 2	10
Pressure from suppliers	33.33% 3	0.00% 0	33.33% 3	22.22% 2	11.11% 1	9
To reduce insurance premium	11.11% 1	11.11% 1	33.33% 3	44.44% 4	0.00% 0	9
Pressure from shareholders or investors (if applicable)	50.00% 5	30.00% 3	10.00% 1	10.00% 1	0.00% 0	10
Pressure from employees	20.00% 2	30.00% 3	30.00% 3	10.00% 1	10.00% 1	10
Pressure from trade unions	30.00% 3	20.00% 2	20.00% 2	20.00% 2	10.00% 1	10

Figure 6. Motivations to manage health & safety effectively

Question 19

The question asked of which idea would affect the ability to effectively manage health and safety in the company? It depicts that of all 10 responses, 30% of respondents suggested lack of financial benefit,

50% of respondents suggested complex health and safety legislation, 10% of respondents suggested lack of support and 10% suggested lack of knowledge of details and implications.

Question 20

The question asked is your company part of an industry specific partnership that shares good practice? It depicts that of all 10 responses, 20% of respondents suggested Yes, and 80% of respondents suggested No.

Question 21

The question asked is your company part of a network that shares health and safety good practice or information? It depicts that of all 10 responses, 30% of respondents suggested Yes, and 70% of respondents suggested No.

Question 22

The question asked is your company part of a supply chain initiative that is involved in an active dialogue with stakeholders? It depicts that of all 10 responses, 20% of respondents suggested Yes, and 80% of respondents suggested No.

Question 23

The question asked would your company be interested in participating to improve the health and safety criteria in the company? It depicts that of all 10 responses, 70% of respondents suggested Yes, and 30% of respondents suggested No.

Question 24

The statement suggests “we have received health and safety guidance from our customers”? It depicts that of all 10 responses, 80% of respondents suggested Yes, and 20% of respondents suggested No.

Question 25

The statement suggests “we have benefited from workshops and visits by our customers to educate us on what health and safety improvements can be made”? It depicts that of all 10 responses, 30% of respondents suggested Yes, and 70% of respondents suggested No.

Question 26

The question asked how many suppliers does your company have?. It depicts that of all 10 responses, 40% of respondents suggested 1-9 suppliers, 40% of respondents suggested 10-19 suppliers and 20% of respondents suggested 20-29 suppliers.

Question 27

The statement suggests “we assess the health and safety standard and performance of our suppliers informally in our assessment process”? It depicts that of all 10 responses, 90% of respondents agreed and 10% of respondents did not agree.

Question 28

The statement suggests “we assess the health and safety standard and performance of our suppliers in a formal process”? It depicts that of all 10 responses, 50% of respondents agreed and 50% of respondents did not agree.

Question 29

The statement suggests “we set health and safety criteria that our suppliers meet”? It depicts that of all 10 responses, 20% of respondents agreed and 80% of respondents did not agree.

Question 30

The statement suggests “health and safety performance forms part of our sub-contract position”. It depicts that of all 10 responses, 90% of respondents agreed and 10% of respondents did not agree.

Question 31

The statement suggests “in choosing our suppliers, health and safety performance rates as highly as cost?”. It depicts that of all 10 responses, 70% of respondents agreed and 30% of respondents did not agree.

6.3 The second questionnaire - vetting bidders for contracts, the monitoring of procurement, financial and legal implications, cost effectiveness and strategic decisions.

The second questionnaire(Pt.2), consists of 46 questions addressing specific areas looked at in the research within health and safety in the construction industry, namely;

Question 1. Vetting bidders for contracts.

The question asked the name of the business. For the purposes of this study, company names will remain anonymous, as depicted in the questionnaire, see appendix C.

Question 2.

The question asked the name of the parent company. For the purposes of this study, company names will remain anonymous, as depicted in the questionnaire, see appendix C.

Question 3

The question asked of what is the type of your organisation? It depicts that of 7 responses, 85.71% of respondents suggested it is a limited company and 14.29% of respondents suggested it is a sole trader.

Question 4

The question asked about sub-contracting. It depicts that of 8 responses, 62.50% of respondents suggested that the organisation bids to provide goods and services by itself, 25% of respondents suggest that the organisation bids in the role as a prime contractor and intends to use third parties to provide some of the goods and/or services, and 12.5% of respondents suggest that the potential provider is a consortium or major stakeholder.

Question 5

The question asked that is there any awareness of members of staff who through their association with key stakeholders could influence any of the decisions in relation to a contract, in particular throughout the tendering process? It depicts that of 7 responses, 100% of respondents suggested No.

Question 6

The question asked that has the organisation ever had default notices or liquidated damages imposed of any contract within the last 5 years? It depicts that of 7 responses, 14.29% of respondents suggested Yes and 85.71% of respondents suggested No.

Question 7

The question asked that has the organisation ever had a contract terminated or its employment determined under the terms of any contract within the last 5 years? It depicts that of 7 responses, 100% of respondents suggested No.

Question 8

The question asked that has the organisation ever withdrawn from a contract within the last 5 years? It depicts that of 8 responses, 25% of respondents suggested Yes and 75% of respondents suggested No.

Question 9

The question asked that is there pending or threatened or has there been any material litigation or other legal proceedings in the last 5 years? It depicts that of 8 responses, 12.5% of respondents suggested Yes and 87.5% of respondents suggested No.

Question 10

The question asked that has the organisation ever been in dispute within any public sector body within the last 5 years? It depicts that of 8 responses, 12.5% of respondents suggested Yes and 87.5% of respondents suggested No.

Question 11

The question asked that has the organisation ever been in dispute within any public sector body within the last 5 years? It depicts that of 8 responses, 12.5% of respondents suggested Yes and 87.5% of respondents suggested No.

Question 12

The question asked to state names of any public regulatory body, safety or trade companies which your company is associated to? It depicts that of 6 responses, all parties declined to answer.

Question 13

The question asked that what vetting procedures are in place when selecting contractors for work? Individual answers were given.

Question 14 - The monitoring of procurement

The question asked that does the organisation have a procurement department? It depicts that of 8 responses, 62.5% of respondents suggested Yes and 37.5% of respondents suggested No.

Question 15

The question asked that if “Yes” to Q.14, which group of actions would require approval? It depicts that of 8 responses, 37.5% of respondents suggested bidding document, invitation to pre-qualify or request from proposal, 12.5% of respondents suggested evaluation reports and 50% of respondents suggested contacts.

Question 16

The question asked that does the organisation aim at certain contractors for procurement? It depicts that of 8 responses, 62.5% of respondents suggested Yes and 37.5% of respondents suggested No.

Question 17

The question asked that would the organisations procurement strategy involve areas as indicated? It depicts that of 8 responses, the following was indicated in the table below.

	Negligible	Small extent	Normal	Great extent	Very great extent	Total	Weighted Average
Involving a contractor with a past credit history	87.50% 7	0.00% 0	12.50% 1	0.00% 0	0.00% 0	8	1.25
Lack of insurance indemnity	50.00% 4	50.00% 4	0.00% 0	0.00% 0	0.00% 0	8	1.50
Contractor known to the business	0.00% 0	25.00% 2	37.50% 3	0.00% 0	37.50% 3	8	3.50
Similar procurement techniques	25.00% 2	25.00% 2	12.50% 1	0.00% 0	37.50% 3	8	3.00
Criteria required	37.50% 3	0.00% 0	0.00% 0	0.00% 0	62.50% 5	8	3.50
Pre-proposed visits/meetings	0.00% 0	25.00% 2	25.00% 2	0.00% 0	50.00% 4	8	3.75
Feasibility studies	37.50% 3	12.50% 1	12.50% 1	0.00% 0	37.50% 3	8	2.88
Financial and technical proposals	50.00% 4	0.00% 0	12.50% 1	0.00% 0	37.50% 3	8	2.75
Systematic process to identify procurement requirement	12.50% 1	25.00% 2	0.00% 0	12.50% 1	50.00% 4	8	3.63

Figure 6.1 Organisations procurement strategy

Question 18

The question asked what percentage of the business is with private, public or government departments? It depicts that of 8 responses, the following was indicated in the table below.

	0%	1 - 19%	20 - 39%	40 - 59%	60%+	Total	Weighted Average
Private	12.50% 1	12.50% 1	12.50% 1	12.50% 1	50.00% 4	8	3.75
Public	50.00% 4	12.50% 1	12.50% 1	0.00% 0	25.00% 2	8	2.38
Government	37.50% 3	37.50% 3	12.50% 1	0.00% 0	12.50% 1	8	2.13

Figure 6.2 Business relations

Question 19

The question asked that does the organisation participate in company collaboration? It depicts that of 8 responses, 37.5% of respondents suggested Yes and 62.5% of respondents suggested No.

Question 20

The question asked that does the organisation ever consider receiving a cheaper price from a prospective company? It depicts that of 8 responses, 75% of respondents suggested Yes and 25% of respondents suggested No.

Question 21 - Financial and legal implications with construction accidents

The question asked that does the company ever operate and understand financial and legal implications for accidents? It depicts that of 7 responses, 85.71% of respondents suggested Yes and 14.29% of respondents suggested None.

Question 22

The question asked that within a legal framework, what would you think as a company, the remit of health and safety in construction? It depicts that of 7 responses, the following was indicated in the table below, next;

	Negligible	Small extent	Moderate	Great extent	Very great extent	Total	Weighted Average
Rules/regulations in the workplace	14.29% 1	0.00% 0	14.29% 1	0.00% 0	71.43% 5	7	4.14
Rules/regulations to ensure general wellbeing	0.00% 0	14.29% 1	14.29% 1	0.00% 0	71.43% 5	7	4.29
Breaches of regulations	28.57% 2	0.00% 0	14.29% 1	0.00% 0	57.14% 4	7	3.57
Training	0.00% 0	14.29% 1	14.29% 1	28.57% 2	42.86% 3	7	4.00
Working conditions	0.00% 0	0.00% 0	16.67% 1	0.00% 0	83.33% 5	6	4.67
To ignore illegal contracts	85.71% 6	0.00% 0	14.29% 1	0.00% 0	0.00% 0	7	1.29
Insurance indemnity	0.00% 0	0.00% 0	14.29% 1	0.00% 0	85.71% 6	7	4.71
Influence in bidding	57.14% 4	14.29% 1	14.29% 1	0.00% 0	14.29% 1	7	2.00

Figure 6.3 Legal framework in construction

Question 23

The question asked that from a financial point of view, which factors would affect your company? It depicts that of 7 responses, the following was indicated in the table below.

Answer Choices	Responses
Customer dissatisfaction	0.00% 0
Employee morale	14.29% 1
Efficiency	28.57% 2
Productivity	28.57% 2
Delivery	14.29% 1
Other (please specify)	14.29% 1
Total	7

Figure 6.4 Financial factors

Question 24 - Cost effectiveness in construction projects

The question asked that does cost effectiveness affect your company's objectives ? It depicts that of 8 responses, 62.5% of respondents suggested Yes and 37.5% of respondents suggested No.

Question 25

The question asked that is the company aware or use any of the methods indicated within a health and safety remit? It depicts that of 8 responses, the following was indicated in the table, next;

Answer Choices	Responses	
Cost effectiveness analysis	25.00%	2
Cost benefit analysis	25.00%	2
Multi criteria analysis	0.00%	0
Project efficiency	37.50%	3
Project management	12.50%	1
Other (please specify)	0.00%	0
Total		8

Figure 6.5 Health and safety method

Question 26

In the case of answers given in Q.25, could you point out any positive or negative sides to these methodologies? Individual answers were given.

Question 27

The question asked that does the organisation have any arrangements or current plans to consider a cost effective analysis methodology ? It depicts that of 8 responses, 75% of respondents suggested No and 25% of respondents suggested Don't Know.

Question 28

The question asked which type of methodology do think should be applied to promote cost effectiveness in the company. ? Individual answers were given.

Question 29

The question asked that, from experience, would you agree with methods to promote cost effectiveness in the company – from a value of 0 totally agree to 5, totally disagree? It depicts that of 7 responses, the following was indicated in the table below.

Answer Choices	Responses	
0	0.00%	0
1	14.29%	1
2	14.29%	1
3	14.29%	1
4	0.00%	0
5	57.14%	4
Total		7

Figure 6.6 Promotion of cost effectiveness

Question 30

The question asked that could advantages and disadvantages be pointed out of using a cost effectiveness methodology? It depicts that of 8 responses, the following was indicated in the table below.

	Advantage	Disadvantage	Total	Weighted Average
Simplicity	100.00% 8	0.00% 0	8	1.00
Quantitative analysis	28.57% 2	71.43% 5	7	1.71
Qualitative analysis	25.00% 2	75.00% 6	8	1.75
Accuracy	87.50% 7	12.50% 1	8	1.13
Complexity	0.00% 0	100.00% 8	8	2.00
Technical demanding	12.50% 1	87.50% 7	8	1.88
Importance	87.50% 7	12.50% 1	8	1.13
Effectiveness	75.00% 6	25.00% 2	8	1.25
Success in a project	87.50% 7	12.50% 1	8	1.13
Achievement	87.50% 7	12.50% 1	8	1.13

Figure 6.7 Cost effectiveness methodology

Question 31

The question asked what is the importance of cost effectiveness in the company? It depicts that of 8 responses, the following was indicated in the table below.

Answer Choices	Responses
Very high	37.50% 3
High	62.50% 5
Adequate	0.00% 0
Low	0.00% 0
Very low	0.00% 0
Do not know	0.00% 0
No answer	0.00% 0
Other (please specify)	0.00% 0
Total	8

Figure 6.8 Importance of cost effectiveness

Question 32

The question asked what in which way the company is involved in a cost effective methodology? It depicts that of 8 responses, the following was indicated in the table below.

Answer Choices	Responses	
For functionality	12.50%	1
For profitability	25.00%	2
Legal undertakings	0.00%	0
Awareness of costs	50.00%	4
Other (please specify)	12.50%	1
Total		8

Figure 6.9 Involvement of cost effectiveness

Question 33

The question asked that does the company recognise or believe that enough is being done regarding cost effectiveness? It depicts that of 8 responses, 50% of respondents suggested Yes, 12.5% of respondents suggested No and 30% of respondents suggested Don't Know.

Question 34

The question asked what if any, should be improved to enhance cost effectiveness? It depicts that of 8 responses, the following was indicated in the table below.

Answer Choices	Responses	
Management	25.00%	2
Staff	0.00%	0
Resources	50.00%	4
Methodology	0.00%	0
Efficiency	12.50%	1
Legal	0.00%	0
Financial	12.50%	1
Other (please specify)	0.00%	0
Total		8

Figure 6.10 Enhancement of cost effectiveness

Question 35

The question asked that does the company think there are issues that are not being addressed in cost effectiveness? It depicts that of 8 responses, 25% of respondents suggested Yes, 50% of respondents suggested No and 25% of respondents suggested Don't Know.

Question 36

The question asked if “Yes” to Q.35, what issues would you highlight.? Individual answers were given.

Question 37

The question asked that would the company consider that the use of a cost effectiveness methodology/analysis improve the company? It depicts that of 8 responses, 50% of respondents suggested Yes, 12.5% of respondents suggested No and 37.5% of respondents suggested Don't Know.

Question 38

The question asked if “Yes” to Q.37, which ones? Individual answers were given.

Question 39

The question asked that what would the company think, from prior experience, the priority to promote cost effectiveness should be given to? It depicts that of 8 responses, the following was indicated in the table below.

Answer Choices	Responses	
Project functionality	25.00%	2
Client/company satisfaction	12.50%	1
Level of effectiveness	37.50%	3
Value for money	12.50%	1
Profitability	12.50%	1
Legal undertaking and proceedings	0.00%	0
Other (please specify)	0.00%	0
Total		8

Figure 6.11 Priority of cost effectiveness

Question 40

The question asked that would the company adopt a cost effective strategy? It depicts that of 8 responses, 75% of respondents suggested Yes and 25% of respondents suggested Don't Know.

Question 41

The question asked that if “Yes” to Q.40, to develop such a strategy, what kind of legislation or norms be taken into consideration? It depicts that of 7 responses, the following was indicated in the table below.

Answer Choices	Responses	
EU directive	0.00%	0
National legislation	0.00%	0
Regional legislation	14.29%	1
Local legislation	85.71%	6
Norms defined by your company	0.00%	0
None	0.00%	0
Other (please specify)	0.00%	0
Total		7

Figure 6.12 Legislation consideration

Question 42

The question asked that for what reasons would be needed to lead or create a cost effective strategy in the company? It depicts that of 8 responses, the following was indicated in the table below.

Answer Choices	Responses	
An important project	25.00%	2
Sequence of events	12.50%	1
Effective utilisation	0.00%	0
Company objectives	25.00%	2
Competition	0.00%	0
Schedules	0.00%	0
Budget	37.50%	3
Other (please specify)	0.00%	0
Total		8

Figure 6.13 Cost effective strategy

Question 43 - Contractor and stakeholder strategic decisions in construction health and safety

The question asked that within the company, who is ultimately responsible for making decisions regarding health and safety? It depicts that of 7 responses, 85.71% of respondents suggested the managing director, and 14.29% of respondents suggested director.

Question 44

The question asked that who would make decisions for training to be given regarding health and safety in the company? It depicts that of 7 responses, the following was indicated in the table below.

Answer Choices	Responses	
Managing director	71.43%	5
Director	14.29%	1
Stakeholders	0.00%	0
Manager	14.29%	1
Supervisor	0.00%	0
Operatives	0.00%	0
Office staff	0.00%	0
Other (please specify)	0.00%	0
Total		7

Figure 6.14 Health and safety training

Question 45

The question asked that does the company use outside regulatory bodies to influence health and safety issues? It depicts that of 7 responses, 14.29% of respondents suggested Yes and 85.71% of respondents suggested No.

Question 46

The question asked that based on your experience, what kind of decisions are made with reference to health and safety legislation in the company? It depicts that of 8 responses, the following was indicated in the table, next;

	By the company	By the stakeholder	By staff	By a sub-contractor	By legislation	Total	Weighted Average
Changes in products or services, i.e, design, guarantee.	100.00% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	1	1.00
Sales and distribution	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0	0.00
Marketing	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1	3.00
Manufacturing process, i.e, production technology	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0	0.00
Purchasing	0.00% 0	100.00% 1	0.00% 0	0.00% 0	0.00% 0	1	2.00
Monitoring and controlling quality	0.00% 0	0.00% 0	0.00% 0	50.00% 1	50.00% 1	2	4.50
Introduction of new technologies and new products	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 1	1	5.00
Budgeting	100.00% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	1	1.00
Approval of financing for major or minor products	66.67% 2	0.00% 0	0.00% 0	0.00% 0	33.33% 1	3	2.33
Employment of sub-contractors	0.00% 0	66.67% 2	33.33% 1	0.00% 0	0.00% 0	3	2.33
Salary/wages	25.00% 1	25.00% 1	25.00% 1	25.00% 1	0.00% 0	4	2.50
Training	0.00% 0	0.00% 0	33.33% 1	33.33% 1	33.33% 1	3	4.00

Figure 6.15 Health and safety legislation

The responses to the initial questionnaire, this being Pt.1, revealed that 70% of respondents were based in the construction industry. Although it would seem that there was a lack of awareness of most companies approached, to the general idea and concept of health and safety in the construction industry around which the questionnaire questions were based. It was also used to be a base for the second questionnaire, as to define and give a general background to the thoughts and general state of the industry regarding health and safety. Henceforth, it was decided to base the main questionnaire, this being Pt.2, questions around the same areas with the exception to identify specific areas under consideration within the research, this being the vetting of bidders for contracts, the monitoring of procurement, financial and legal implications with construction accidents, cost effectiveness in construction projects, contractor and stakeholder strategic decisions in construction.

The questions asked were carefully designed, regarding type and style, in order to a short but precise answer, and to perhaps save time by the respondents when answering the electronic form. This consequently would be seen to increase the response rate. The selection of a closed question format usually provides the respondents with a set of choices where they can easily tick on the appropriate answer, hence open questions give the freedom to the respondents to give their answers with no limitation to the length. Both formats have been used on the first and second questionnaires, although the closed style of question style is much more widely used within the data collection. Also, where additional information is required, some questions included answer boxes and provided in the appropriate section and question.

6.4 Questionnaire structure

The first questionnaire consists of 1 part, and is intended to give a general overview and investigation of the current state of health and safety in the construction industry, within 10 companies based in the United Kingdom. The content of the questionnaire is shown previous in this chapter, it consists of one section – general health and safety practices. This is an introductory part and its main purpose is to identify the company and to make sure and give an account of what the company knows and understands of current health and safety legislation, it's size and knowledge. It also asks the respondents about their positions within the company as to implement any legislation and to ensure they have sufficient understanding of the company environment and practice. Prior to designing both questionnaires, a pilot study was carried out consisting of a selection of prototype questionnaires that were distributed randomly to a selection of 10 companies, and also family and friends, in order to get a feel of the work involved and get constructive criticism from all respondents This pilot questionnaire was provided to enable the design of the potential questionnaires, and also to enable a testing facility to see whether the questions were intelligible, easy to answer, whether they contained inapplicable or confusing statements, which could retrieve incorrect information for the benefit of the research. When the pilot questionnaire got to the stage of good feedback from the respondents, the two primary questionnaires were then put in place, and distributed to the 10 selected companies within the construction industry in the United Kingdom.(Samples of questionnaire Pt.1 and Pt.2 are shown in Appendix B and C).

Most of the questions asked were short and close ended, and also specific and to the point. Indeed many questions were only with two possible answers: yes or no.

The second questionnaire consists of 5 parts, and is intended to deal with the improvement of organisational health and safety, through the monitoring of the process of procurement in construction projects; the cost effectiveness in construction projects; any strategic decisions and the responsibilities of both the contractor and client in dealing with organisational health and safety regarding construction projects. As with the first questionnaire, it was sent to the same 10 companies based in the United Kingdom. However, not all respondents replied. The content of the questionnaire is shown previous in this chapter, it consists of 5 sections, broken down from the 3 overall aims described earlier. The 5 areas and points in the questionnaire are as follows;

1. Vetting bidders for contracts;
2. The monitoring of procurement;
3. Financial and legal implications with construction accidents;
4. Cost effectiveness in construction projects;
5. Contractor and stakeholder strategic decisions in construction health and safety.

The first section, vetting bidders for contracts, asks questions and establishes whether the surveyed companies have any policies and history with current or previous contractors, and asks what checking practices have been observed.

The second section, the monitoring of procurement, asks questions and establishes whether the surveyed companies about their procurement practices and any strategies they may involve.

The third section, financial and legal implications with construction accidents, asks questions and establishes whether the surveyed companies about their financial and legal practices, and its implication within health and safety in the construction industry.

The fourth section, cost effectiveness in construction projects, asks questions and establishes whether the surveyed companies about its cost effectiveness, giving any advantages/disadvantages and methodologies they may involve.

The fifth section, contractor and strategic decisions in construction health and safety, asks questions and establishes whether the surveyed companies about their decision making processes and practices and any strategies they may involve regarding decisions in construction health and safety.

The main purpose of creating the prototype questionnaire was to clearly identify and understand problems with the main questions before they were used. It also gave the writer valuable experience and training in the relevant documentation procedures, contacting the respondents, explaining the purpose of the survey and timing each operation. Henceforth, the main objective and subsequent result of this work was to make some alterations and adaptations that was deemed to be necessary for the final questionnaire.

6.5 Interviews

A pilot interview was also created and designed, to the exact same nature and structure as the questionnaire. Surprisingly, the pilot interview with a company known to the writer did not take long at all, moreover it was used to introduce the writer and give notice of a forthcoming questionnaire, and to give a basic overview of the questions identified in both parts 1 and 2.

A total of 10 companies took part, the same establishments as to participate in the 2 subsequent questionnaires. These structured interviews involved the writer talking to and asking another person a set of predetermined questions, about the topic purpose of the survey and timing each operation. Accordingly, the main result of this work was to make some alterations and adaptations that seemed necessary for the final questionnaire and structured interviews.concerned in the research. The person asking the questions usually sets any tone and explain things to the person being interviewed, (the interviewee), to explain any topic he or she does not understand or may seem confusing. Conducting interviews has its limitations, weaknesses, strength and uses, just like any other form of data collection.

The prototype questionnaire and interviews were created to identify problems with the questions before they were used. It also gave the writer valuable experience in the relevant documentation procedures, contacting the respondents, explaining the purpose of the survey and timing each operation. Accordingly, the main result of this work was to make some alterations and adaptations that seemed necessary for the final questionnaire and structured interviews.

6.6 Questionnaire analysis

From the pilot study, the design of the interview and the information found and collated from the literature review; the final questionnaire was designed by the writer in order to determine the level of application and depth of the 3 main areas, and 5 sub areas, described in the questionnaire, would have within companies based within health and safety in the construction industry. The goal of the questionnaire is to find out and give answers and meet the aims and objectives as described within this research.

Generally, both questionnaires were grouped into 2 separate tasks;

- General health and safety practice – background information of the respondent and/or company;
- The specific identification of the 5 areas under discussion within health and safety in the construction industry.

Within the main questionnaire, and indeed the preliminary questionnaire, the respondents were asked to give honest but realistic answers to the set questions, specifically to the 5 areas discussed. From all the information that was obtained and collated, a quantitative analysis was carried out and the results are discussed and shown in detail in the following chapter 7.

6.7 Reliance and validation of the questionnaire

In using the 2 questionnaires for this research, it was important to ask questions that are relevant to the research being undertaken. The main aim was to ensure that the way the data was obtained and collated to give maximum assurance of validity and reliability. It was envisaged that all and any feedback obtained from the questionnaire or the answers chosen by the respondents will be of value as to the researcher can take forward such choices and answer to each or any number of issues. In view of this, considerable care has been taken while constructing the questionnaires and interviews for this research to make sure that the result obtained will add value to the research. Reliability applied on a measurement tool is used to obtain the same result if used repeatedly by another researcher, carrying out research in a similar area of work at the same time. However, in contrast, the term validity applied to a measurement tool measures what it plans to measure. If the indicator contains a small error percentage, then the indicator is a valid measure of the concept.

Reliability indicated that all research obtained from a respondent should be close and be of a full representation of what is actually happening within their organisation. Henceforth, to deliberate and discuss the different issues of health and safety in construction within this research, particular attention was given to the contents of both questionnaires. The questions were objectively constructed and designed without any pre-empting or giving the respondents any indication of preferred answers. The questions were organised and arranged from general health and safety issues within construction, allowing for adequate order of the questions to the respondents. However, to ensure a clearer understanding of the questions, a simple introduction to each questionnaire was given, highlighting the objectives and giving a brief explanation for the reasons behind the questionnaire

Also, during the design of both surveys, it was construed, as much as possible, to set questions and being in such a syntax as to avoid ambiguous and/or embarrassing questions, and to exclude any aspects that may cause misunderstanding, such as poorly constructed phrases or sentences or typing errors. Ethical issues were also considered, as to pertain to laws that protect companies and individuals from any embarrassment or otherwise. Although the two questionnaires varied significantly in detail and length, it restricts information required only to essential information needed by the research. The companies and respondents were assured from the beginning of the confidentiality aspect of the research and that their answers will remain anonymous and confidential. This aspect of the data collection process is very important, as it demonstrates and creates an atmosphere of trust between the interviewer (the writer) and the interviewees, (the respondent). The writer believes and understands that the sampling chosen will have a direct and positive effect to what is representative in quality and quantity, since it was necessary to represent a cross section of companies, that is 10 in number, operating and trading in the United Kingdom, and to show a workforce also typical in the UK context.

6.8 Summary of chapter

The two questionnaires and interviews were carefully planned and executed based on the information obtained, collated and discussed in the literature review, and to the suggested aims and objectives and research questions. All due care and attention was given by the writer to ensure the validity and reliability of the questionnaires and interviews. The sampling chosen and used is a typical cross section of respondents and companies within the construction industry in the United Kingdom.

CHAPTER 7.

INFORMATION COLLECTION, RESULTS AND DISCUSSION

7.1 Introduction

This chapter will give an analysis to the findings from the interviews and questionnaires on health and safety in the construction industry. It was seen that a major finding of this research was that the general health and safety awareness has become an integral and important issue in the construction environment, and even in society in general, as in a socio-economic and legislative manner. From the evidence given, it can be seen that companies are attempting to remain profitable within their construction disciplinary remit in an increasingly competitive UK market. However, with the recent news of the UK wishing to leave the European Union (EU), the economic outcome and any knock on effect may influence these results in future research, within the health and safety in construction element. The companies which are addressing health and safety concerns do this as good business sense, as it would promote a healthy workforce, hence profits and a greater gross domestic product (GDP), for the whole country in general. Moreover, many firms see a robust and strong health and safety regulation and practices as a way of survival. Statistics, given in early chapters, highlight accident and incident statistics, which serve as evidence to this problem, however there are also encouraging statistics given to contradict such occurrences, by giving figures of the construction industries worth to the economy and GDP.

7.2 Collection of data

As mentioned in the introduction and earlier chapter, interviews and questionnaires were created to obtain, collect and collate data for this research. The questionnaires were created using an appropriate survey software, and sent via the internet to all parts of the UK where the participants are located. The targeted respondents of this research included mainly companies, however contractors, consultants, client, and health and safety officers in construction industry in the UK were included. Although all questionnaires were returned, (not all responded in the 2nd questionnaire), they were then checked, edited, and analysed.

The designation of the respondents was general, the survey was sent to a senior member of staff to give a considered opinion of the questions asked from the 2 questionnaires, however it was seen from one result that 80% involved with health and safety duties were senior management, 10% were of a health and safety committee and 10% were others. This suggests immediately that throughout the whole survey, health and safety issues and legislation are dealt with by senior management, which could make sense. The majority of the construction projects the employees were involved with are building works, with a concentration on commercial buildings, specialising in curtain walling, window and door design, manufacture and installation. Other companies included architects practices, manufacturing based firms within the construction industry and suppliers. Most of the projects are medium sized with good safety records, 0% of the 10 respondents had any accident/incident investigation, 50% routine inspection, 10% complaint investigation and 40% advice.

7.2.1 Results

From a total of 10 members of staff available to complete the survey, 10 responses were received from the first questionnaire (Pt.1), with a 100 per cent return rate. The reason which is suspected for such an excellent return rate is because the writer had dealings with the majority of the businesses, and the questions were of a straightforward and suitable context for a realistic timely reply. However, from a total of 8 members of staff available to complete the survey, on occasion only 7 responses were received from the first questionnaire (Pt.2), with a 100 per cent return rate. This was due for various reasons, as shown in the results, e.g., failure to complete the questionnaire, “skipped” questions, not understanding the question and others. The survey was sent to, as mentioned, one member of staff, as opposed to many members, to give an individual point of view as opposed to many. In view of this, further research can be taken from this to give a holistic point of view, and to include many members of staff, however due to time constraint and limitations to this research at present, mainly related to lack of time. However, from an observational point of view, it was seen to be clear in one instance it was clear that some senior members of staff who saw the survey, thought the questionnaire impinged on the management function.

Contrary to this, this research and survey method used by the writer could in future research of a similar nature to identify a “climate” survey questionnaire administered to all staff followed by a series of

meetings to confirm the interpretation of the survey results, and to provide them with an opportunity to offer solutions and suggestions for improving the organisation.

7.3 Analysis of questionnaire - results from questionnaire Pt.1

The analysis of the two questionnaires, namely Pt.1 and Pt.2 distributed to respondents for the purpose of this research is shown and presented in this chapter. The results gained and presented in its graphical form presents statistical results of the collected questionnaires based on a quantitative method. The following section explains the process of the results, in its graphical form with comments. These questionnaires were distributed on-line using an appropriate survey software tool to the companies/respondents identified, to give a representation of the research, this being the health and safety in the construction industry within the UK. It will also provide a general overview of the response rate, as seen in the charts. Sections 7.3 and 7.4 below provides a complete analysis of data collected which aims at examining health and safety in construction within general health and safety practices, (Pt.1), and a more specific analysis of procurement, vetting, financial, legal, cost effectiveness and stakeholder decisions, in the UK. A full discussion of the findings from (Pt.1) and (Pt.2) questionnaires is presented in chapter 8, which also contains the findings and discussions of the literature review.

7.3.1 Question 1

The question asked the name of the business. For the purposes of this study, company names will remain anonymous, as depicted in the questionnaire, see appendix B.

7.3.2 Question 2

The question asked how many employees does the business have. Fig. 7 depicts that of all 10 responses, 40% of respondents had 1-9 employees, 40% of respondents had 10-49 employees, 10% of respondents had between 50-249 and 250 or above.

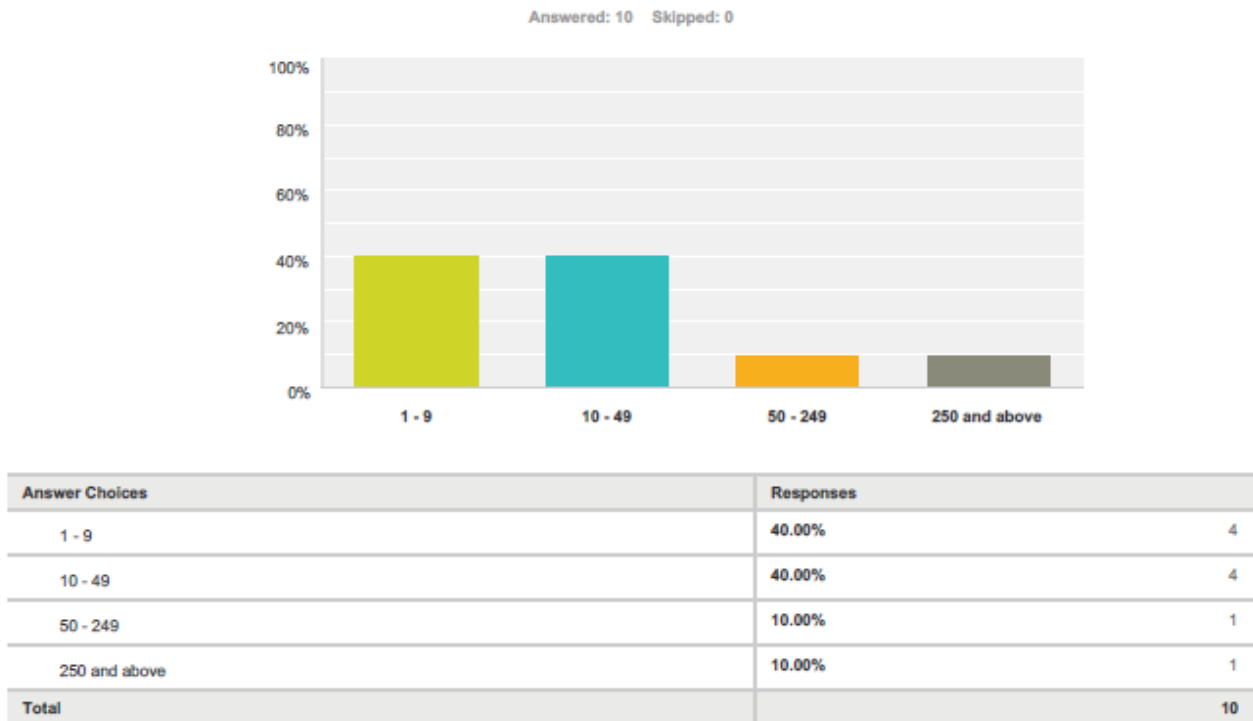


Figure 7. No. of employees

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that a majority of businesses approached, nearly half participated, and were of smaller sized businesses.

7.3.3 Question 3

The question asked in what respect would you think a poor or good health and safety record reflect on your company. Fig. 7.1 depicts that of all 10 responses, 80% of respondents suggested business operations, 20% of respondents suggested business image.

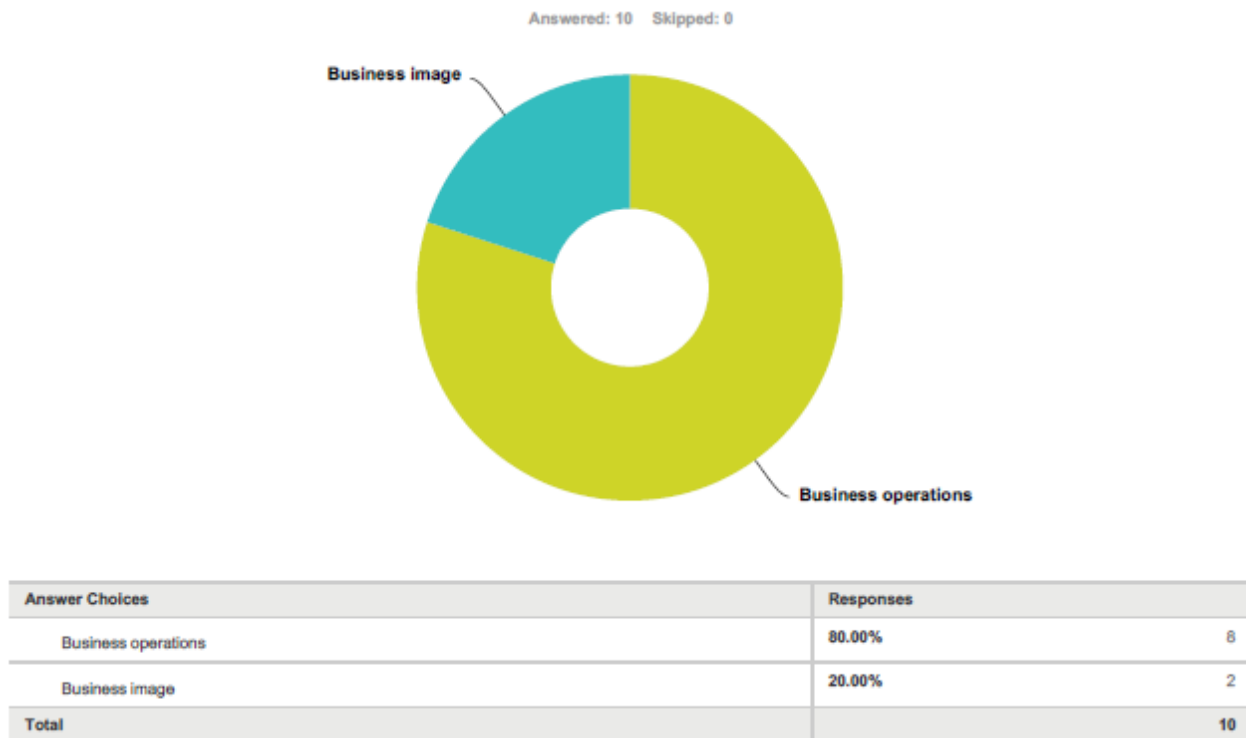
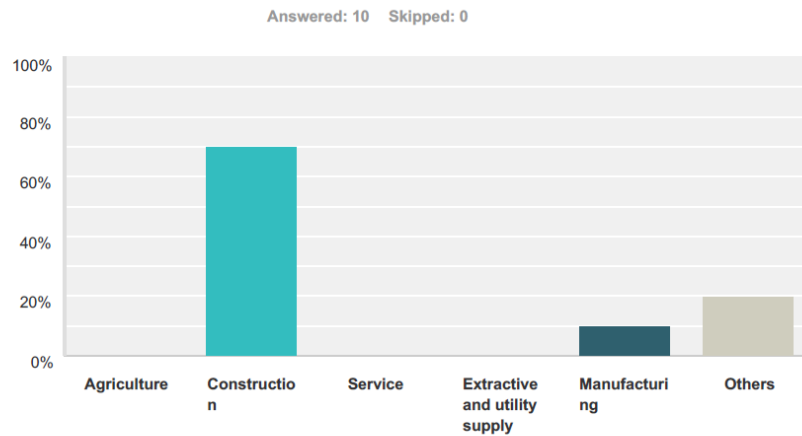


Figure 7.1. Health and safety record

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that a majority of businesses approached, businesses operations were affected.

7.3.4 Question 4

The question asked in which industries does your business belong. Fig. 7.2 depicts that of all 10 responses, 70% of respondents suggested the construction industry, 10% of respondents suggested the manufacturing industry and 20% suggested otherwise.



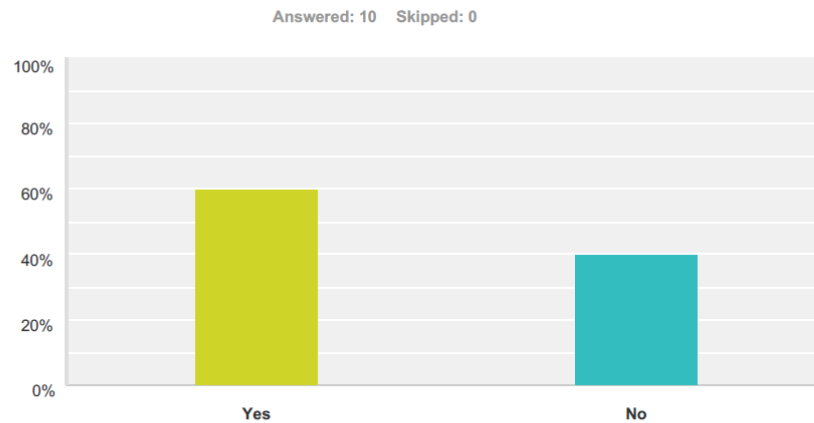
Answer Choices	Responses
Agriculture	0.00% 0
Construction	70.00% 7
Service	0.00% 0
Extractive and utility supply	0.00% 0
Manufacturing	10.00% 1
Others	20.00% 2
Total	10

Figure 7.2. Industry criteria

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that a majority of businesses approached, they were part of the construction industry.

7.3.5 Question 5

The question asked is there an appointed health and safety representative within the company. Fig. 7.3 depicts that of all 10 responses, 60% of respondents suggested Yes, 40% of respondents suggested No.



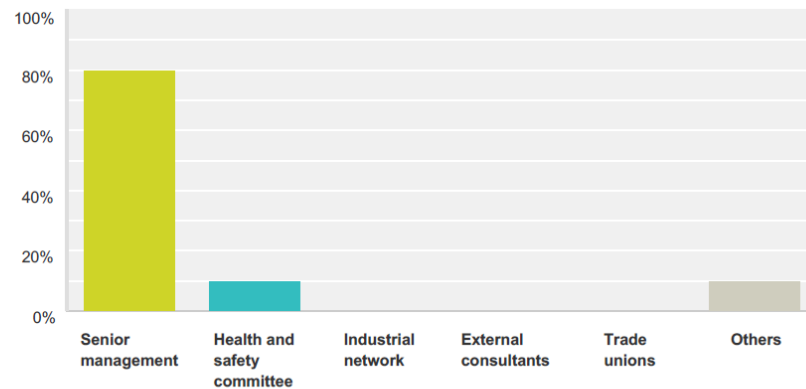
Answer Choices	Responses	
Yes	60.00%	6
No	40.00%	4
Total		10

Figure 7.3. Health and safety representation

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that a majority of businesses approached, just over half of employees knew about a health and safety representative.

7.3.6 Question 6

The question asked who else is involved in your company's health and safety duties. Fig. 7.4 depicts that of all 10 responses, 80% of respondents suggested senior management, 10% of respondents suggested health and safety committee and 10% suggested others.



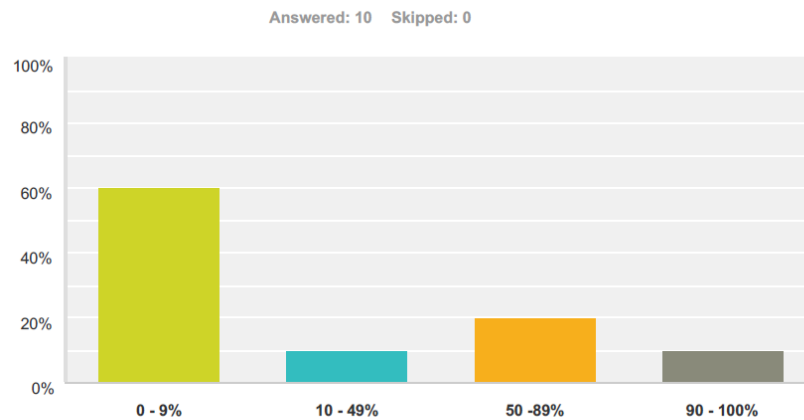
Answer Choices	Responses	
Senior management	80.00%	8
Health and safety committee	10.00%	1
Industrial network	0.00%	0
External consultants	0.00%	0
Trade unions	0.00%	0
Others	10.00%	1
Total		10

Figure 7.4. Health and safety duties

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that a majority of businesses approached, most employees knew about their company's health and safety duties.

7.3.7 Question 7

The question asked what percentage of the total working week of the person identified in Q.6 is spent on health and safety. Fig. 7.5 depicts that of all 10 responses, 0-9% of employees suggested 60% spent time, 10-49% of employees suggested 10%, 50-89% of employees suggested 20% and 90-100% suggested 10%.



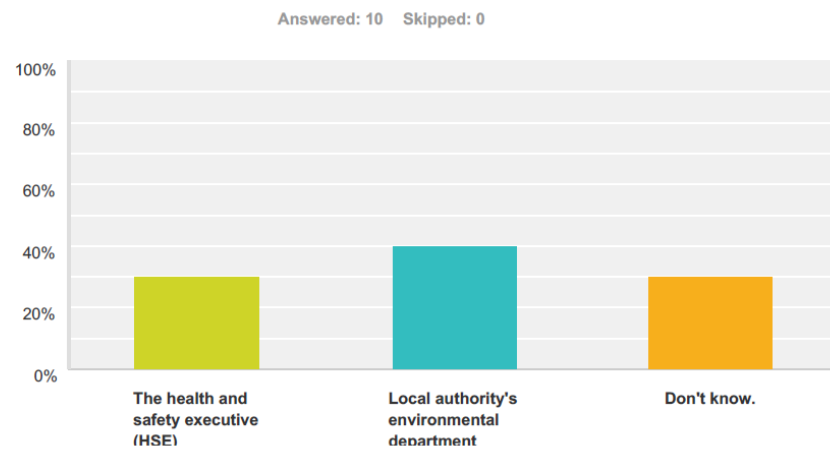
Answer Choices	Responses	Count
0 - 9%	60.00%	6
10 - 49%	10.00%	1
50 - 89%	20.00%	2
90 - 100%	10.00%	1
Total		10

Figure 7.5. Health and safety time spent

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that a majority of businesses approached, a small proportion of employees knew of time spent within the company on health and safety.

7.3.8 Question 8

The question asked who enforces health and safety in your business sector. Fig. 7.6 depicts that of all 10 responses, 30% of respondents suggested the health and safety executive, 40% of respondents suggested local authority and 30% of respondents suggested a don't know.



Answer Choices	Responses
The health and safety executive (HSE)	30.00% 3
Local authority's environmental department	40.00% 4
Don't know.	30.00% 3
Total	10

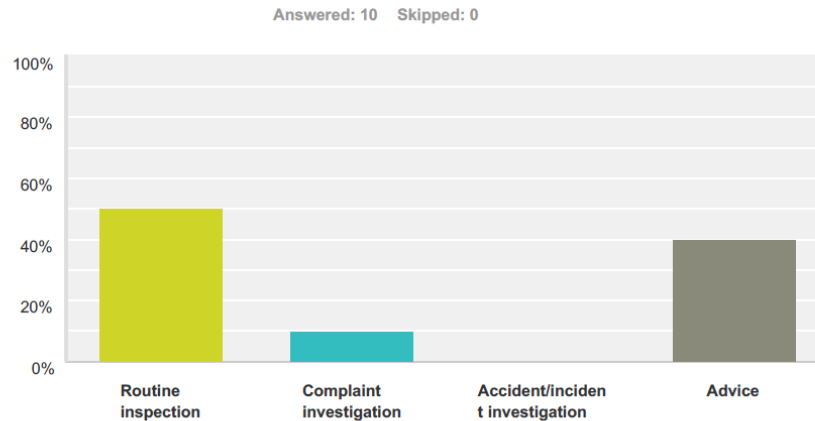
Figure 7.6. Health and safety in the business sector

The above figure shows and depicts data given from the questionnaire carried out within the research.

It would suggest that a majority of businesses approached, most employees knew about health and safety enforcement within the company, however a small percentage overall.

7.3.9 Question 9

The question asked is has a safety enforcement officer ever visited the company? Fig. 7.7 depicts that of all 10 responses, 50% of respondents suggested the visit was a routine inspection, 10% of respondents suggested the visit was about a complaint/investigation and 40% of respondents suggested it was for advice.



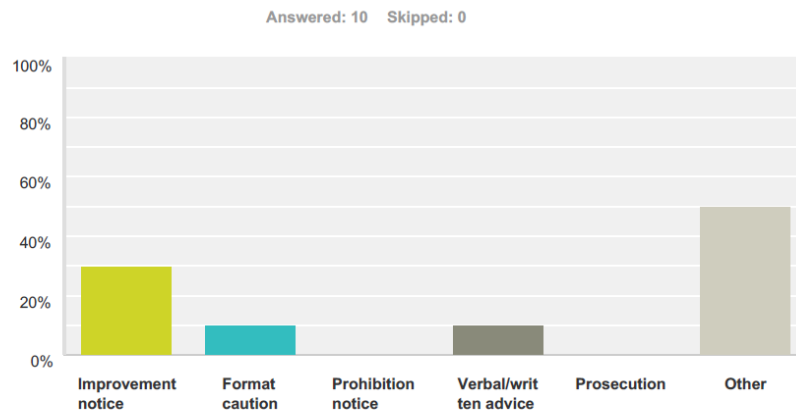
Answer Choices	Responses
Routine inspection	50.00% 5
Complaint investigation	10.00% 1
Accident/incident investigation	0.00% 0
Advice	40.00% 4
Total	10

Figure 7.7. Visitation by health and safety enforcement officer.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that a majority of businesses approached, half of employees suggested that the visitation of a health and safety officer was for routine inspection only.

7.3.10 Question 10

The question asked what was the outcome of the visit? Fig. 7.8 depicts that of all 10 responses, 30% of respondents suggested the visit was for a routine notice, 10% of respondents suggested the visit was about a formal caution, 10% of respondents suggested it was for a verbal/written notice and 50% suggested other.



Answer Choices	Responses
Improvement notice	30.00% 3
Format caution	10.00% 1
Prohibition notice	0.00% 0
Verbal/written advice	10.00% 1
Prosecution	0.00% 0
Other	50.00% 5
Total	10

Figure 7.8. Outcome of visit.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, half of the employees did not really know the outcome of a visit from a health and safety officer.

7.3.11 Question 11

The question asked in which health and safety legislation that you are aware of that effects the business? Fig. 7.9 depicts that of all 10 responses, 50% of respondents suggested the management of health and safety at work regulations, 10% of respondents suggested workplace (health, safety and welfare) regulations, 10% of respondents suggested health and safety information for employees regulations and 10% suggested reporting of injuries,diseases and dangerous occurances regulations.

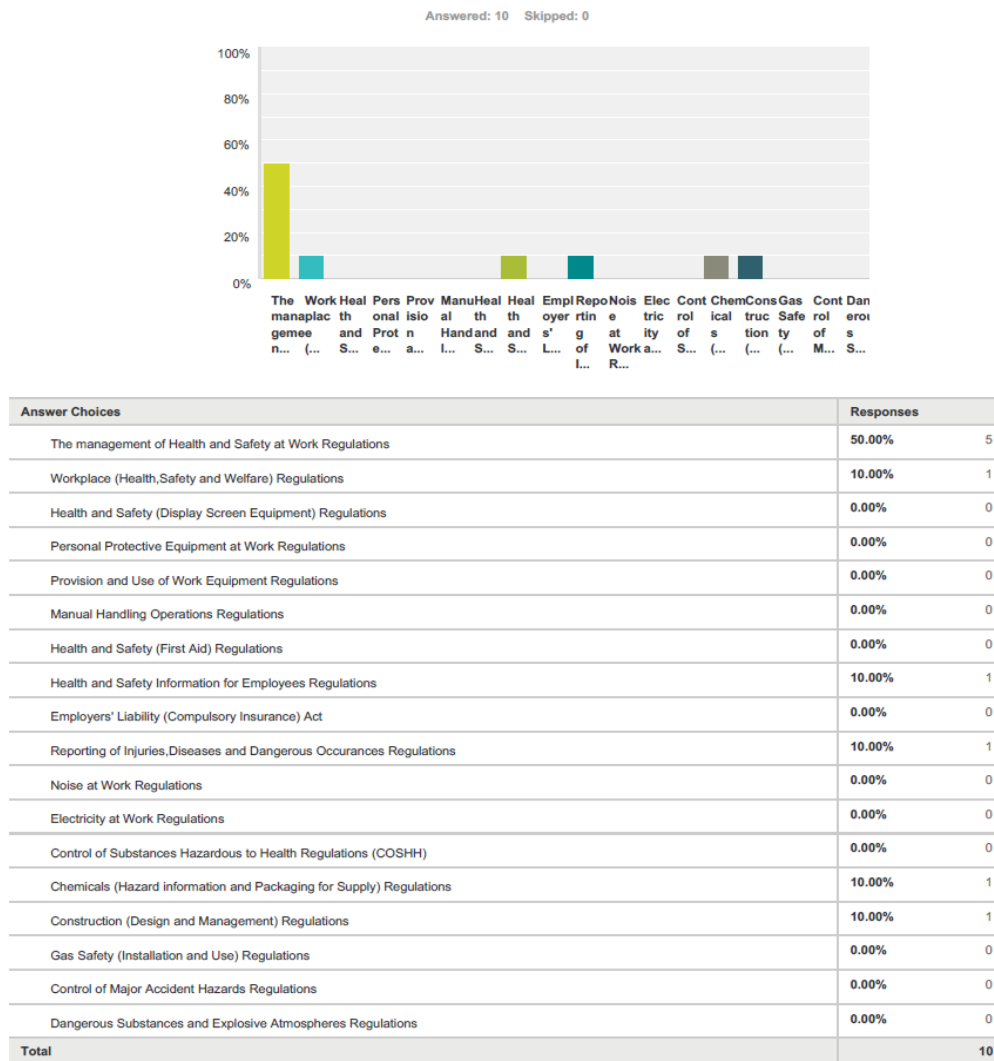
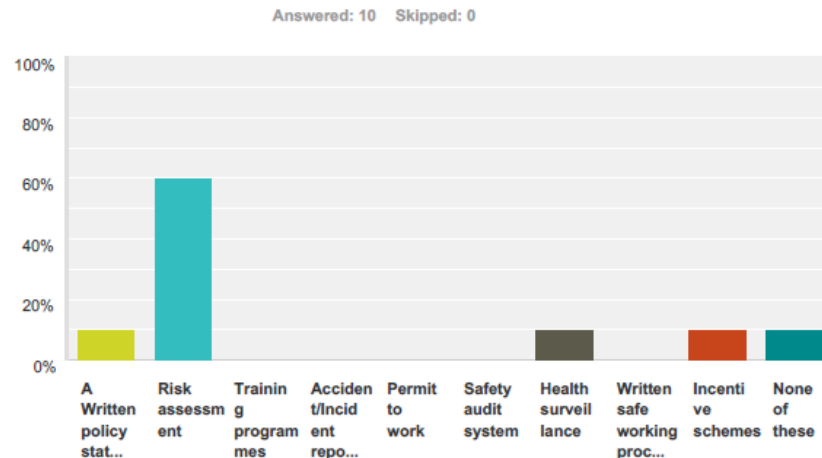


Figure 7.9. Health and safety and effects on business.

The above depicts most employees suggest health and safety regulations are important.

7.3.12 Question 12

The question asked in which health and safety policy do you have in place for managing such issues in the company? Fig. 7.10 depicts that of all 10 responses, 10% of respondents suggested a written policy statement, 60% of respondents suggested a risk assessment, 10% of respondents suggested health surveillance and 10% suggested none of these.



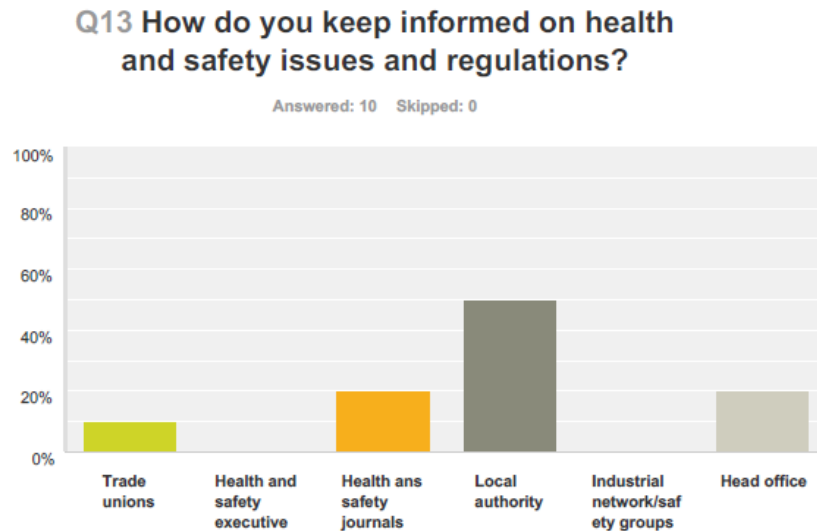
Answer Choices	Responses
A Written policy statement	10.00% 1
Risk assessment	60.00% 6
Training programmes	0.00% 0
Accident/Incident reporting procedures	0.00% 0
Permit to work	0.00% 0
Safety audit system	0.00% 0
Health surveillance	10.00% 1
Written safe working procedures	0.00% 0
Incentive schemes	10.00% 1
None of these	10.00% 1
Total	10

Figure 7.10. Health and safety policy.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, over half of the employees suggested a specific health and safety policy implementation within the company.

7.3.13 Question 13

The question asked how do you keep informed on health and safety issues and regulations? Fig. 7.11 depicts that of all 10 responses, 10% of respondents suggested trade unions, 20% of respondents suggested health and safety journals, 50% of respondents suggested local authorities and 20% suggested the head office.



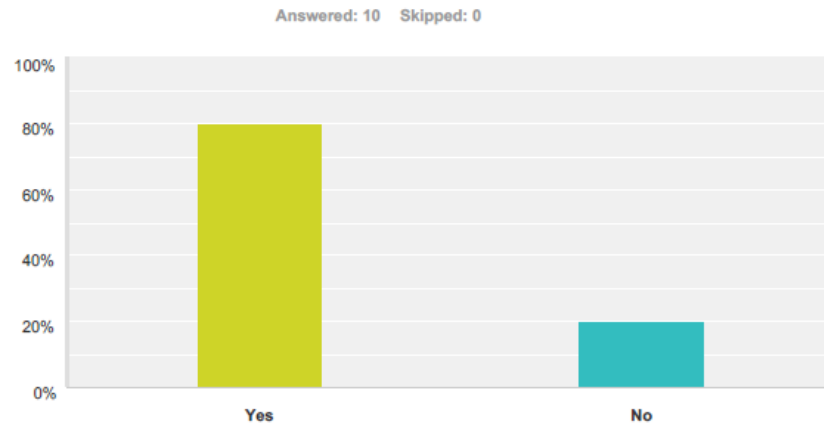
Answer Choices	Responses	
Trade unions	10.00%	1
Health and safety executive	0.00%	0
Health and safety journals	20.00%	2
Local authority	50.00%	5
Industrial network/safety groups	0.00%	0
Head office	20.00%	2
Total		10

Figure 7.11. Health and safety regulations.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, half of the employees suggested health and safety regulations were of the governance of a local authority.

7.3.14 Question 14

The question asked does the company have a formal health and safety policy that describes roles and responsibilities? Fig. 7.12 depicts that of all 10 responses, 80% of respondents suggested Yes and 20% of respondents suggested No.



Answer Choices	Responses	
Yes	80.00%	8
No	20.00%	2
Total		10

Figure 7.12. Health and safety roles and responsibilities.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, the majority of the employees suggested there were health and safety roles and responsibilities.

7.3.15 Question 15

The question asked does the company have a policy that requires written accident/incident reports? Fig. 7.13 depicts that of all 10 responses, 80% of respondents suggested Yes and 20% of respondents suggested No.

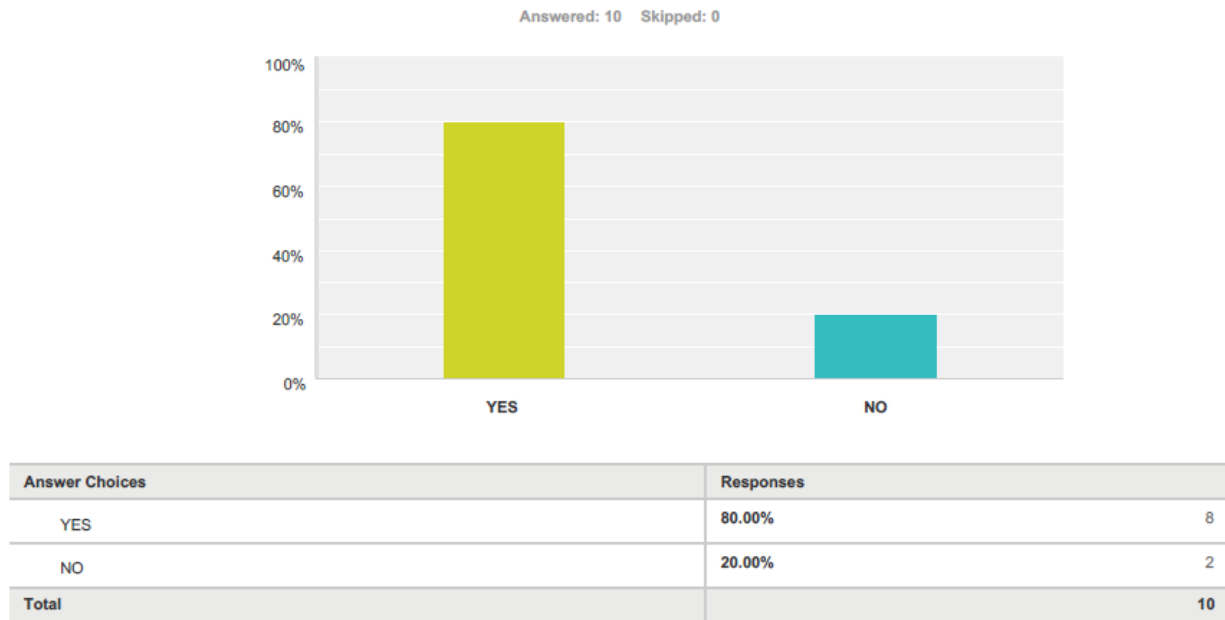
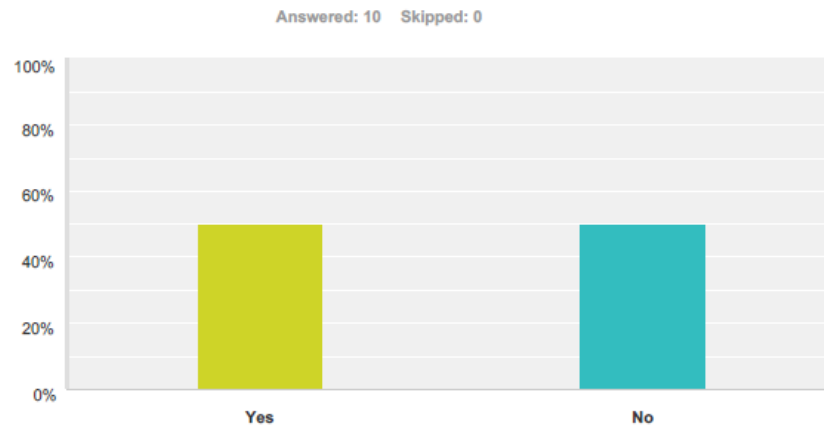


Figure 7.13. Accident/incident reports.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, most of the employees suggested that accident reports were kept.

7.3.16 Question 16

The question asked does the company conduct accident/incident investigations? Fig. 7.14 depicts that of all 10 responses, 50% of respondents suggested Yes and 20% of respondents suggested No.



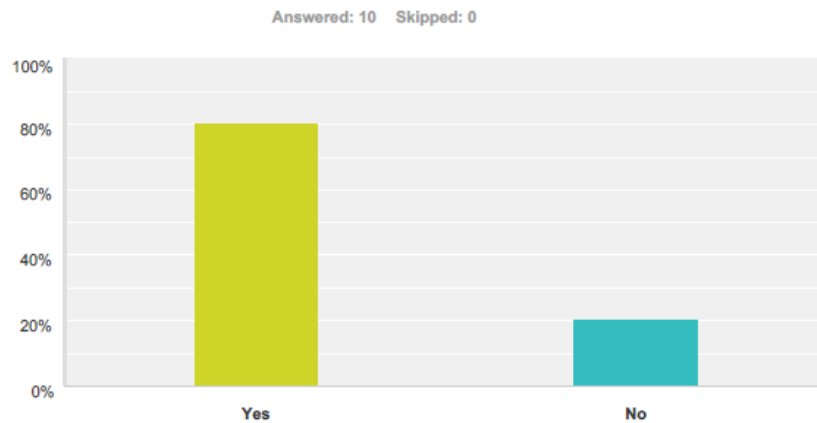
Answer Choices	Responses	
Yes	50.00%	5
No	50.00%	5
Total		10

Figure 7.14. Accident/incident investigations.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, half of the employees suggested that accident and incident investigations took place, likewise half of employees suggested otherwise.

7.3.17 Question 17

The question asked does the company document, investigate and discuss near miss accidents? Fig. 7.15 depicts that of all 10 responses, 80% of respondents suggested Yes and 20% of respondents suggested No



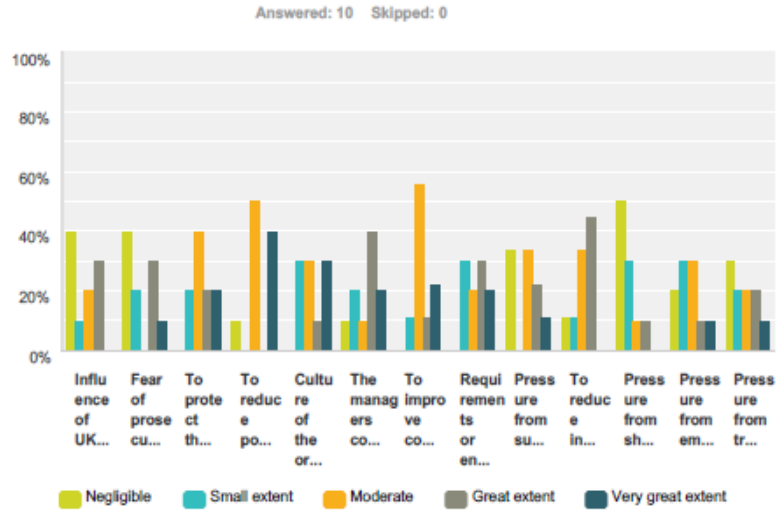
Answer Choices	Responses
Yes	80.00% 8
No	20.00% 2
Total	10

Figure 7.15. Near miss accidents.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, most of the employees suggested that near miss accidents were reported.

7.3.18 Question 18

The question asked how the following contribute to your motivations to manage health and safety effectively? Fig. 7.16 depicts that of all 10 responses, the following was indicated in the table below;

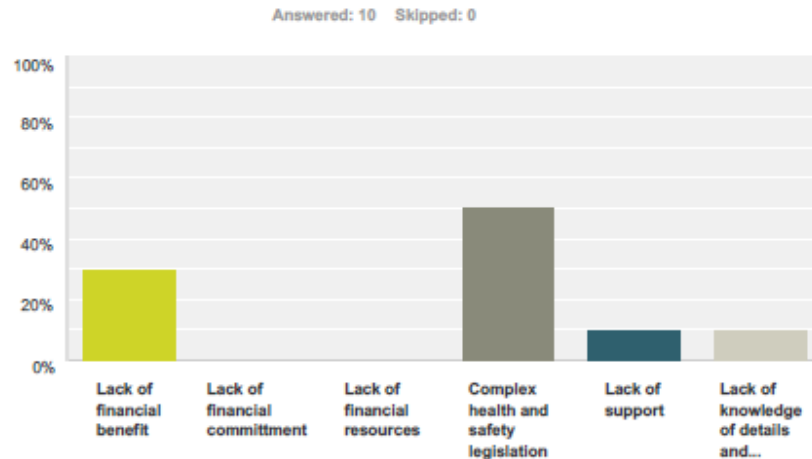


	Negligible	Small extent	Moderate	Great extent	Very great extent	Total	Weighted Average
Influence of UK's current health and safety legislation	40.00% 4	10.00% 1	20.00% 2	30.00% 3	0.00% 0	10	2.40
Fear of prosecution for health and safety offences	40.00% 4	20.00% 2	0.00% 0	30.00% 3	10.00% 1	10	2.50
To protect the company's/industry's reputation	0.00% 0	20.00% 2	40.00% 4	20.00% 2	20.00% 2	10	3.40
To reduce possible health and safety impact posed by the company	10.00% 1	0.00% 0	50.00% 5	0.00% 0	40.00% 4	10	3.60
Culture of the organisation promotes health and safety responsibility	0.00% 0	30.00% 3	30.00% 3	10.00% 1	30.00% 3	10	3.40
The managers commitment to health and safety improvement	10.00% 1	20.00% 2	10.00% 1	40.00% 4	20.00% 2	10	3.40
To improve competitiveness	0.00% 0	11.11% 1	55.56% 5	11.11% 1	22.22% 2	9	3.44
Requirements or encouragement from customers	0.00% 0	30.00% 3	20.00% 2	30.00% 3	20.00% 2	10	3.40
Pressure from suppliers	33.33% 3	0.00% 0	33.33% 3	22.22% 2	11.11% 1	9	2.78
To reduce insurance premium	11.11% 1	11.11% 1	33.33% 3	44.44% 4	0.00% 0	9	3.11
Pressure from shareholders or investors (if applicable)	50.00% 5	30.00% 3	10.00% 1	10.00% 1	0.00% 0	10	1.80
Pressure from employees	20.00% 2	30.00% 3	30.00% 3	10.00% 1	10.00% 1	10	2.60

Figure 7.16. Motivations for health and safety.

7.3.19 Question 19

The question asked of which idea would affect the ability to effectively manage health and safety in the company? Fig. 7.17 depicts that of all 10 responses, 30% of respondents suggested lack of financial benefit, 50% of respondents suggested complex health and safety legislation, 10% of respondents suggested lack of support and 10% suggested lack of knowledge of details and implications.



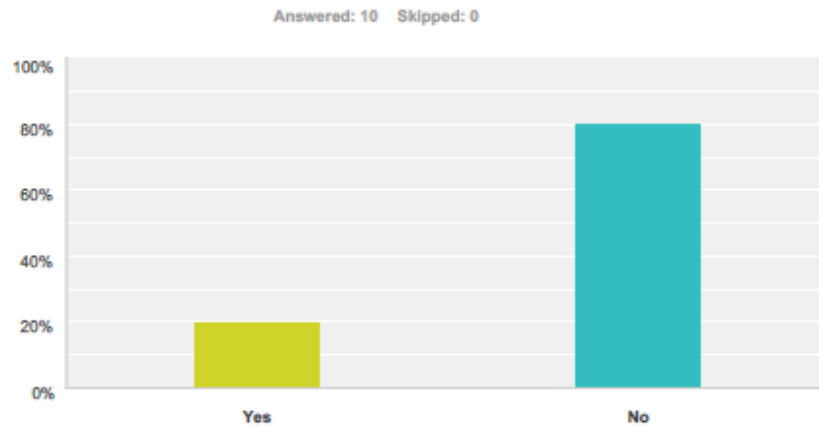
Answer Choices	Responses	
Lack of financial benefit	30.00%	3
Lack of financial commitment	0.00%	0
Lack of financial resources	0.00%	0
Complex health and safety legislation	50.00%	5
Lack of support	10.00%	1
Lack of knowledge of details and implications	10.00%	1
Total		10

Figure 7.17. Management for health and safety.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, half of the employees suggest that complex health and safety legislation affects management.

7.3.20 Question 20

The question asked is your company part of an industry specific partnership that shares good practice? Fig. 7.18 depicts that of all 10 responses, 20% of respondents suggested Yes, and 80% of respondents suggested No.



Answer Choices	Responses	
Yes	20.00%	2
No	80.00%	8
Total		10

Figure 7.18. Industry specific partnership.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, most of the employees suggest that there is no industry specific partnership.

7.3.21 Question 21

The question asked is your company part of a network that shares health and safety good practice or information? Fig. 7.19 depicts that of all 10 responses, 30% of respondents suggested Yes, and 70% of respondents suggested No.

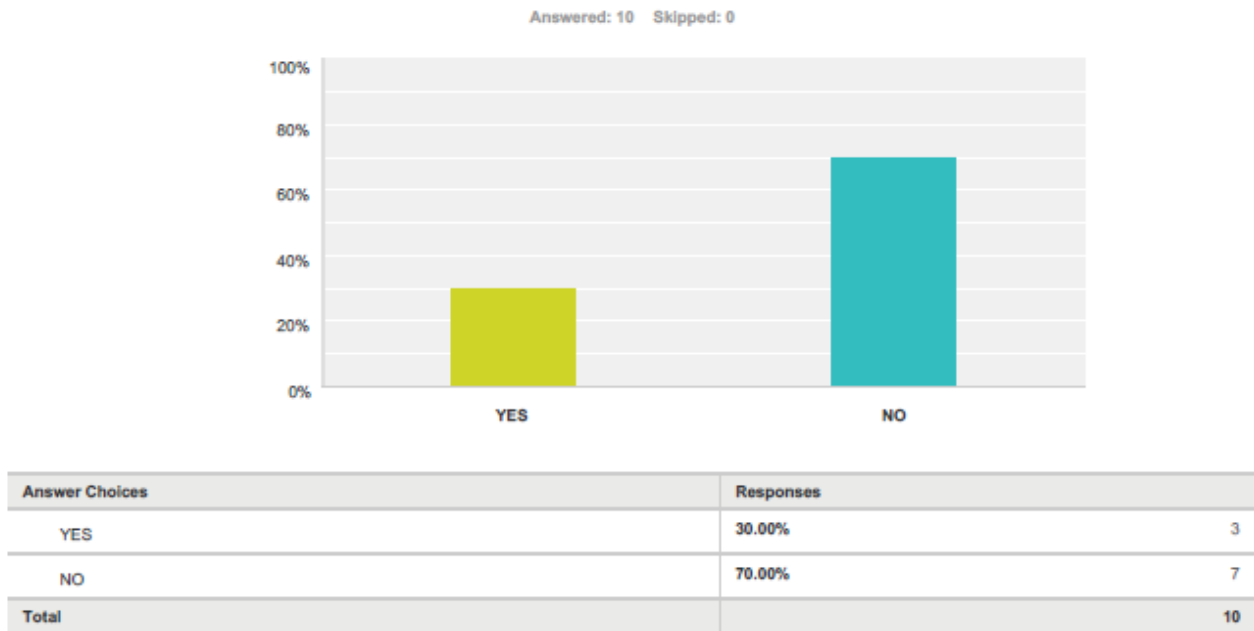
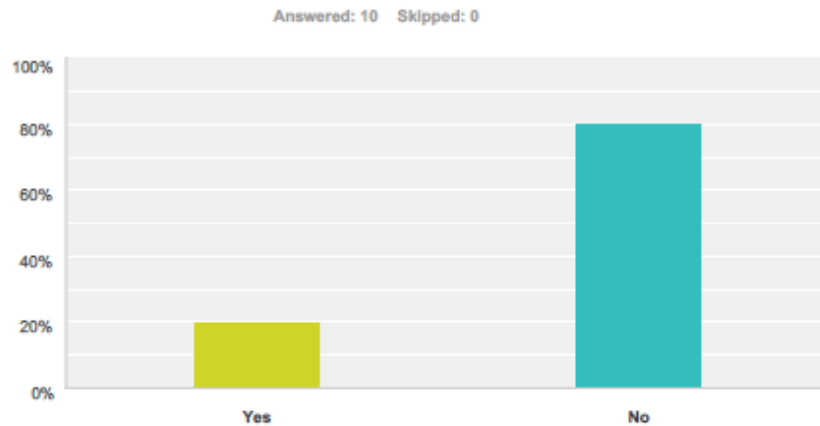


Figure 7.19. Health and safety good practice.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, a significant no. of the employees suggest that there is no network sharing a health and safety good practice.

7.3.22 Question 22

The question asked is your company part of a supply chain initiative that is involved in an active dialogue with stakeholders? Fig. 7.20 depicts that of all 10 responses, 20% of respondents suggested Yes, and 80% of respondents suggested No.



Answer Choices	Responses	
Yes	20.00%	2
No	80.00%	8
Total		10

Figure 7.20. Supply chain initiative.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, most of the employees suggest that there is no such relationship regarding supply chain initiative dialogue with stakeholders.

7.3.23 Question 23

The question asked would your company be interested in participating to improve the health and safety criteria in the company? Fig. 7.21 depicts that of all 10 responses, 70% of respondents suggested Yes, and 30% of respondents suggested No.

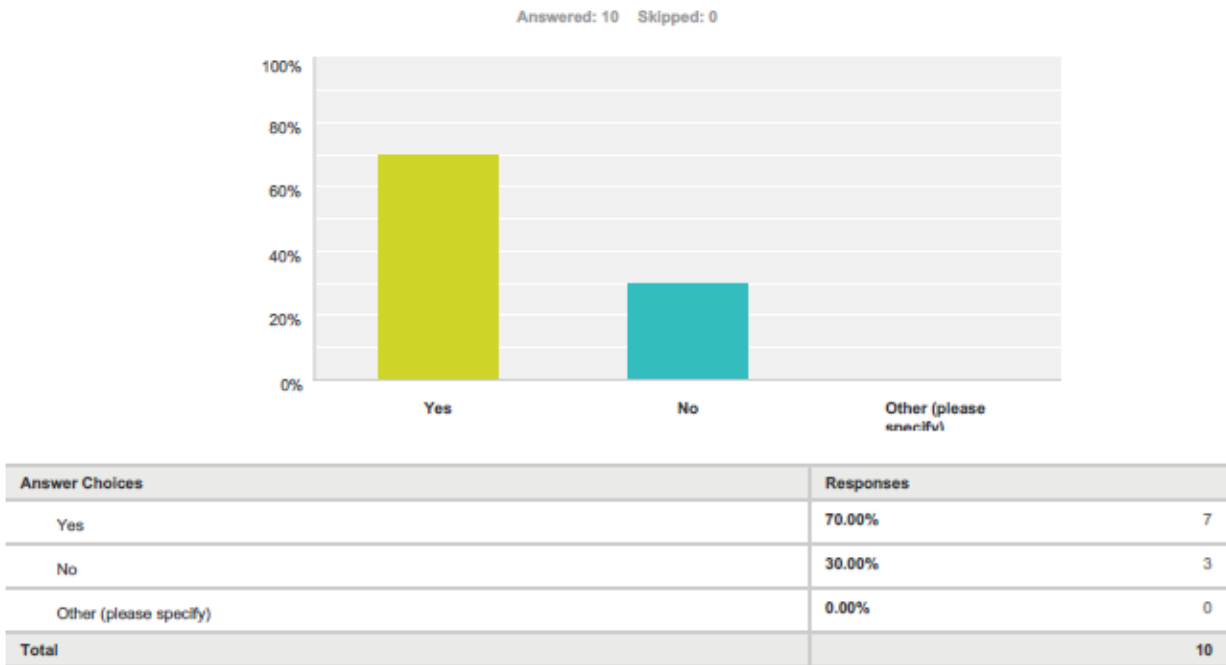


Figure 7.21. Health and safety improvements.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, most of the employees suggest that participation in health and safety improvements would be favorable.

7.3.24 Question 24

The statement suggests “we have received health and safety guidance from our customers”.

Fig. 7.22 depicts that of all 10 responses, 80% of respondents suggested Yes, and 20% of respondents suggested No.

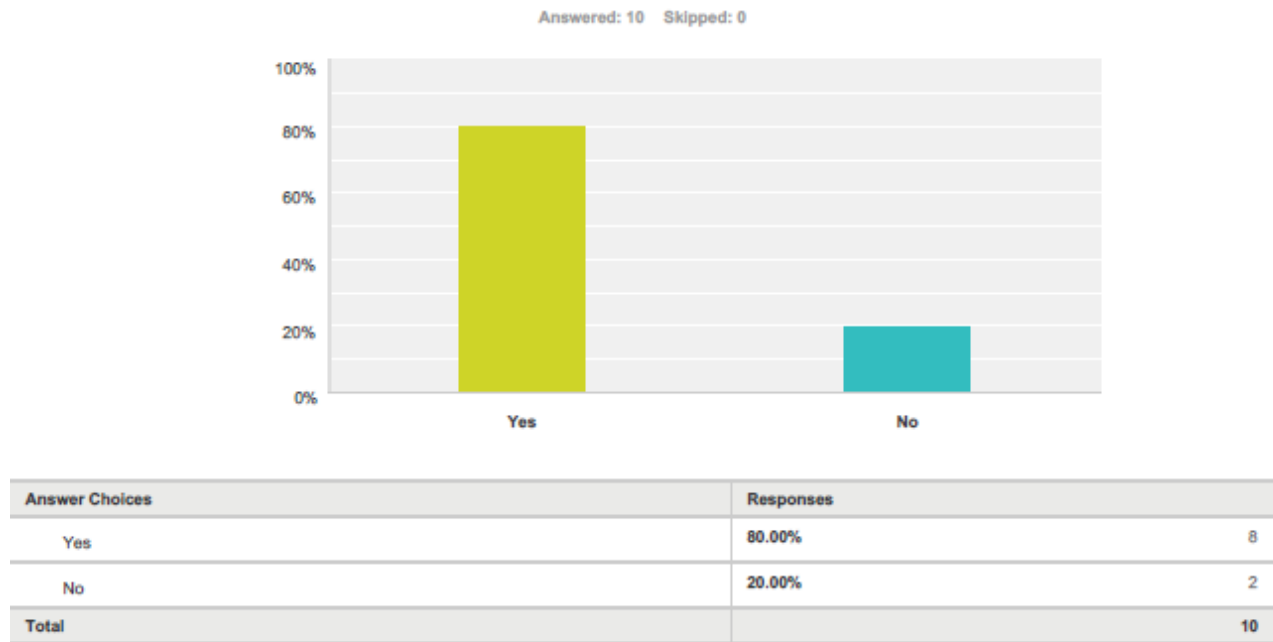


Figure 7.22. Health and safety guidance.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, half of the employees suggest that complex health and safety legislation affects management.

7.3.25 Question 25

The statement suggests “we have benefited from workshops and visits by our customers to educate us on what health and safety improvements can be made”. Fig. 7.23 depicts that of all 10 responses, 30% of respondents suggested Yes, and 70% of respondents suggested No.

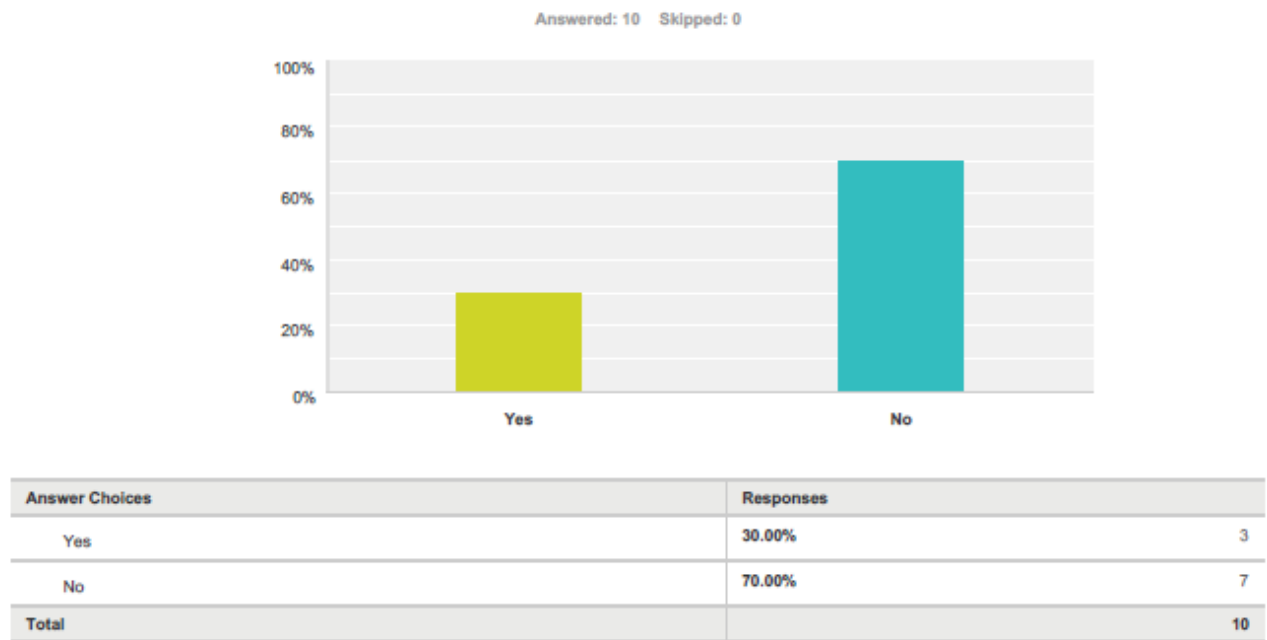


Figure 7.23. Health and safety improvements.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, most of the employees suggest that there have been no health and safety improvements.

7.3.26 Question 26

The question asked how many suppliers does your company have?. Fig. 7.24 depicts that of all 10 responses, 40% of respondents suggested 1-9 suppliers, 40% of respondents suggested 10-19 suppliers and 20% of respondents suggested 20-29 suppliers.

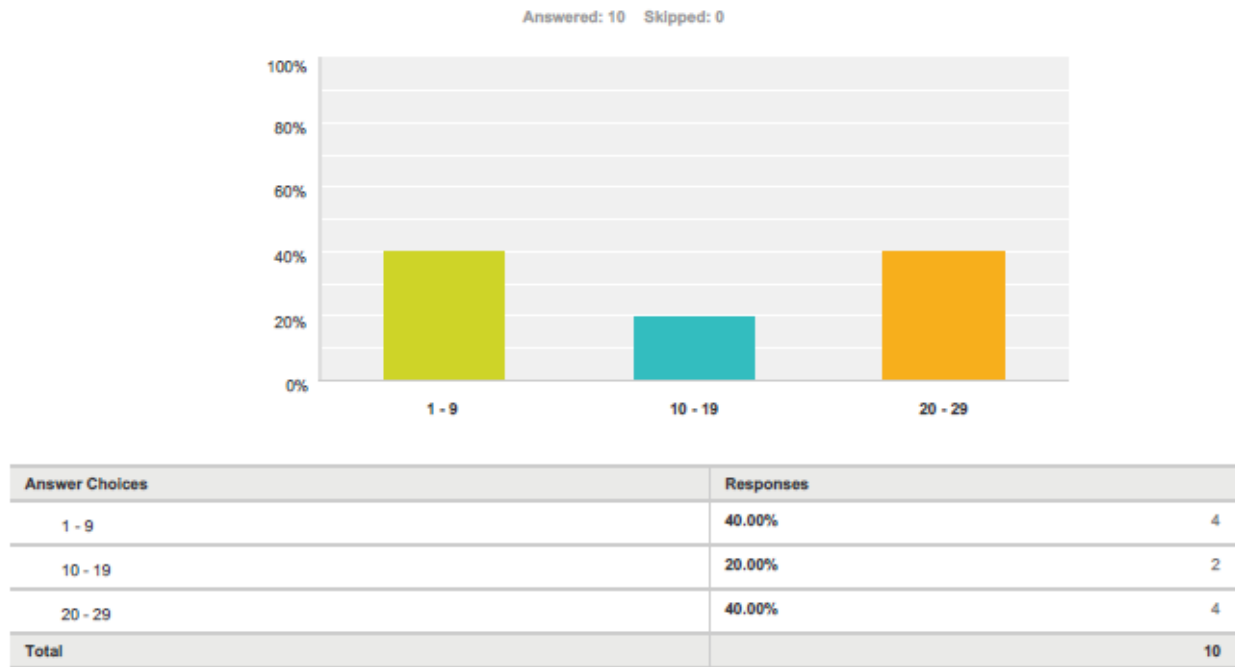


Figure 7.24. No.of suppliers.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, nearly half of the employees suggest that they know their suppliers, and nearly half don't know who their suppliers are.

7.3.27 Question 27

The statement suggests “we assess the health and safety standard and performance of our suppliers informally in our assessment process”. Fig. 7.25 depicts that of all 10 responses, 90% of respondents agreed and 10% of respondents did not agree.

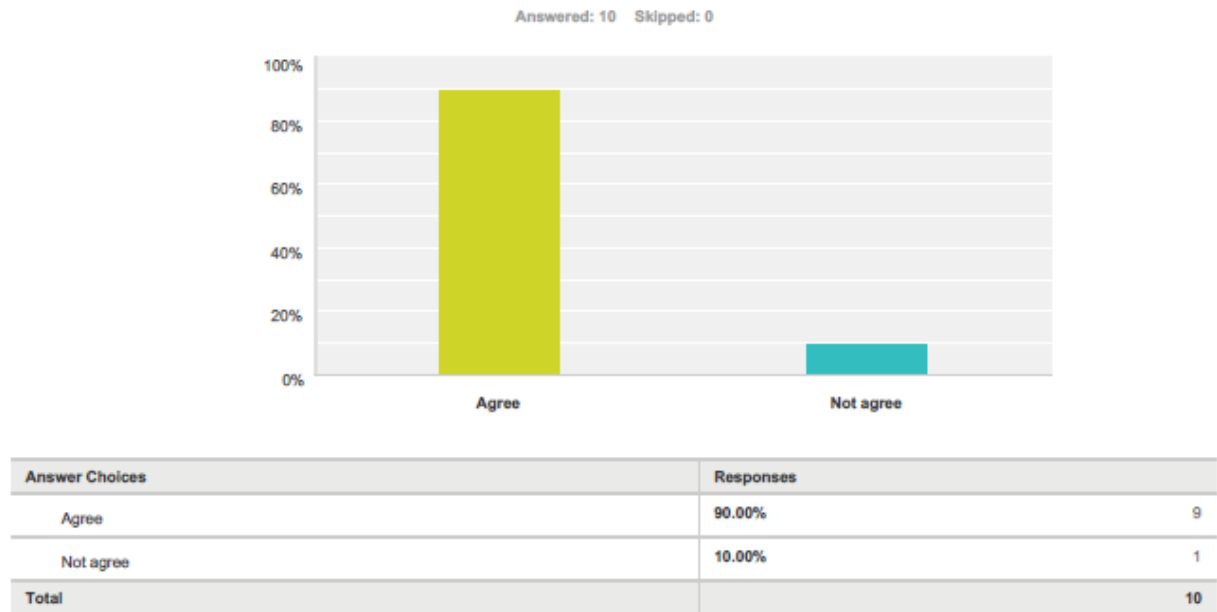
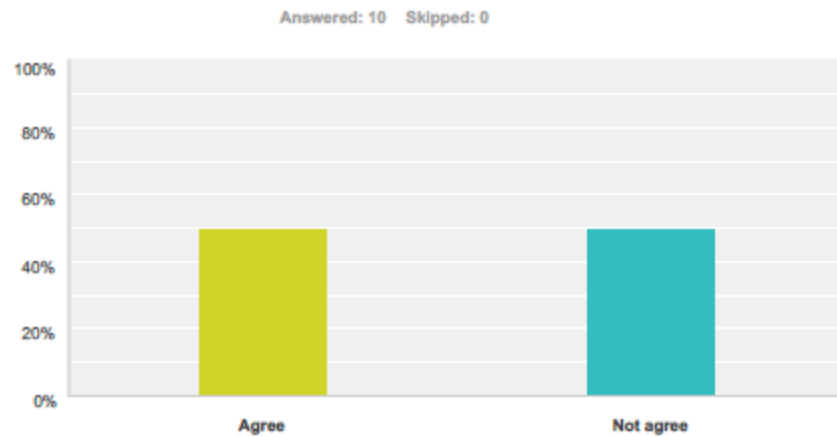


Figure 7.25. Health and safety standard and performance.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, most of the employees suggest that health and safety assessments on suppliers are carried out.

7.3.28 Question 28

The statement suggests “we assess the health and safety standard and performance of our suppliers in a formal process”. Fig. 7.26 depicts that of all 10 responses, 50% of respondents agreed and 50% of respondents did not agree



Answer Choices	Responses	
Agree	50.00%	5
Not agree	50.00%	5
Total		10

Figure 7.26. Health and safety standard and performance.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, half of the employees suggest that they are aware of such assessments on performance, half of the employees are not aware.

7.3.29 Question 29

The statement suggests “we set health and safety criteria that our suppliers meet”. Fig. 7.27 depicts that of all 10 responses, 20% of respondents agreed and 80% of respondents did not agree.

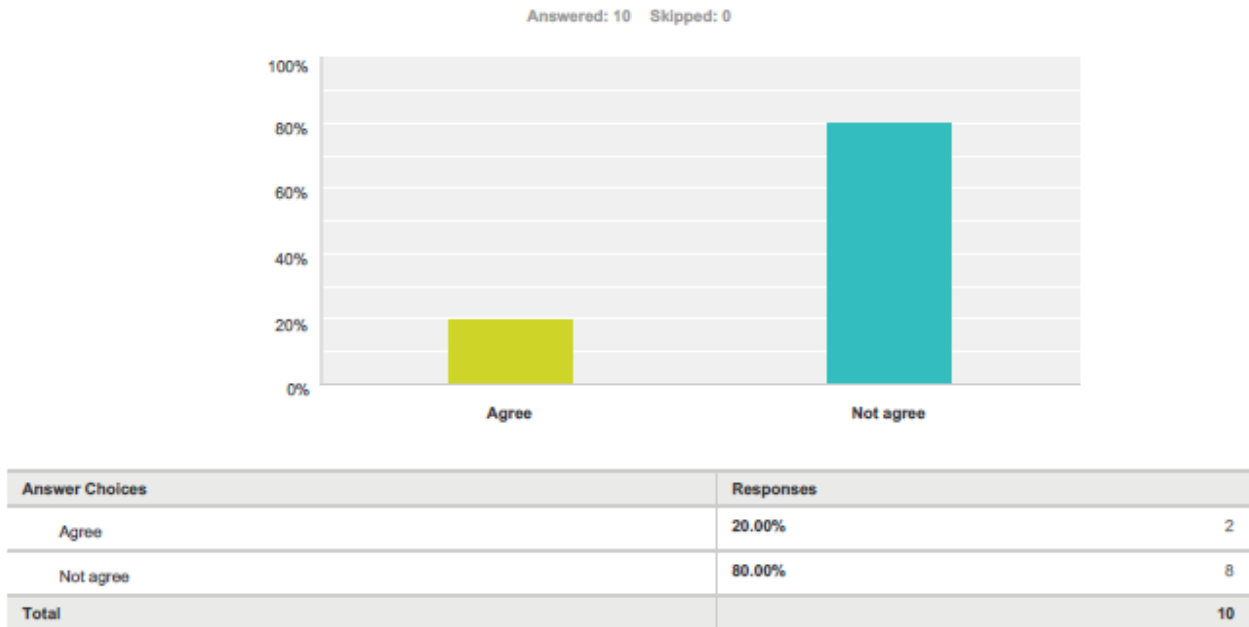
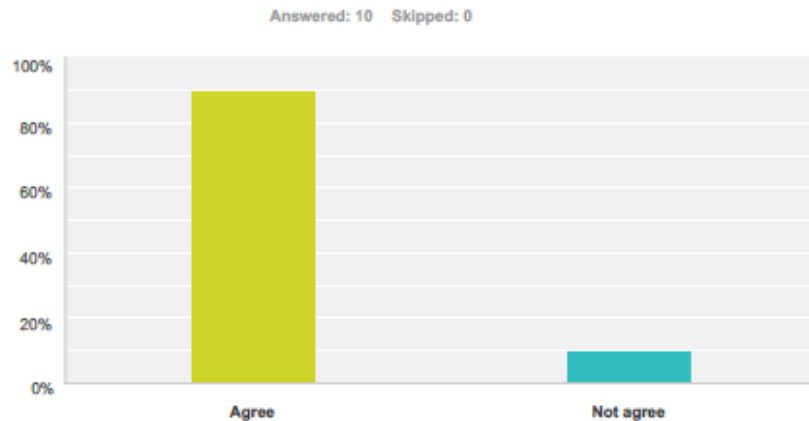


Figure 7.27. Health and safety criteria for suppliers.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, most of the employees suggest non agreement to health and safety criteria for suppliers.

7.3.30 Question 30

The statement suggests “health and safety performance forms part of our sub-contract position”. Fig. 7.28 depicts that of all 10 responses, 90% of respondents agreed and 10% of respondents did not agree.



Answer Choices	Responses
Agree	90.00% 9
Not agree	10.00% 1
Total	10

Figure 7.28. Health and safety performance.

The above figure shows and depicts data given from the questionnaire given carried out within the research. It would suggest that for the majority of businesses approached, most of the employees suggest that health and safety performance is an important part to any sub-contracting position the company may have.

7.3.31 Question 31

The statement suggests “in choosing our suppliers, health and safety performance rates as highly as cost”. Fig. 7.29 depicts that of all 10 responses, 70% of respondents agreed and 30% of respondents did not agree.

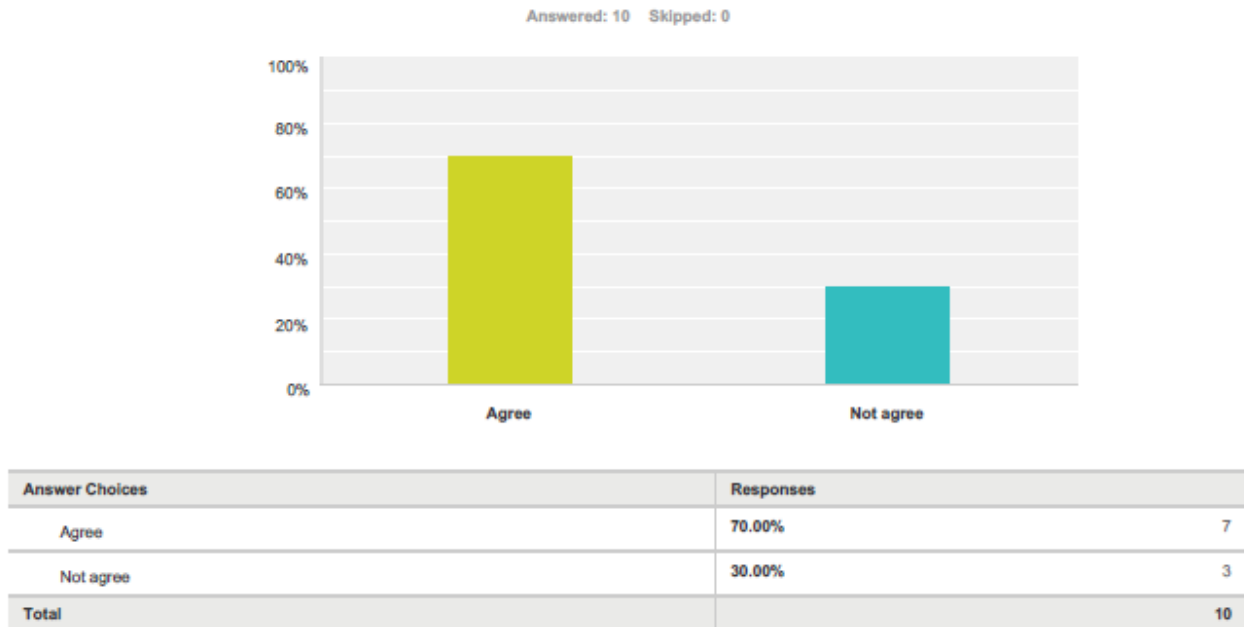


Figure 7.29. Health and safety performance.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses approached, well over half of the employees suggest that health and safety performance is as important as cost.

Summary

The results shown and depicted in figures shown from 1 - 31, indicate and give an account of health and safety practices within the construction industry. It can be seen that many employees are not aware of which legislation is of the most importance to their environments, or indeed who is responsible generally for the implementation of the appropriate legislation required in their part of the construction industry. It can also be seen that the majority of respondents would be positive about further participation in gaining a better awareness of health and safety legislation, to improve productivity and strategy within the industry.

7.4 Analysis of questionnaire - Results from questionnaire Pt.2

7.4.1 Question 1 - Vetting bidders for contracts

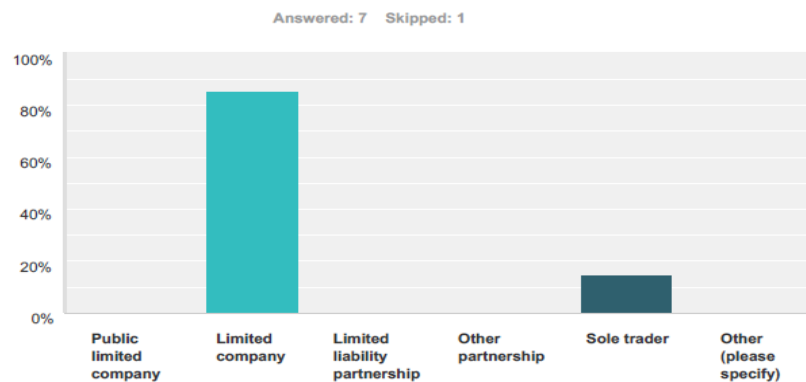
The question asked the name of the company. For the purposes of this study, company names will remain anonymous, as depicted in the questionnaire, see appendix C.

7.4.2 Question 2

The question asked the name of the parent company. For the purposes of this study, company names will remain anonymous, as depicted in the questionnaire, see appendix C.

7.4.3 Question 3

The question asked of what is the type of your organisation? Fig. 7.30 depicts that of 7 responses, 85.71% of respondents suggested it is a limited company and 14.29% of respondents suggested it is a sole trader.



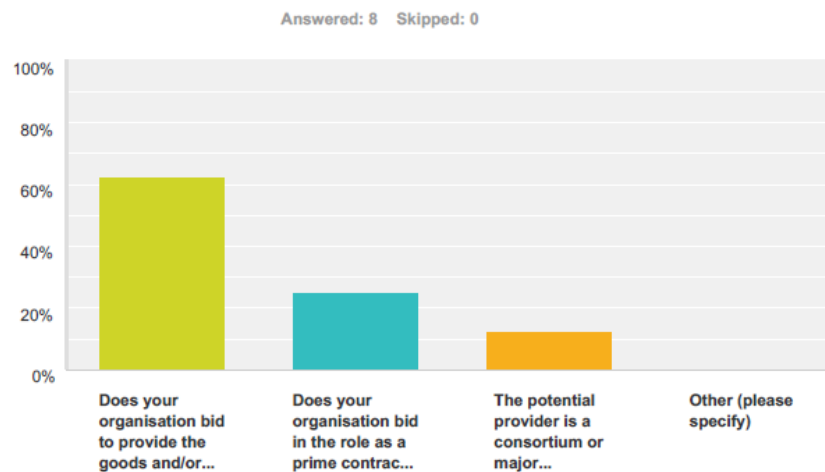
Answer Choices	Responses
Public limited company	0.00% 0
Limited company	85.71% 6
Limited liability partnership	0.00% 0
Other partnership	0.00% 0
Sole trader	14.29% 1
Other (please specify)	0.00% 0
Total	7

Figure 7.30. Type of organisation.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses approached, the majority of employees suggest that they understand what type of organisation they are employed by.

7.4.4 Question 4

The question asked about sub-contracting. Fig. 7.31 depicts that of 8 responses, 62.50% of respondents suggested that the organisation bids to provide goods and services by itself, 25% of respondents suggest that the organisation bids in the role as a prime contractor and intends to use third parties to provide some of the goods and/or services, and 12.5% of respondents suggest that the potential provider is a consortium or major stakeholder.



Answer Choices	Responses
Does your organisation bid to provide the goods and/or services required itself.	62.50% 5
Does your organisation bid in the role as a prime contractor and intends to use third parties to provide some of the goods and/or services.	25.00% 2
The potential provider is a consortium or major stakeholder.	12.50% 1
Other (please specify)	0.00% 0
Total	8

Figure 7.31. Sub-contracting.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses approached, over half of the employees suggest that their organisation bids to provide goods and services.

7.4.5 Question 5

The question asked that is there any awareness of members of staff who through their association with key stakeholders could influence any of the decisions in relation to a contract, in particular throughout the tendering process? Fig. 7.32 depicts that of 7 responses, 100% of respondents suggested No.

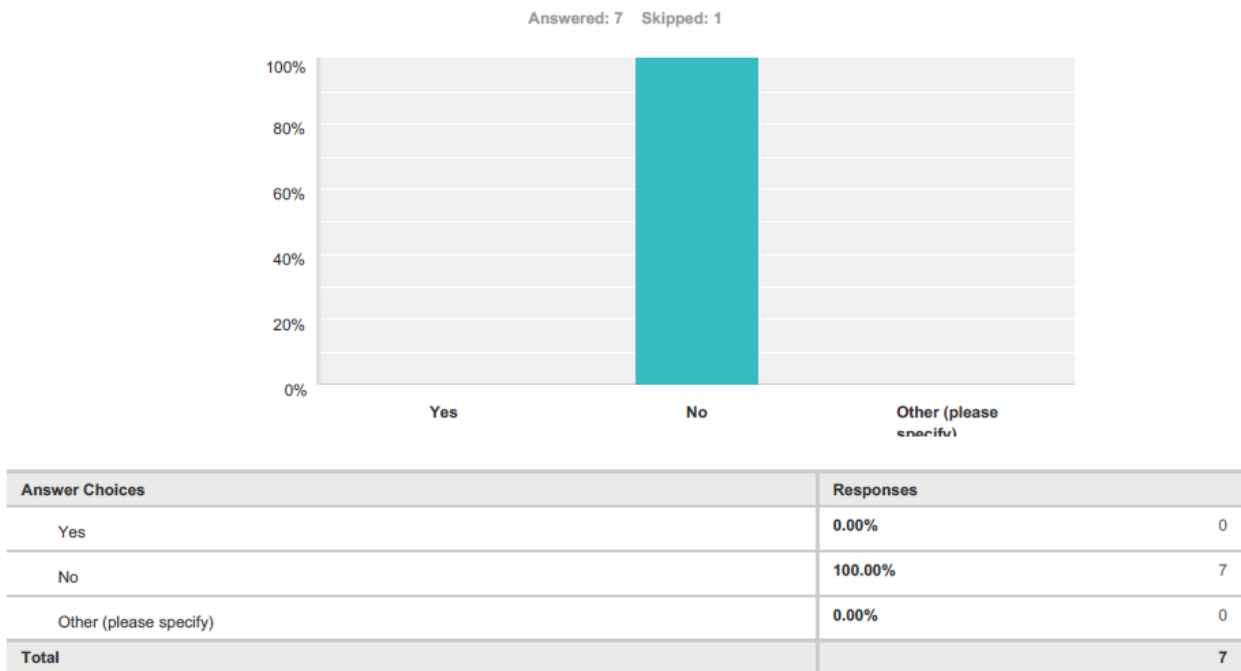


Figure 7.32. Stakeholder association.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, all of the employees suggest that they have no awareness of stakeholder association.

7.4.6 Question 6

The question asked that has the organisation ever had default notices or liquidated damages imposed of any contract within the last 5 years? Fig.7.33 depicts that of 7 responses, 14.29% of respondents suggested Yes and 85.71% of respondents suggested No.



Answer Choices	Responses
Yes	14.29% 1
No	85.71% 6
Other (please specify)	0.00% 0
Total	7

Figure 7.33. Default notices.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, most of the employees suggest that they did not know of any default notices against the company.

7.4.7 Question 7

The question asked that has the organisation ever had a contract terminated or its employment determined under the terms of any contract within the last 5 years? Fig.7.34 depicts that of 7 responses, 100% of respondents suggested No.

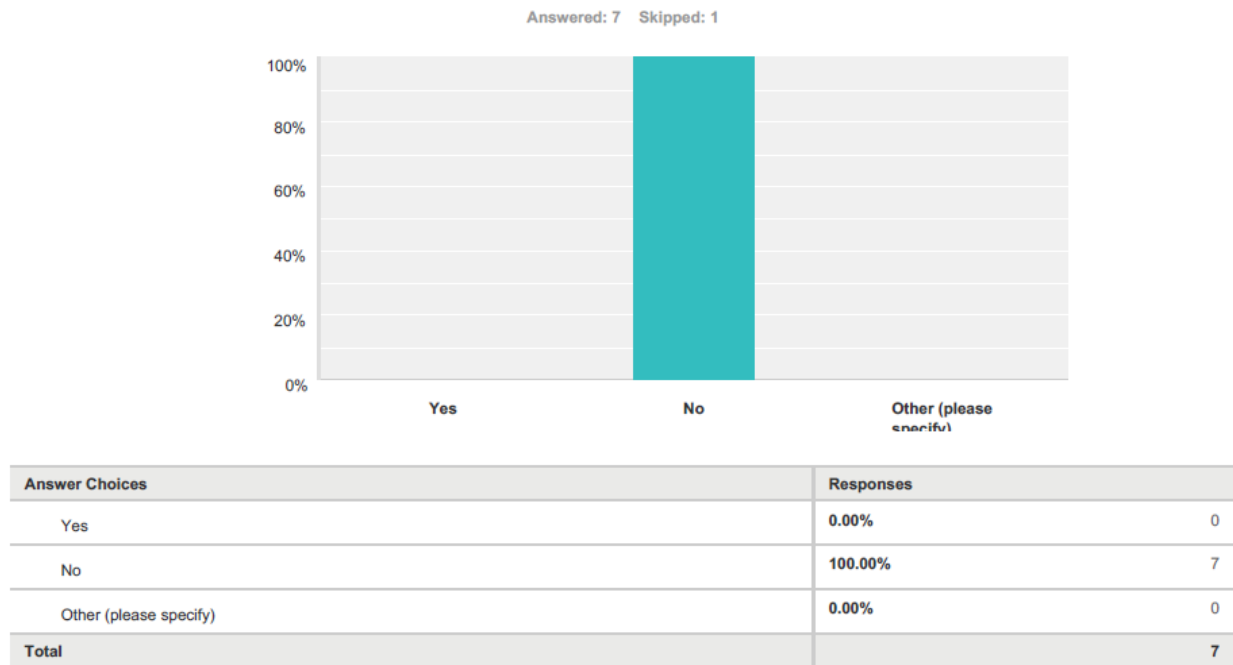


Figure 7.34. Contract termination.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, all of the employees suggest that they have no awareness of any contract termination

7.4.8 Question 8

The question asked that has the organisation ever withdrawn from a contract within the last 5 years? Fig.7.35 depicts that of 8 responses, 25% of respondents suggested Yes and 75% of respondents suggested No.

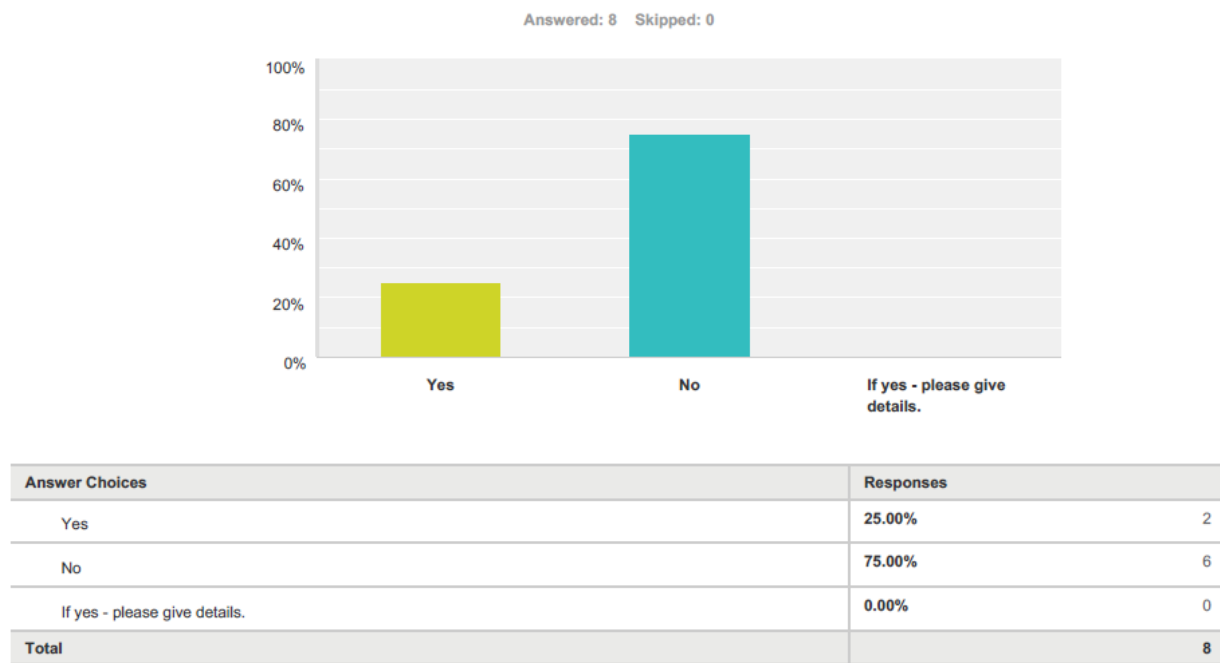
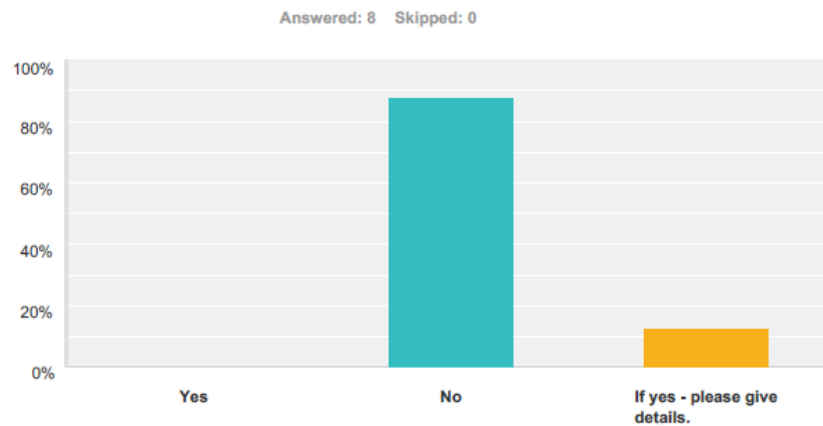


Figure 7.35. Contract withdrawal.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, most of the employees suggest that they have no awareness of any contract withdrawal.

7.4.9 Question 9

The question asked that is there pending or threatened or has there been any material litigation or other legal proceedings in the last 5 years? Fig.7.36 depicts that of 8 responses, 12.5% of respondents suggested Yes and 87.5% of respondents suggested No.



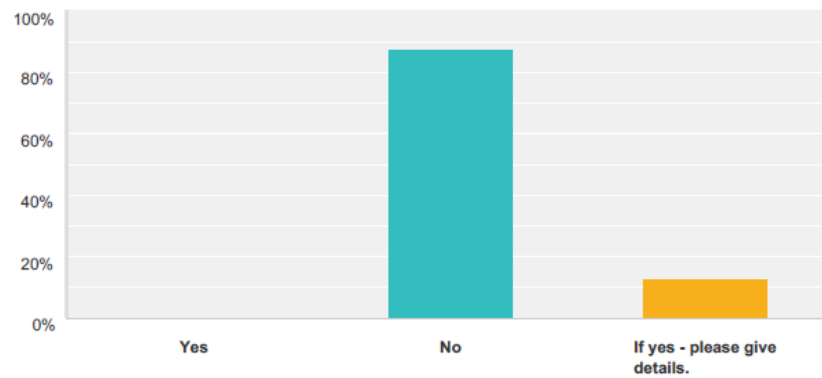
Answer Choices	Responses	
Yes	0.00%	0
No	87.50%	7
If yes - please give details.	12.50%	1
Total		8

Figure 7.36. Legal proceedings.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, most of the employees suggest that they have no awareness of any legal proceedings.

7.4.10 Question 10

The question asked that has the organisation ever been in dispute within any public sector body within the last 5 years? Fig.7.37 depicts that of 8 responses, 12.5% of respondents suggested Yes and 87.5% of respondents suggested No.



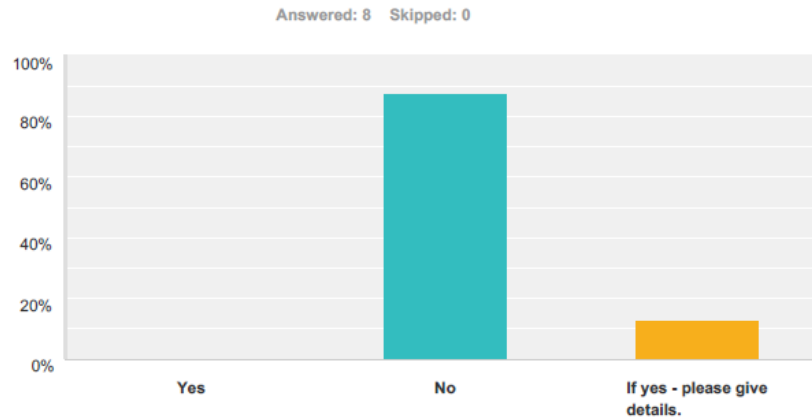
Answer Choices	Responses	
Yes	0.00%	0
No	87.50%	7
If yes - please give details.	12.50%	1
Total		8

Figure 7.37. Disputes.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a majority of the employees suggest that they have no awareness of any disputes.

7.4.11 Question 11

The question asked that has the organisation ever been in dispute within any public sector body under 5 years? Fig.7.38 depicts that of 8 responses, 12.5% of respondents suggested Yes and 87.5% of respondents suggested No.



Answer Choices	Responses	
Yes	0.00%	0
No	87.50%	7
If yes - please give details.	12.50%	1
Total		8

Figure 7.38. Disputes.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a majority of the employees suggest that they have no awareness of any disputes.

7.4.12 Question 12

The question asked to state names of any public regulatory body, safety or trade companies which your company is associated to? It depicts that of 6 responses, all parties declined to answer.

7.4.13 Question 13

The question asked that what vetting procedures are in place when selecting contractors for work? Individual answers were given.

7.4.14 Question 14 - The monitoring of procurement

The question asked that does the organisation have a procurement department? Fig.7.39 depicts that of 8 responses, 62.5% of respondents suggested Yes and 37.5% of respondents suggested No.

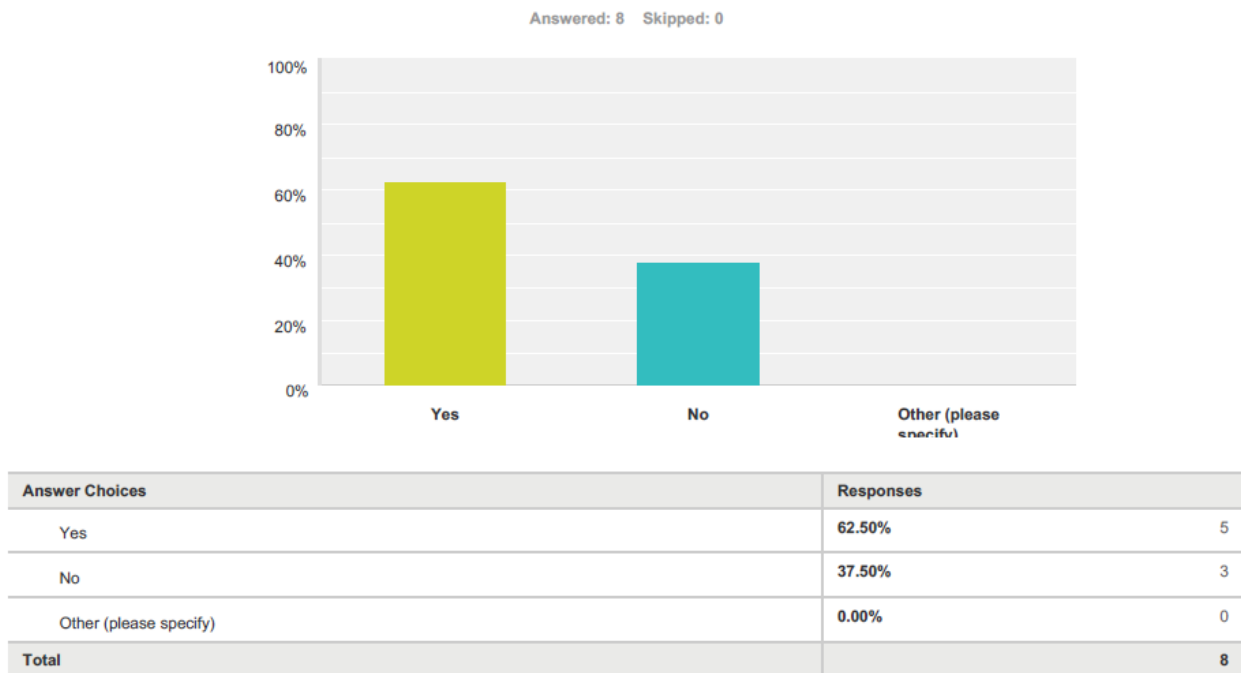
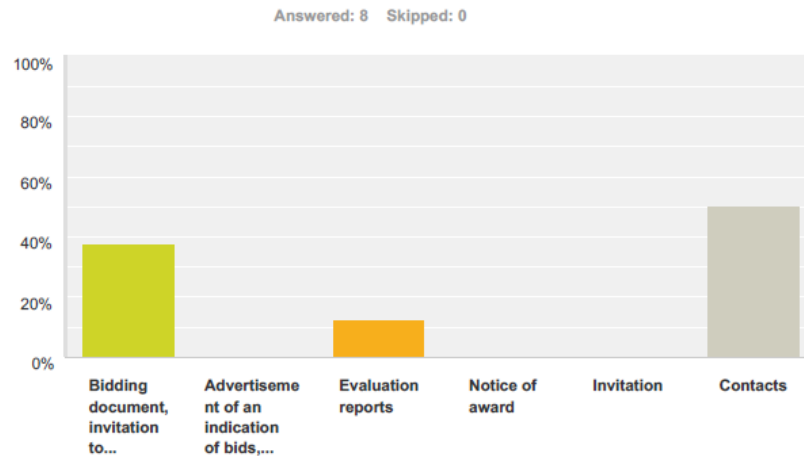


Figure 7.39. Procurement.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, over half of the employees suggest that there is a construction department within the company.

7.4.15 Question 15

The question asked that if “Yes” to Q.14, which group of actions would require approval? Fig.7.40 depicts that of 8 responses, 37.5% of respondents suggested bidding document, invitation to pre-qualify or request from proposal, 12.5% of respondents suggested evaluation reports and 50% of respondents suggested contacts.



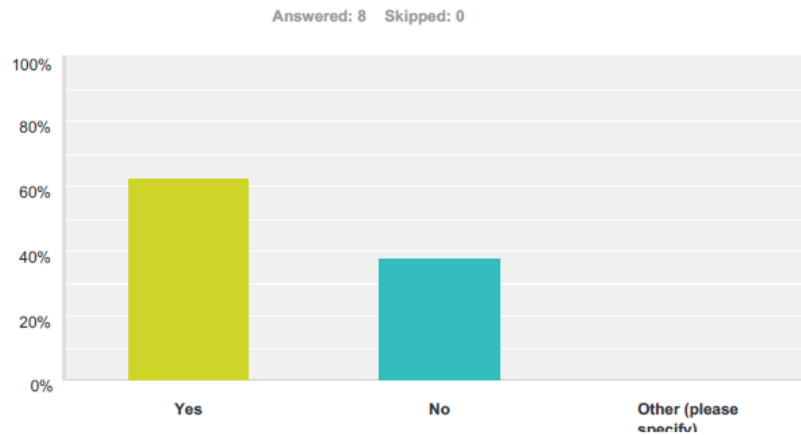
Answer Choices	Responses
Bidding document, invitation to pre-qualify or request fro proposal	37.50% 3
Advertisement of an indication of bids, pre-qualification or call for expression of interest	0.00% 0
Evaluation reports	12.50% 1
Notice of award	0.00% 0
Invitation	0.00% 0
Contacts	50.00% 4
Total	8

Figure 7.40. Approval of actions.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, half of the employees suggest that contacts would be more beneficial to aid the bidding approval process and procurement department.

7.4.16 Question 16

The question asked that does the organisation aim at certain contractors for procurement? Fig 7.41 depicts that of 8 responses, 62.5% of respondents suggested Yes and 37.5% of respondents suggested No.



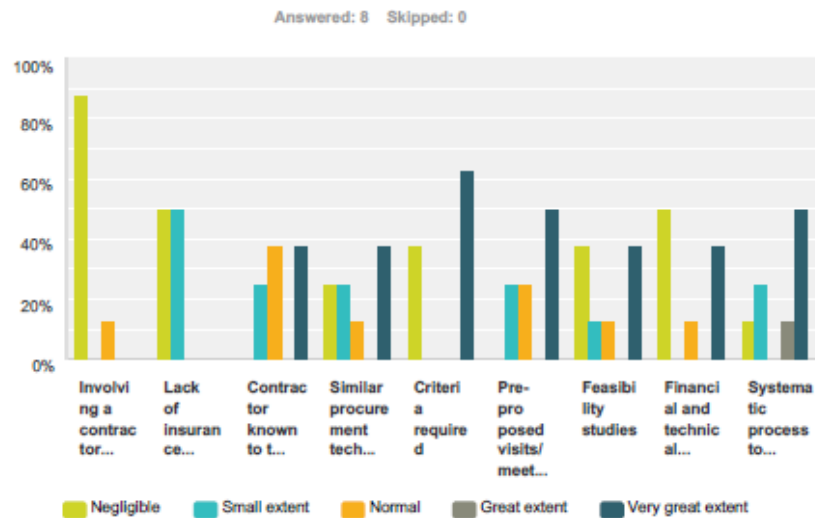
Answer Choices	Responses	Count
Yes	62.50%	5
No	37.50%	3
Other (please specify)	0.00%	0
Total		8

Figure 7.41. Procurement action.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, over half of the employees suggest that the company aims at specific contractors during the procurement process.

7.4.17 Question 17

The question asked that would the organisations procurement strategy involve areas as indicated? Fig. 7.42 depicts that of 8 responses, the following was indicated in the table below.



	Negligible	Small extent	Normal	Great extent	Very great extent	Total	Weighted Average
Involving a contractor with a past credit history	87.50% 7	0.00% 0	12.50% 1	0.00% 0	0.00% 0	8	1.25
Lack of Insurance indemnity	50.00% 4	50.00% 4	0.00% 0	0.00% 0	0.00% 0	8	1.50
Contractor known to the business	0.00% 0	25.00% 2	37.50% 3	0.00% 0	37.50% 3	8	3.50
Similar procurement techniques	25.00% 2	25.00% 2	12.50% 1	0.00% 0	37.50% 3	8	3.00
Criteria required	37.50% 3	0.00% 0	0.00% 0	0.00% 0	62.50% 5	8	3.50
Pre-proposed visits/meetings	0.00% 0	25.00% 2	25.00% 2	0.00% 0	50.00% 4	8	3.75
Feasibility studies	37.50% 3	12.50% 1	12.50% 1	0.00% 0	37.50% 3	8	2.88
Financial and technical proposals	50.00% 4	0.00% 0	12.50% 1	0.00% 0	37.50% 3	8	2.75
Systematic process to identify procurement requirement	12.50% 1	25.00% 2	0.00% 0	12.50% 1	50.00% 4	8	3.63

Figure 7.42. Procurement strategy.

7.4.18 Question 18

The question asked what percentage of the business is with private, public or government departments?

It depicts that of 8 responses, the following was indicated in the table below.

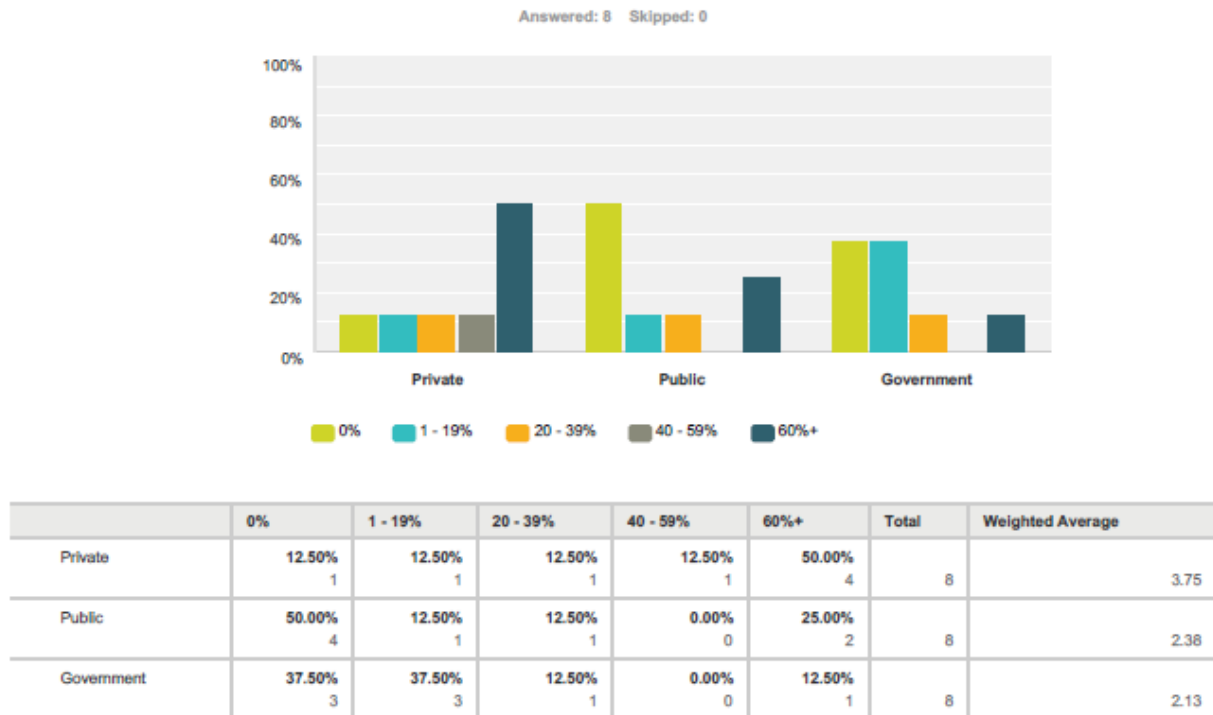


Figure 7.43. Business type.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a general consensus by the employees suggest that they involve business and contracting with many business and organisational types.

7.4.19 Question 19

The question asked that does the organisation participate in company collaboration? Fig. 7.44 depicts that of 8 responses, 37.5% of respondents suggested Yes and 62.5% of respondents suggested No.

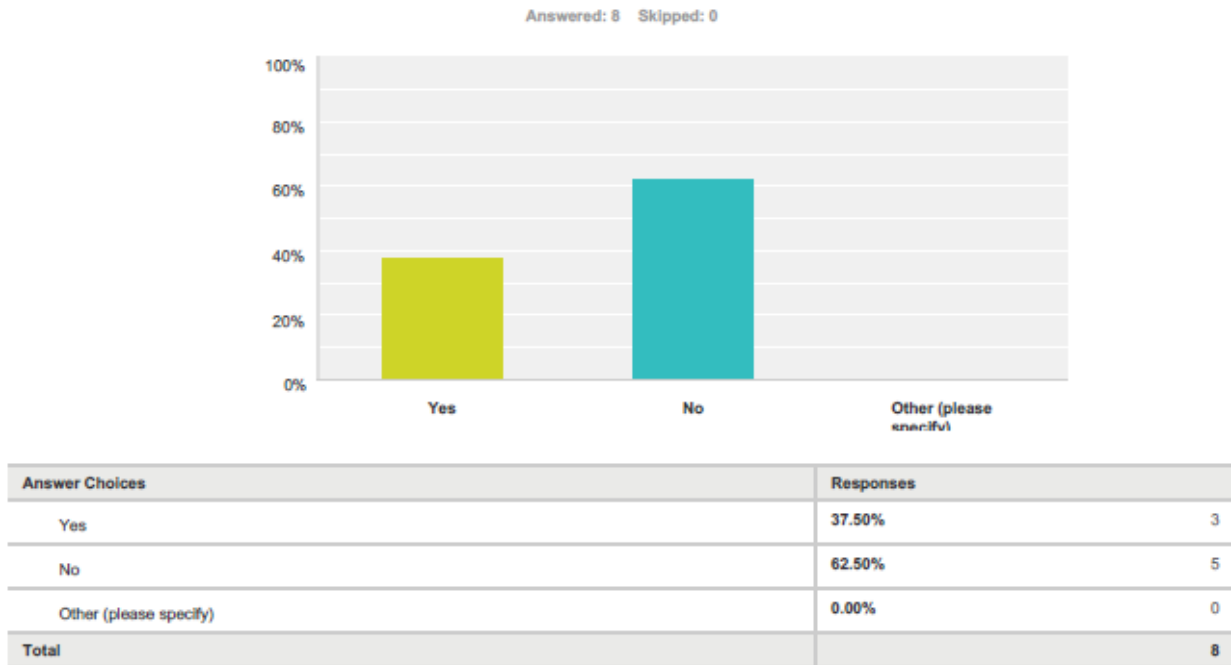
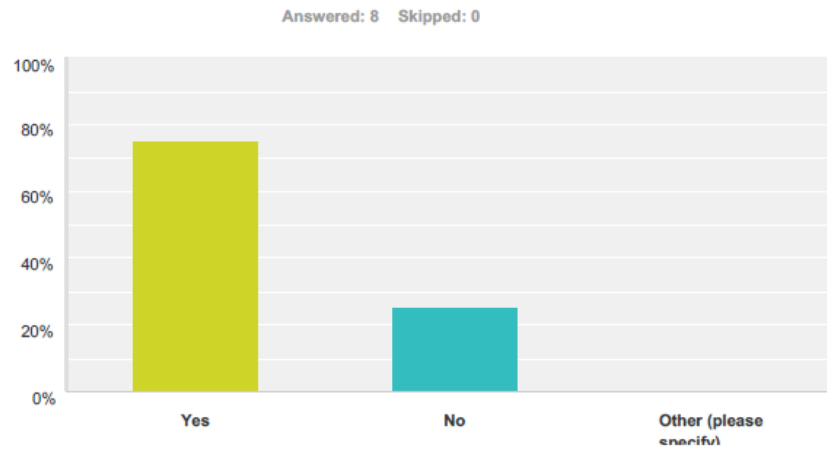


Figure 7.44. Company collaboration.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, over half of the employees suggest that they have no collaboration with other companies.

7.4.20 Question 20

The question asked that does the organisation ever consider receiving a cheaper price from a prospective company? Fig.7.45 depicts that of 8 responses, 75% of respondents suggested Yes and 25% of respondents suggested No.



Answer Choices	Responses
Yes	75.00% 6
No	25.00% 2
Other (please specify)	0.00% 0
Total	8

Figure 7.45. Prices.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a majority of the employees suggest that the company does consider cheaper prices from other organisations.

7.4.21 Question 21 - Financial and legal implications with construction accidents

The question asked that does the company ever operate and understand financial and legal implications for accidents? Fig. 7.46 depicts that of 7 responses, 85.71% of respondents suggested Yes and 14.29% of respondents suggested None.

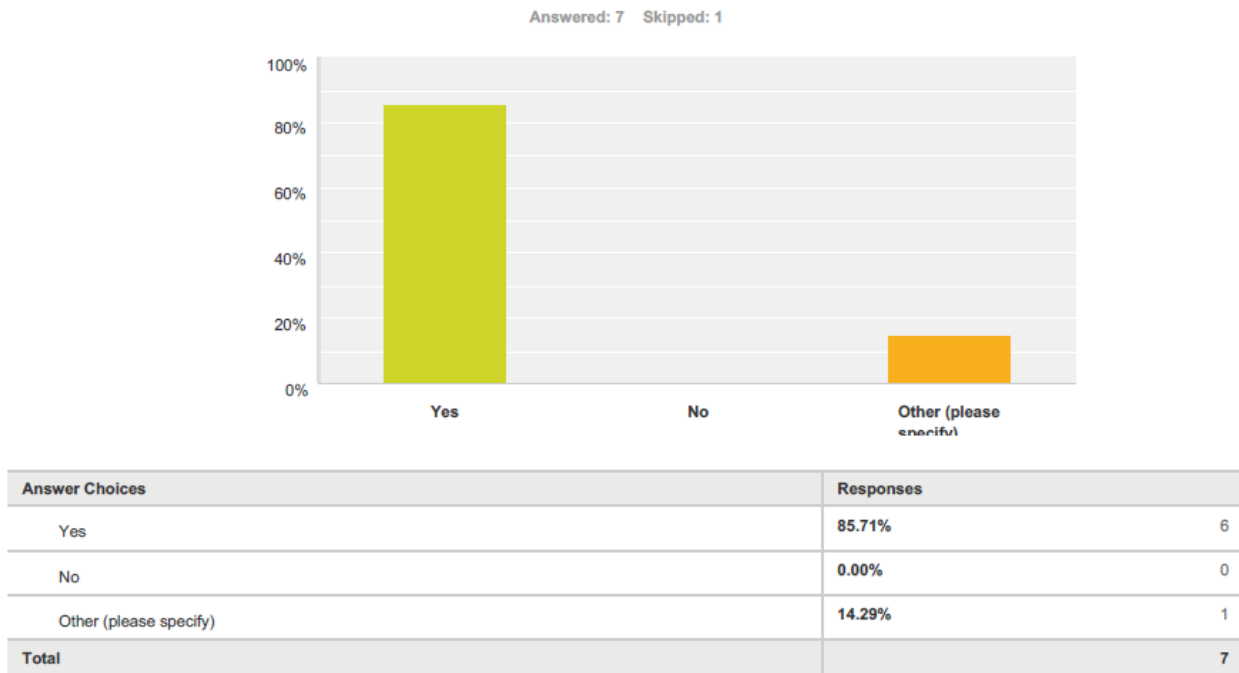
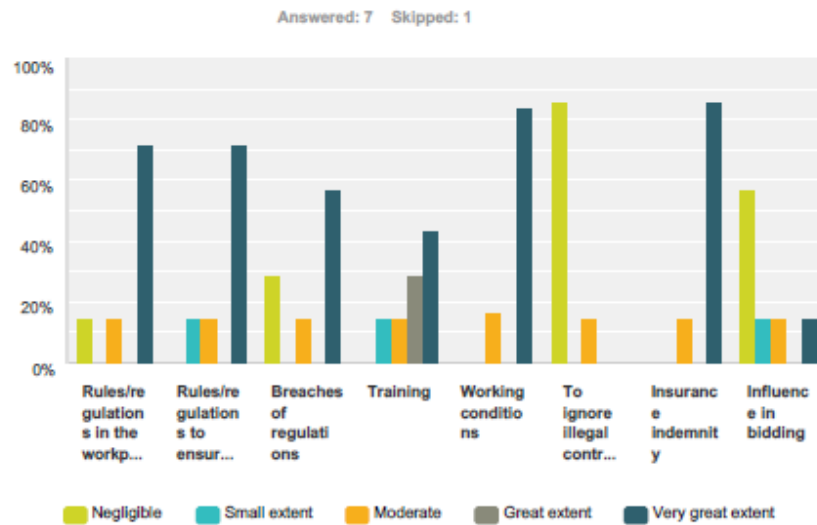


Figure 7.46. Financial and legal implications.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a majority of the employees suggest that they know the company operates a policy for financial and legal incidents.

7.4.22 Question 22

The question asked that within a legal framework, what would you think as a company, the remit of health and safety in construction? Fig.7.47 depicts that of 7 responses, the following was indicated in the table below.

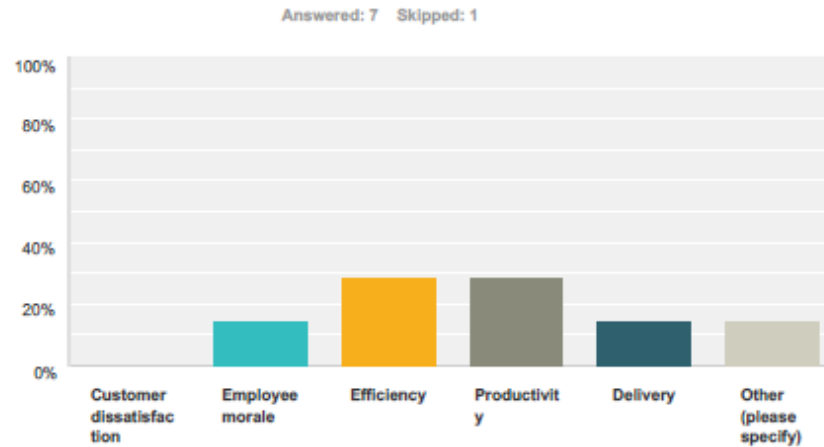


	Negligible	Small extent	Moderate	Great extent	Very great extent	Total	Weighted Average
Rules/regulations in the workplace	14.29% 1	0.00% 0	14.29% 1	0.00% 0	71.43% 5	7	4.14
Rules/regulations to ensure general wellbeing	0.00% 0	14.29% 1	14.29% 1	0.00% 0	71.43% 5	7	4.29
Breaches of regulations	28.57% 2	0.00% 0	14.29% 1	0.00% 0	57.14% 4	7	3.57
Training	0.00% 0	14.29% 1	14.29% 1	28.57% 2	42.86% 3	7	4.00
Working conditions	0.00% 0	0.00% 0	16.67% 1	0.00% 0	83.33% 5	6	4.67
To ignore illegal contracts	85.71% 6	0.00% 0	14.29% 1	0.00% 0	0.00% 0	7	1.29
Insurance indemnity	0.00% 0	0.00% 0	14.29% 1	0.00% 0	85.71% 6	7	4.71
Influence in bidding	57.14% 4	14.29% 1	14.29% 1	0.00% 0	14.29% 1	7	2.00

Figure 7.47. Legal framework.

7.4.23 Question 23

The question asked that from a financial point of view, which factors would affect your company? Fig. 7.48 depicts that of 7 responses, the following was indicated in the table below.



Answer Choices	Responses	
Customer dissatisfaction	0.00%	0
Employee morale	14.29%	1
Efficiency	28.57%	2
Productivity	28.57%	2
Delivery	14.29%	1
Other (please specify)	14.29%	1
Total		7

Figure 7.48. Financial.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a small number of the employees suggest that efficiency and productivity affect the financial aspect of the company.

7.4.24 Question 24 - Cost effectiveness in construction projects

The question asked that does cost effectiveness affect your company's objectives? Fig. 7.49 depicts that of 8 responses, 62.5% of respondents suggested Yes and 37.5% of respondents suggested No.

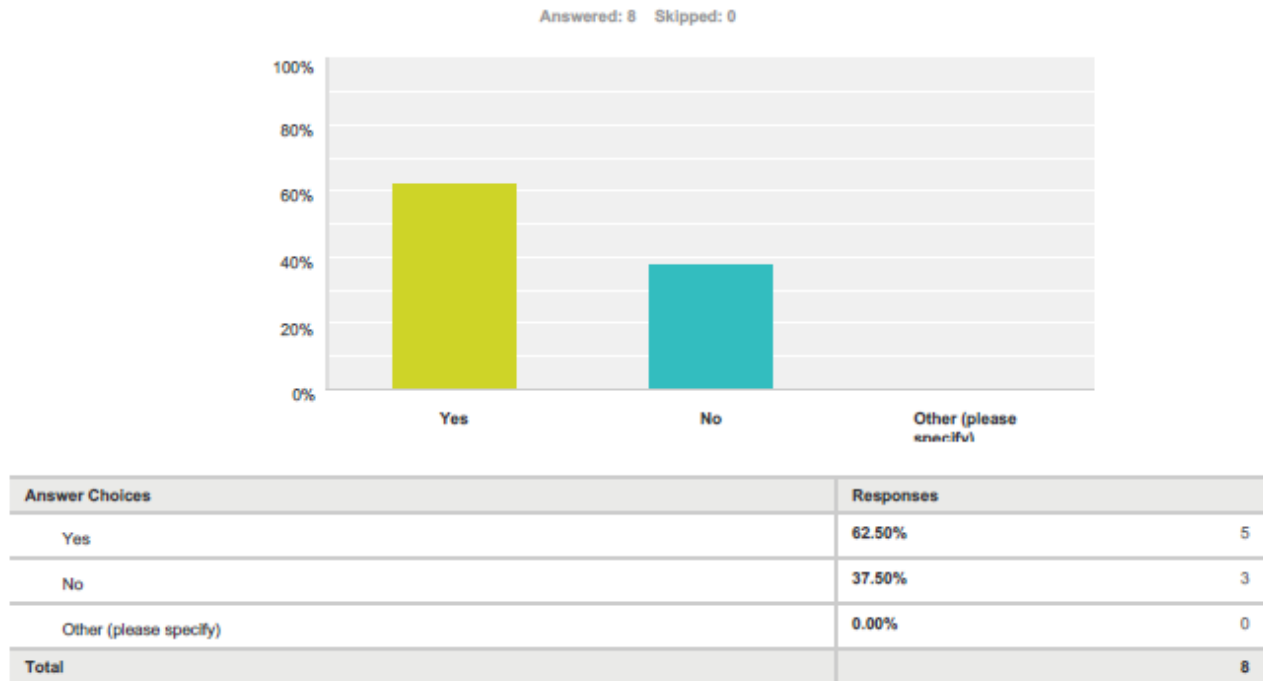
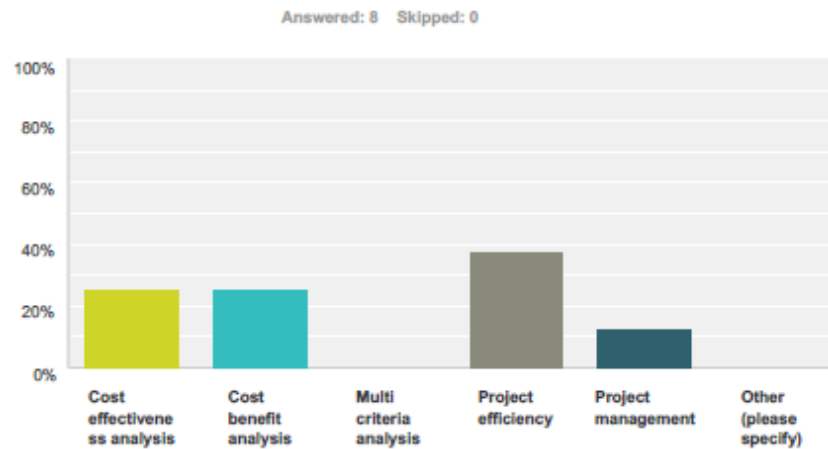


Figure 7.49. Cost effectiveness.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a majority of the employees suggest that cost effectiveness does have bearing on the company's objectives.

7.4.25 Question 25

The question asked that is the company aware or use any of the methods indicated within a health and safety remit? Fig. 7.50 depicts that of 8 responses, the following was indicated in the table below.



Answer Choices	Responses
Cost effectiveness analysis	25.00% 2
Cost benefit analysis	25.00% 2
Multi criteria analysis	0.00% 0
Project efficiency	37.50% 3
Project management	12.50% 1
Other (please specify)	0.00% 0
Total	8

Figure 7.50. Health and safety remit.

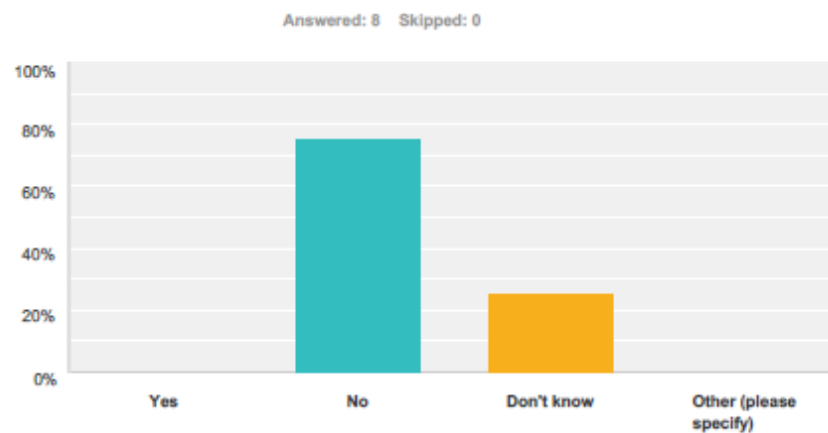
The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a majority of the employees in this sample suggest that project efficiency has most bearing within the company's health and safety remit.

7.4.26 Question 26

In the case of answers given in Q.25, could you point out any positive or negative sides to these methodologies? Individual answers were given.

7.4.27 Question 27

The question asked that does the organisation have any arrangements or current plans to consider a cost effective analysis methodology ? Fig.7.51 depicts that of 8 responses, 75% of respondents suggested No and 25% of respondents suggested Don't Know.



Answer Choices	Responses
Yes	0.00% 0
No	75.00% 6
Don't know	25.00% 2
Other (please specify)	0.00% 0
Total	8

Figure 7.51. Cost effectiveness methodology.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, three quarters of the employees suggest that they were not aware of any plans for a cost effectiveness methodology task to be taken forward.

7.4.28 Question 28

The question asked which type of methodology do think should be applied to promote cost effectiveness in the company. ? Individual answers were given.

7.4.29 Question 29

The question asked that, from experience, would you agree with methods to promote cost effectiveness in the company – from a value of 0 totally agree to 5, totally disagree? Fig.7.52 depicts that of 7 responses, the following was indicated in the table below.

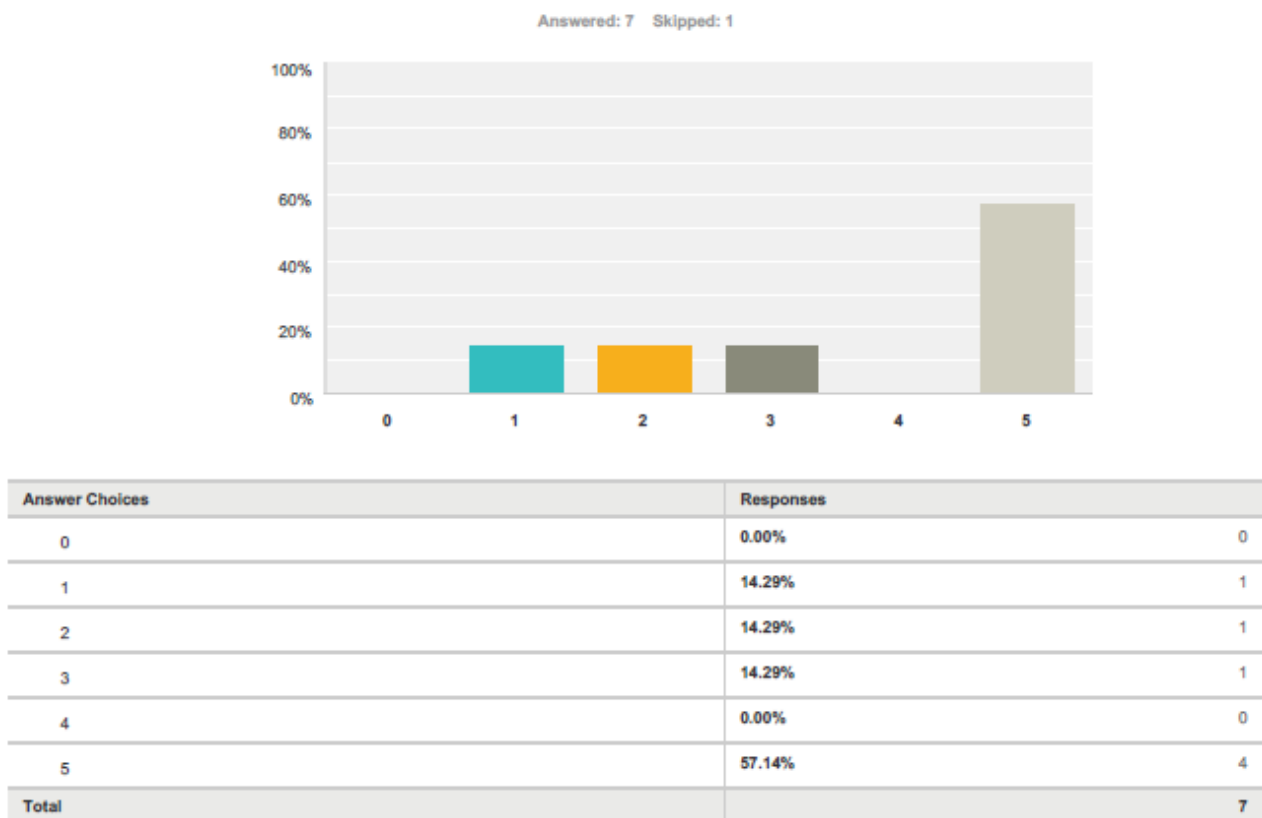
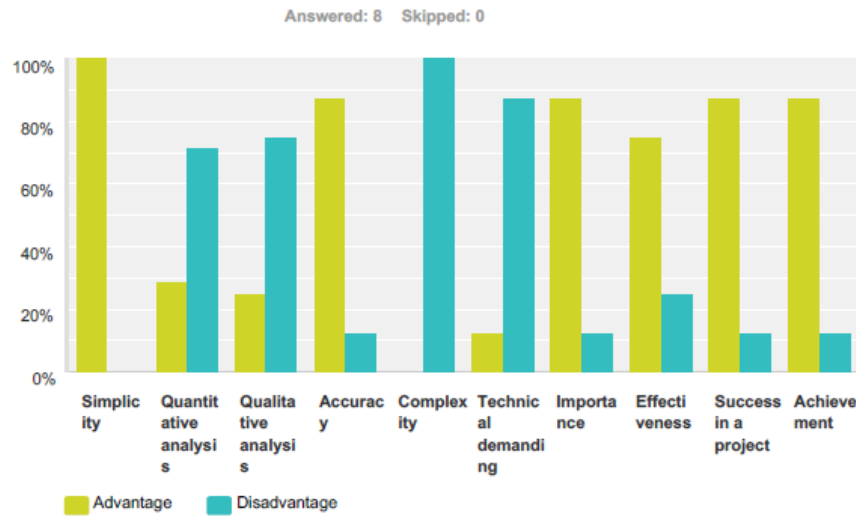


Figure 7.52. Promotion of cost effectiveness.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a majority of the employees suggest that a cost effectiveness strategy would have no benefit to the company.

7.4.30 Question 30

The question asked that could advantages and disadvantages be pointed out of using a cost effectiveness methodology? Fig.7.53 depicts that of 8 responses, the following was indicated in the table below.

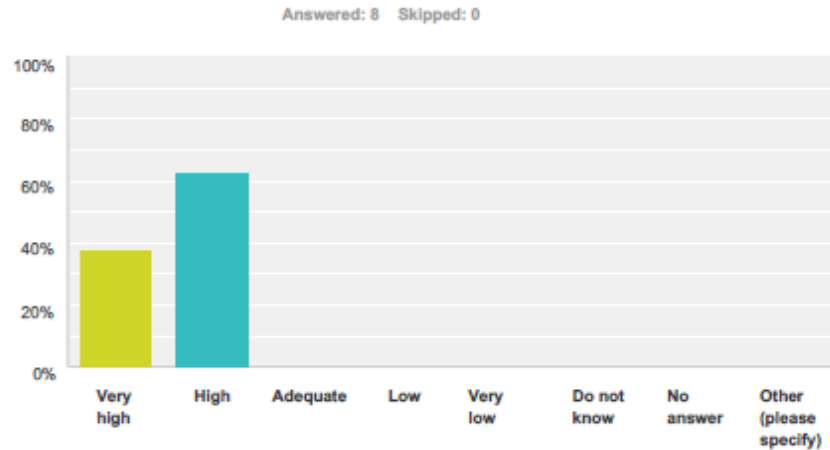


	Advantage	Disadvantage	Total	Weighted Average
Simplicity	100.00% 8	0.00% 0	8	1.00
Quantitative analysis	28.57% 2	71.43% 5	7	1.71
Qualitative analysis	25.00% 2	75.00% 6	8	1.75
Accuracy	87.50% 7	12.50% 1	8	1.13
Complexity	0.00% 0	100.00% 8	8	2.00
Technical demanding	12.50% 1	87.50% 7	8	1.88
Importance	87.50% 7	12.50% 1	8	1.13
Effectiveness	75.00% 6	25.00% 2	8	1.25
Success in a project	87.50% 7	12.50% 1	8	1.13
Achievement	87.50% 7	12.50% 1	8	1.13

Figure 7.53. Advantages/disadvantages of cost effectiveness.

7.4.31 Question 31

The question asked what is the importance of cost effectiveness in the company? Fig 7.54 depicts that of 8 responses, the following was indicated in the table below.



Answer Choices	Responses	
Very high	37.50%	3
High	62.50%	5
Adequate	0.00%	0
Low	0.00%	0
Very low	0.00%	0
Do not know	0.00%	0
No answer	0.00%	0
Other (please specify)	0.00%	0
Total		8

Figure 7.54. Importance of cost effectiveness.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, over half of the employees suggest that the importance of cost effectiveness is high within the company.

7.4.32 Question 32

The question asked what in which way the company is involved in a cost effective methodology? Fig. 7.55 depicts that of 8 responses, the following was indicated in the table below.



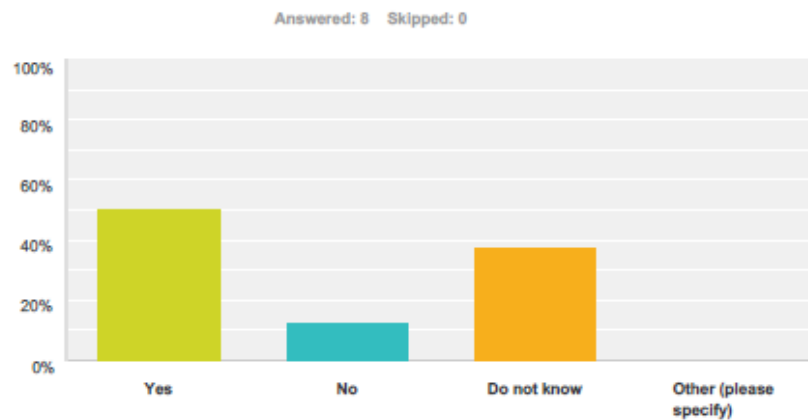
Answer Choices	Responses
For functionality	12.50% 1
For profitability	25.00% 2
Legal undertakings	0.00% 0
Awareness of costs	50.00% 4
Other (please specify)	12.50% 1
Total	8

Figure 7.55. Involvement with cost effectiveness.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, half of the employees suggest that being aware of costs is important within the involvement of cost effectiveness.

7.4.33 Question 33

The question asked that does the company recognise or believe that enough is being done regarding cost effectiveness? Fig. 7.56 depicts that of 8 responses, 50% of respondents suggested Yes, 12.5% of respondents suggested No and 37.5% of respondents suggested Don't Know.



Answer Choices	Responses
Yes	50.00% 4
No	12.50% 1
Do not know	37.50% 3
Other (please specify)	0.00% 0
Total	8

Figure 7.56. Input of cost effectiveness.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, half of the employees suggest that enough is being done regarding the input of a cost effectiveness plan within the company.

7.4.34 Question 34

The question asked what if any, should be improved to enhance cost effectiveness? Fig. 7.57 depicts that of 8 responses, the following was indicated in the table below.



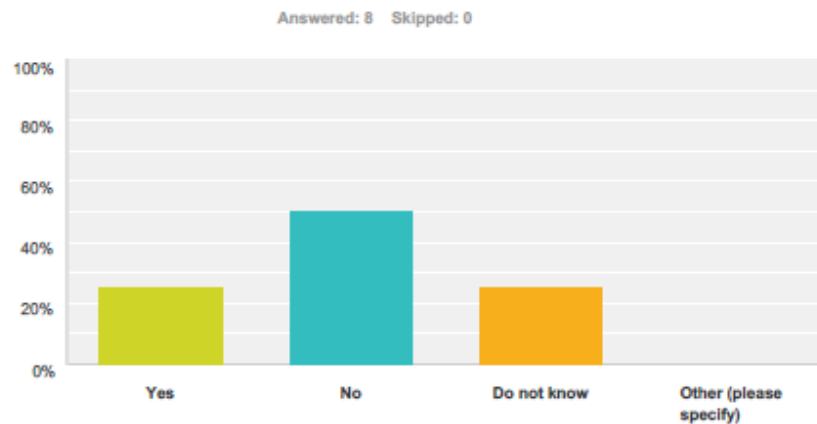
Answer Choices	Responses
Management	25.00% 2
Staff	0.00% 0
Resources	50.00% 4
Methodology	0.00% 0
Efficiency	12.50% 1
Legal	0.00% 0
Financial	12.50% 1
Other (please specify)	0.00% 0
Total	8

Figure 7.57. Improvement of cost effectiveness.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, half of the employees suggest that resources would improve cost effectiveness.

7.4.35 Question 35

The question asked that does the company think there are issues that are not being addressed in cost effectiveness? Fig.7.58 depicts that of 8 responses, 25% of respondents suggested Yes, 50% of respondents suggested No and 25% of respondents suggested Don't Know.



Answer Choices	Responses	
Yes	25.00%	2
No	50.00%	4
Do not know	25.00%	2
Other (please specify)	0.00%	0
Total		8

Figure 7.58. Issues of cost effectiveness.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, half of the employees suggest that issues are not being addressed within cost effectiveness.

7.4.36 Question 36

The question asked if “Yes” to Q.35, what issues would you highlight.? Individual answers were given.

7.4.37 Question 37

The question asked that would the company consider that the use of a cost effectiveness methodology/analysis would improve the company? Fig 7.59 depicts that of 8 responses, 50% of respondents suggested Yes, 12.5% of respondents suggested No and 37.5% of respondents suggested Don't Know.

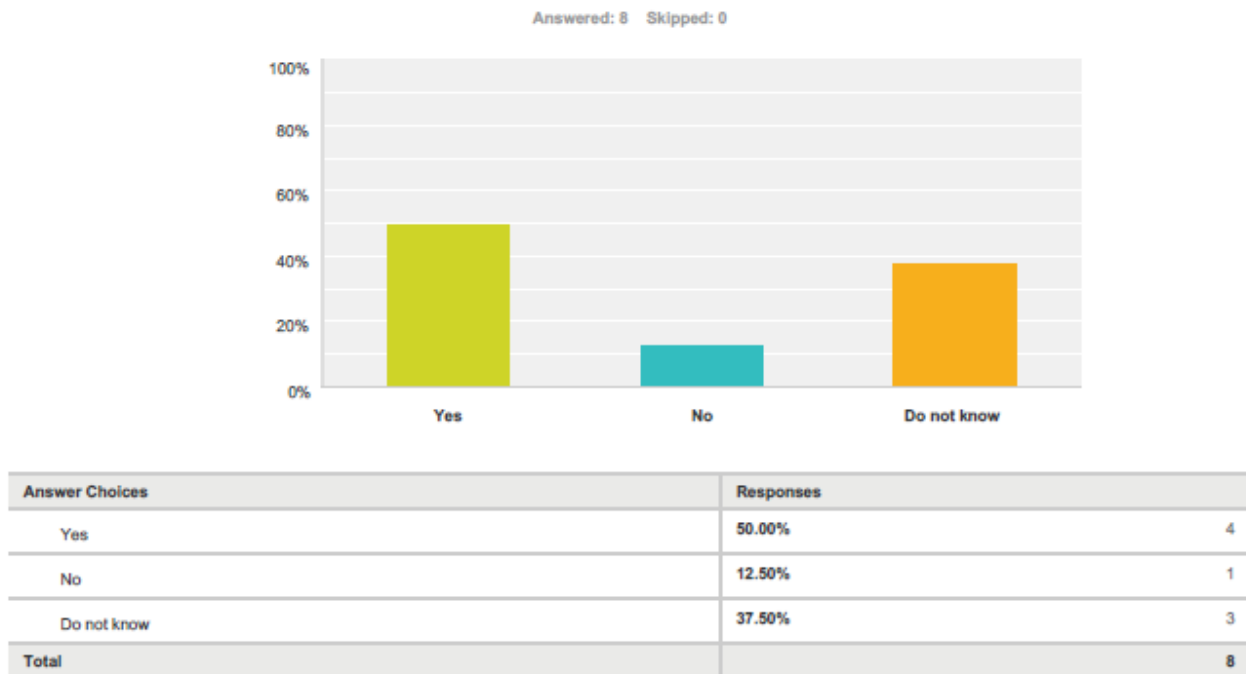


Figure 7.59. Improvement of cost effectiveness.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, half of the employees suggest that the implementation of a cost analysis system within the company would be beneficial.

7.4.38 Question 38

The question asked if “Yes” to Q.37, which ones? Individual answers were given.

7.4.39 Question 39

The question asked that what would the company think, from prior experience, the priority to promote cost effectiveness should be given to? Fig.7.60 depicts that of 8 responses, the following was indicated in the table below.

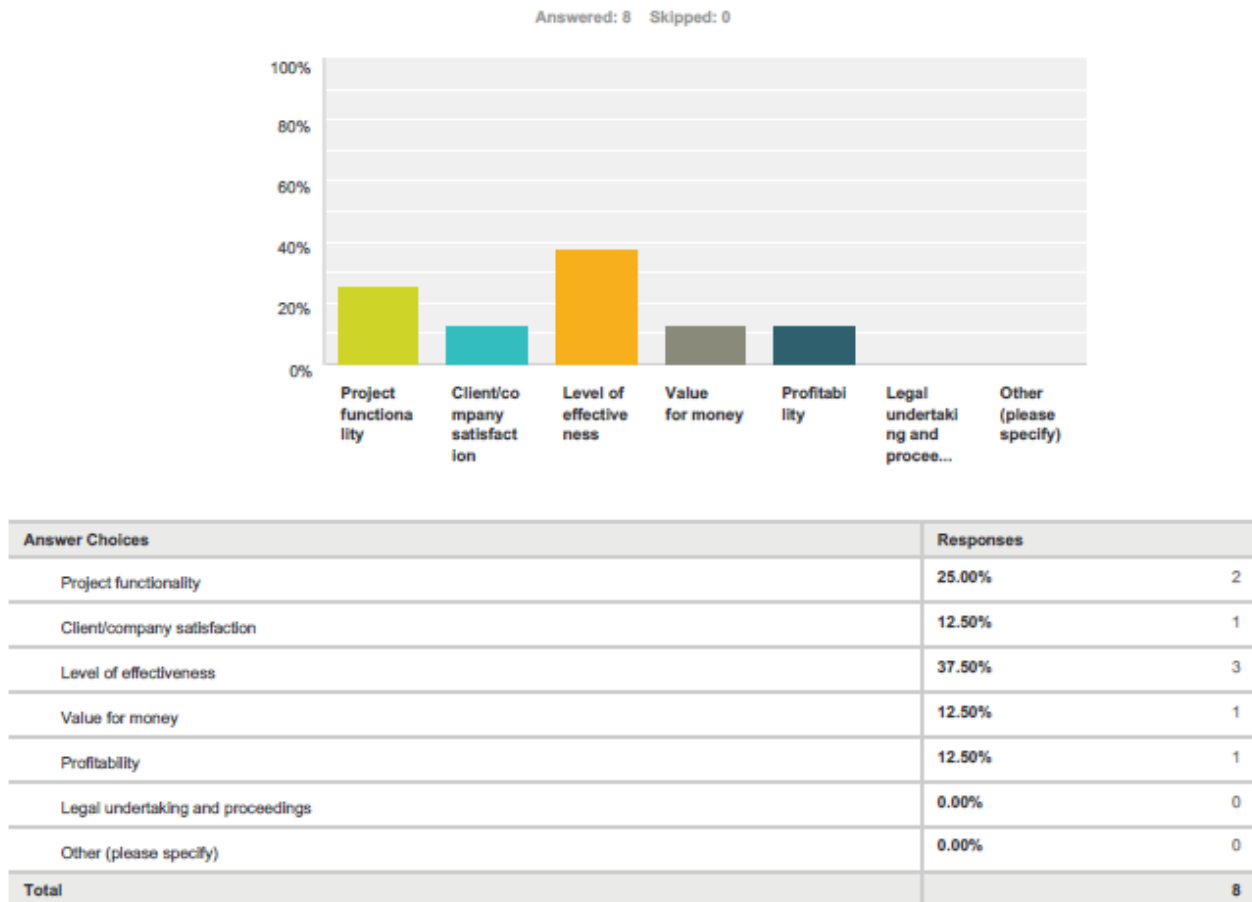
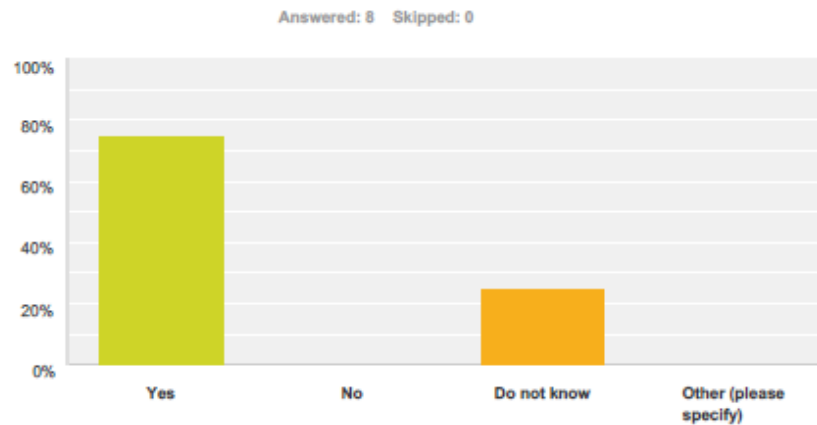


Figure 7.60. Priority of cost effectiveness.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a varied cross-section of the employees suggested and gave various responses. However, a small majority instigated that the priority of a cost effectiveness strategy should be given to the level of effectiveness in the company.

7.4.40 Question 40

The question asked that would the company adopt a cost effective strategy? Fig 7.61 depicts that of 8 responses, 75% of respondents suggested Yes and 25% of respondents suggested Don't Know.



Answer Choices	Responses
Yes	75.00% 6
No	0.00% 0
Do not know	25.00% 2
Other (please specify)	0.00% 0
Total	8

Figure 7.61. Adoption of cost effectiveness.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a majority of the employees suggest that they would adopt a cost effectiveness strategy within the company.

7.4.41 Question 41

The question asked that if “Yes” to Q.40, to develop such a strategy, what kind of legislation or norms be taken into consideration? Fig.7.62 depicts that of 7 responses, the following was indicated in the table below.

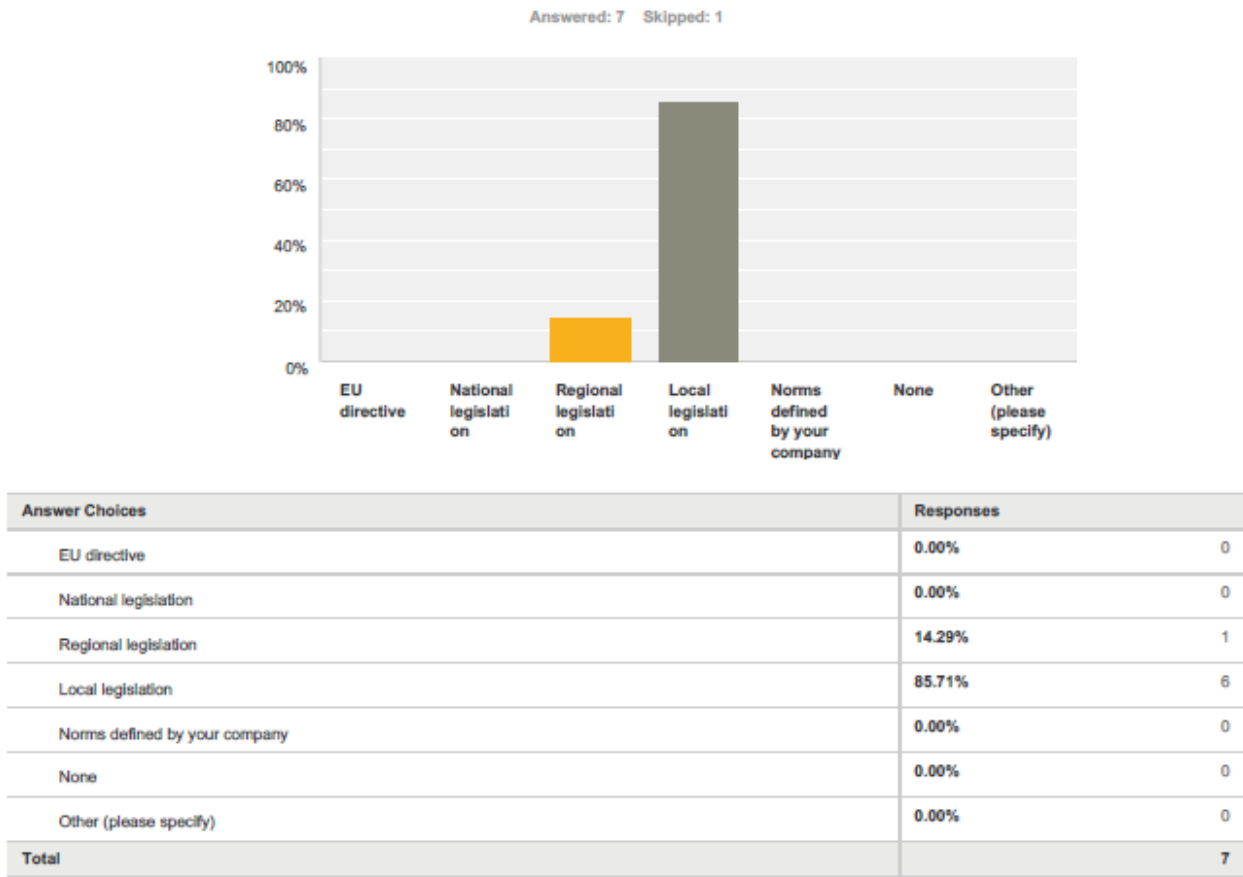


Figure 7.62. Consideration of legislation.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a majority of the employees suggest that if a cost effectiveness strategy was introduced, local legislation would be used.

7.4.42 Question 42

The question asked that for what reasons would be needed to lead or create a cost effective strategy in the company? Fig. 7.63 depicts that of 8 responses, the following was indicated in the table below.

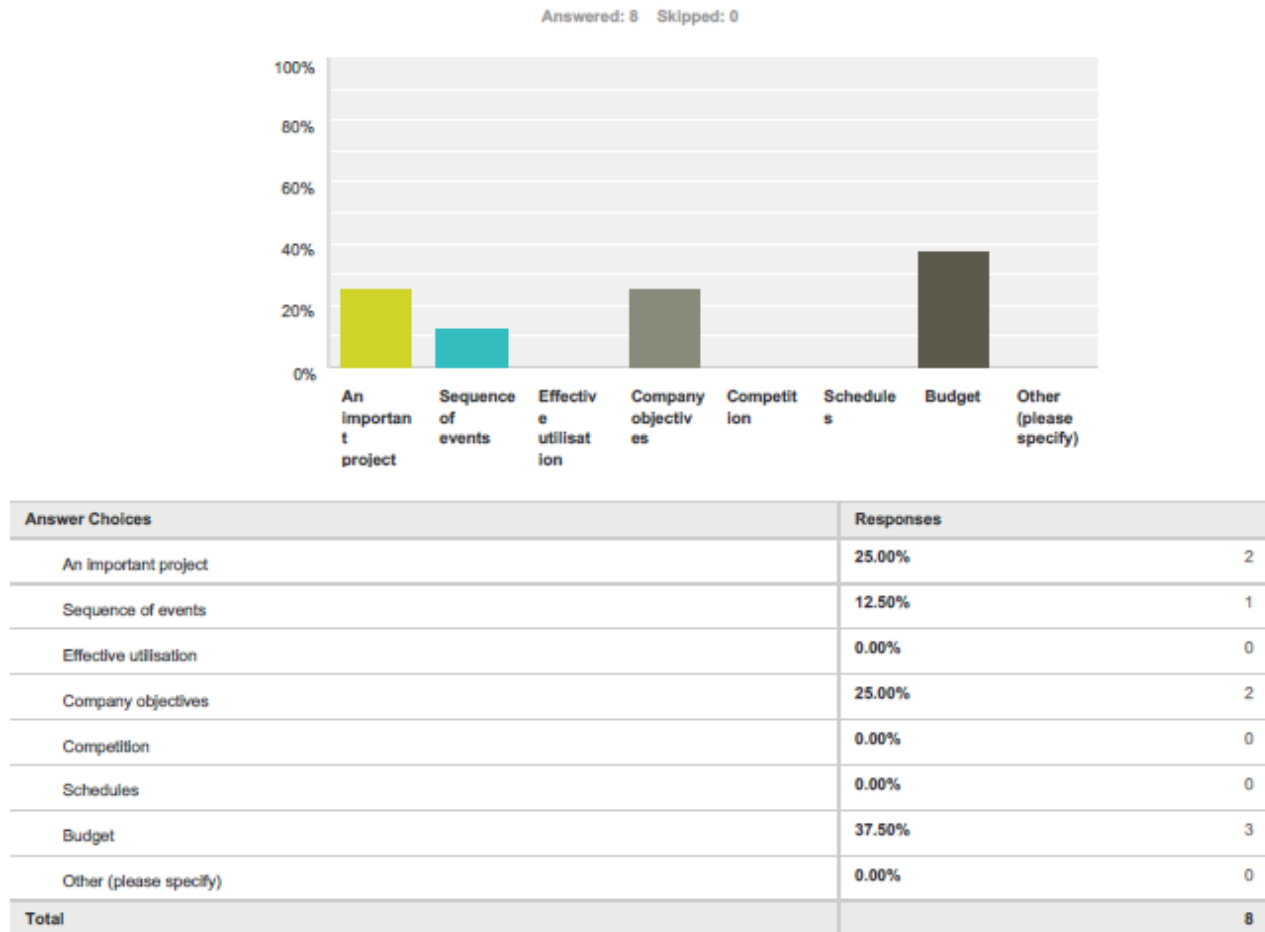
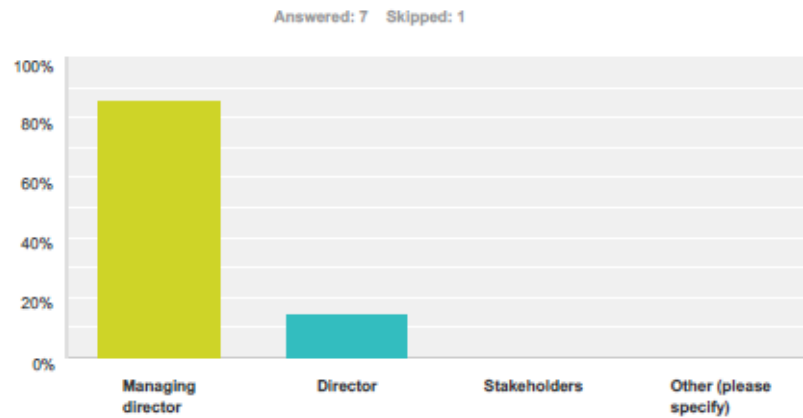


Figure 7.63. Creation of cost effectiveness.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a cross-section of results from the employees was received, however a small majority suggest that the budget would be the main factor of the introduction of a cost effectiveness plan.

7.4.43 Question 43 - Contractor and stakeholder decisions in construction health and safety

The question asked that within the company, who is ultimately responsible for making decisions regarding health and safety? Fig. 7.63 depicts that of 7 responses, 85.71% of respondents suggested the managing director, and 14.29% of respondents suggested director.



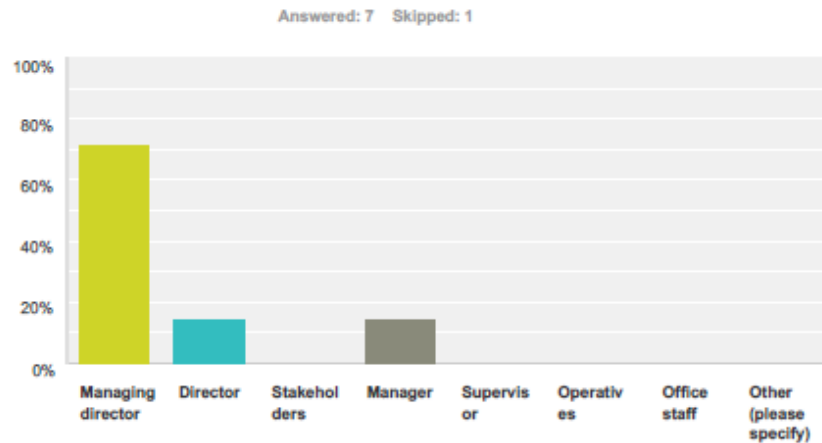
Answer Choices	Responses	Count
Managing director	85.71%	6
Director	14.29%	1
Stakeholders	0.00%	0
Other (please specify)	0.00%	0
Total		7

Figure 7.64. Responsibility of health and safety.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a majority of the employees suggest that the managing director is responsible for making decisions regarding health and safety matters.

7.4.44 Question 44

The question asked that who would make decisions for training to be given regarding health and safety in the company? Fig. 7.65 depicts that of 7 responses, the following was indicated in the table below.



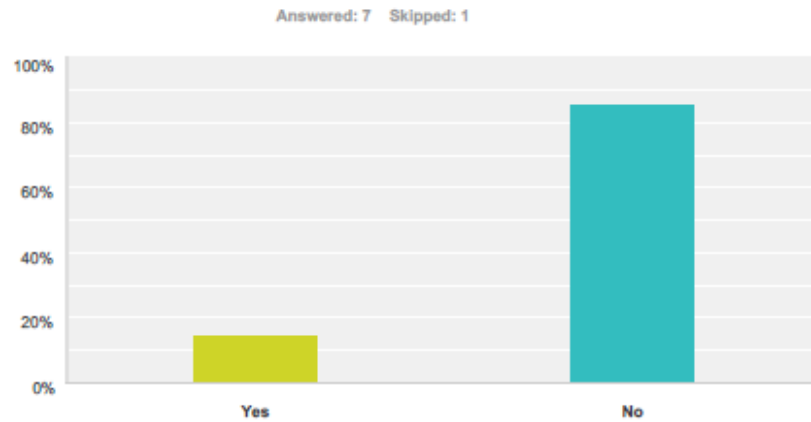
Answer Choices	Responses
Managing director	71.43% 5
Director	14.29% 1
Stakeholders	0.00% 0
Manager	14.29% 1
Supervisor	0.00% 0
Operatives	0.00% 0
Office staff	0.00% 0
Other (please specify)	0.00% 0
Total	7

Figure 7.65. Training of health and safety.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a majority of the employees suggest that the managing director is responsible for making training decisions regarding health and safety matters.

7.4.45 Question 45

The question asked that does the company use outside regulatory bodies to influence health and safety issues? Fig. 7.66 depicts that of 7 responses, 14.29% of respondents suggested Yes and 85.71% of respondents suggested No.



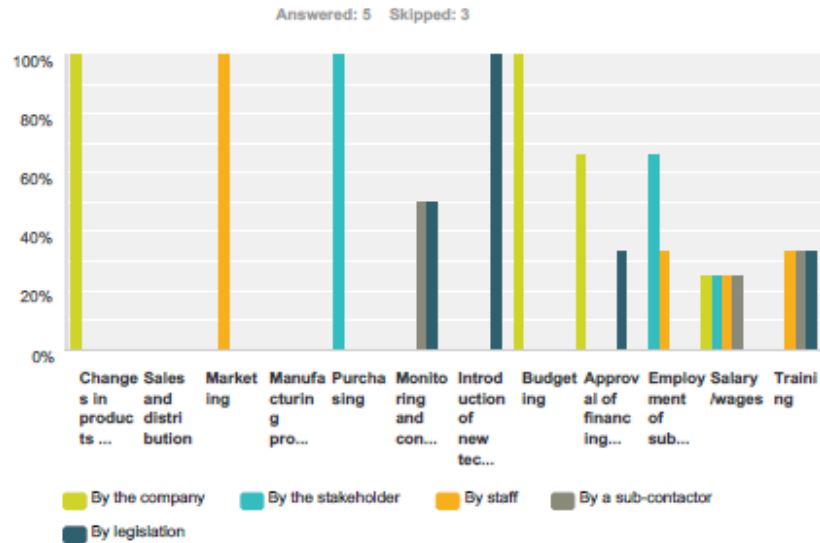
Answer Choices	Responses
Yes	14.29% 1
No	85.71% 6
Total	7

Figure 7.66. Influence of health and safety.

The above figure shows and depicts data given from the questionnaire carried out within the research. It would suggest that for the majority of businesses, a majority of the employees suggest that they did not know of the use of outside regulatory bodies to influence health and safety issues within the company.

7.4.46 Question 46

The question asked that based on your experience, what kind of decisions are made with reference to health and safety legislation in the company? Fig. 7.67 depicts that of 8 responses, the following was indicated in the table below.



	By the company	By the stakeholder	By staff	By a sub-contractor	By legislation	Total	Weighted Average
Changes in products or services, I.e., design, guarantee.	100.00% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	1	1.00
Sales and distribution	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0	0.00
Marketing	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1	3.00
Manufacturing process, I.e., production technology	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0	0.00
Purchasing	0.00% 0	100.00% 1	0.00% 0	0.00% 0	0.00% 0	1	2.00
Monitoring and controlling quality	0.00% 0	0.00% 0	0.00% 0	50.00% 1	50.00% 1	2	4.50
Introduction of new technologies and new products	0.00% 0	0.00% 0	0.00% 0	0.00% 0	100.00% 1	1	5.00
Budgeting	100.00% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	1	1.00
Approval of financing for major or minor products	66.67% 2	0.00% 0	0.00% 0	0.00% 0	33.33% 1	3	2.33
Employment of sub-contractors	0.00% 0	66.67% 2	33.33% 1	0.00% 0	0.00% 0	3	2.33
Salary/wages	25.00% 1	25.00% 1	25.00% 1	25.00% 1	0.00% 0	4	2.50

Training	0.00% 0	0.00% 0	33.33% 1	33.33% 1	33.33% 1	3	4.00
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Figure 7.67. Decisions of health and safety.

Summary

The results shown and depicted in figures shown from 1 - 46, indicate and give an account of health and safety practices within the construction industry. However, this survey goes deeper to that was instigated in Pt. 1. It can be seen that many respondents did not realise the type of organisation that they were in, and are not aware of which legislation is of the most importance to their environments, or indeed who is responsible generally for the implementation of the appropriate legislation required in their part of the construction industry. Cost effectiveness was a very important factor also, as the results all suggested to show that its implementation as an analysis tool seemed to be seen as beneficial to their respective industry. It can also be seen that the majority of respondents would be positive about further participation in understanding how contracts work, to review procurement procedures and to have training in the appropriate discipline, and to achieve a better understanding of health and safety legislation, to improve productivity and strategy within the industry.

7.5 Analysis of questionnaire

As viewed and discussed in the previous chapter, the questionnaires were sent in 2 parts in total. The responses from each of the companies were analysed as a whole so that an overall view of the situation within a UK based construction industry is represented. The sole purpose of all questions is summarised by the use of the appropriate charts and graphics, as to enable the reader to take stock of what is being portrayed by reason of the research carried out, and to deduce an outcome. In particular, the second questionnaire has questions grouped into specific areas, as these questions are specifically relevant to the area concerned. This will make the analysis of subsequent responses more sensible.

7.6 Summary of results

7.6.1 General health and safety practices

With respect to the general health and safety practices analysis, it was seen that there are no recorded serious accidents or major concerns within the industry, only 10% of complaint investigations and half, 50%, as routine inspection. It also shows that such practices forms part of any sub-contract conditions. The number of employees varied throughout the trawl, the majority being between 1- 49 members of staff, with only 10% 250 or above. This would form a typical cross section of companies within the construction industry environment. The companies operation was also considered important, with 80% of respondents suggesting it was more significant than its image. The majority of health and safety duties was seen to be carried out by the senior management, 80%, with the local authority overseeing it with a slight majority, with the business being kept informed with 50%. Accident and incident investigations were 50% yes and no, which concurs with what has been discovered in previous research. Health and safety guidance from customers was given at 80% yes, probably due to contracts being given with pre-determined clauses and legislation within the such contract. A very important aspect to be seen is the result of 90% of health and safety performance is part of subcontract conditions. This suggests that such conditions give rise to higher profits because of good health and safety knowledge and legislation. To tie in with this, 70% of respondents suggested that health and safety performance rates as highly as cost. This would suggest that the company is aware that health and safety policy which is adhered to is just as important as all overheads and suggests the generation of higher profit.

Overall, the Pt.1 questionnaire and results demonstrates a reasonable attitude and knowledge of general health and safety practices within each individual firms. There was a slight lack of understanding of policy importance within each company working conditions, but a significant number of respondents understood the management of health and safety at work regulations.

7.6.2 Vetting bidders for contracts

This section gives a general summary of results for the vetting of bidders. As per normal, the respondent was asked for its name which will remain anonymous. The majority, 85.71% of companies were limited companies, with 14.29% being sole traders. It was found that the main majority of companies, 62.5%, bided themselves for sub-contracts, with 100% having no decision in influencing bidding. This suggests

that legislation is being adhered to, hence only 14.29% being in default of any damages with such default notices. This style of management is reflected in the literature. Throughout the results given all respondents show respect and good business practice with their dealings with contractors and sub-contractors. They have had little or no disputes, 87.5%, with any public sector body. A surprising number of respondents, 62.5%, suggested that they have a procurement department, however, this could be that procurement is contracted out to outside, and subject to 50% of respondents which require approval, by the management. This it would suggest, have a mark on productivity, hence 28% of respondents amongst other factors suggested this could be a contributory factor which affects the company

7.6.3 The monitoring of procurement

From the respondents, 62.8% suggested that the company had a procurement department, with 37.5% suggest no. This, as before, may arise from the company sub-contracting procuring methods to outside sources. It also suggests that 50% thought that contracts needed approval. Which is common in most industries. Because of the nature of each individual business, it was seen that 62.50% of respondents specifically aim at certain contractors for procurement. For example, a curtain walling company, of which there are 5 respondents in this industry, it would make sense for the firm to remain with such suppliers, for reasons of availability, cost and convenience. Another important result was that 87.50% of respondents would not do business with a contractor with credit history, with half of respondents, 50%, requiring financial and technical proposals. A fairly large proportion, 62.50%, did or do not collaborate financially, however 75% agreed to receiving cheaper prices for goods and services rendered. 85.71% operate and understand financial and legal implications, which correlates to the percentage given to respondents with credit history concerns.

7.6.4 Financial and legal implications with construction accidents

From the onset, it was found from the results that the understanding and operation of legal implications was understood, with 85.71% of respondents suggesting yes. It was also seen that 85.71% of respondents chose to ignore illegal contracts, which would make sense. And shows the company takes value of all required legislation. A significant number, 57.14%, suggests that influence in bidding should

be ignored, hence this ties up with other results from the research. Efficiency, 28.57% and productivity, 28.57%, suggests importance.

7.6.5 Cost effectiveness in construction projects

This particular set of results formed very interesting analysis, as there were contrasts and comparisons as indicated and highlighted in various sections of the literature review. Initially, 62.5% of respondents suggested that the cost effectiveness affects the companies objectives, with 25% using a cost effective analysis technique amongst other methods. 57.14% of respondents also saw it was important to promote cost effectiveness, thus 100% seeing this method as a main advantage. This suggests that from the use of such a methodology, higher profits could be achieved. This sentiment is reflected on highly through most of the survey questions in this section. It also suggests that with the implementation of a cost effectiveness strategy, 85.71% of respondents suggest that it would utilise local legislation, which could be reasonable, as it would bring local contractors together and perhaps encourage integrated project delivery. This method is a means by which a number of companies involved in the same project collaborate together, over the lifecycle, to share costs and profits.

It also suggests the same method would have benefits on a budget, 37.5%, amongst others. The training of health and safety was mainly seen to be supervised by the managing director, as suggested by 71.43% of respondents. Other personnel would include the manager, 14.29%, and director with also 14.29% of respondents. This would be seen as per the norm, as the writer can verify this also from previous experience. A significant amount of respondents do not use outside regulatory bodies, 85.71% of respondents suggest no. This could be seen to be dealt with by the company hierarchy, which is demonstrated previously in this section. 100% of respondents suggest that changes in products or services, i.e., design or guarantee, affect decisions with company health and safety legislation, as does budgeting, 100%, also then a significant number, 66.67% suggest approval of financing and latterly 25% suggest salary/wages. It would seem from other research, such similarities and correlations are normal, the budget being the most significant issue.

7.6.6 Contractor and stakeholder strategic decisions in construction health and safety

The ultimate decision makers within the companies trawled were seen to be the managing director, with 85.71% of respondents, followed by the director, with 14.29% of respondents. This pattern is seen elsewhere in the research. For decisions regarding training, a similar pattern is shown again, with 71.43% of respondents suggesting the managing director, and a joint 14.29% of respondents suggesting the director and manager.

7.7 Overall findings

The discussion of results obtained is carried out with reference to all information obtained and collated in the literature review, to all interviews and questionnaires undertaken. The discussion is divided into specific sections dealing with different aspects and issues discovered by the survey (questionnaires Pt.1,Pt.2 and interviews).

7.8 Swot analysis

A SWOT analysis system is a method in which the strengths, weaknesses, threats and opportunities that may exist in a framework and from results obtained from any interview and or questionnaire that may be carried out (fig 7.68). SWOT analysis is a very useful tool for auditing an organisation and its environment. It mainly is used in the initial stages of planning and helps economists and engineers to focus on the areas primary to their project or business. SWOT stands for Strengths, Weaknesses, Opportunities, and Threats. Strengths and weaknesses are internal factors. Opportunities and threats are external factors. It is widely encouraged that each company or organisation should carry out its own SWOT analysis. The writer has, however, considered all the companies that took part in the research survey and produced a simple SWOT analysis based on the results obtained. This method is very useful for construction companies, and indeed other organisations in other fields, in the UK to indicate and show their weaknesses and exploit any opportunities offered to them.

	Internal to achieving the objective	External to achieving the objective
Positive (attributes of the system)	<p><i>Strengths</i></p> <ul style="list-style-type: none"> • Have basic grasp of H&S principles • Have understanding of procurement, vetting, costing • Willing to take on problem 	<p><i>Opportunity</i></p> <ul style="list-style-type: none"> • Strong economy in the UK • See H&S in a positive mode • Increased <u>liason</u> with contractor, sub-contractors • Increased procurement • Increased profits
Negative (attributes of the environment)	<p><i>Weaknesses</i></p> <ul style="list-style-type: none"> • Decreased understanding of company procedure • Decreased understanding of company protocol • Lack of training for employees • Lack of internal structure 	<p><i>Threats</i></p> <ul style="list-style-type: none"> • System failure • Legal action • Vulnerability • Reputation • Decreased profit • Risk-prone

Figure 7.68. Swot analysis.

CHAPTER 8.

CONCLUSIONS & RECOMMENDATIONS

8.1 Conclusions

The work, research, and collation of all results, with the literature review to define the research areas has shown that very little work has been undertaken as concerns health and safety in the construction industry, in review of any procurement monitoring, vetting of bidders and overall strategy, within the UK. Henceforth, it can be seen that the importance of questionnaires and interviews, using both quantitative and qualitative research methodologies, is crucial to the investigation of a new area of research, or new topic of concern, however limited it can be. Although the research carried out is only a very small detail to a whole situation and construction environment, it could be seen as footprint for further research within the specific topic area, and serve as a foundation to be built upon. A health and safety contingent within the construction industry is a very important one, as it protects the client, employee, contractor, sub-contractor and customer from any harmful, or indeed any legal eventuality. It affects the way bidding for work is set, how it influences contracts, and the way it is seen to be as important as making profit. There is not one without the other. Hence there are powerful incentives, for the aforementioned, for companies and organisations to encourage high level of health and safety standards which are moral, legal and economic. As long ago in the 1960's, the construction industry has had tremendous development and growth, it is now increasingly important that employers and employees are indeed aware of all the necessary legislation that is particular to them. The specific piece of legislation, to enable the correct vetting protocol of contractors, for credit, references, observance of fair play and to protect themselves and the contractor. Proper implementation of health and safety legislation gives increased cost effectiveness, hence giving way for higher profitability, and to develop a strategy to be implemented as part of the company's infrastructure of economics. This creates a sense of loyalty towards the organisation. What was also seen in the surveys was the general sizes of the companies. A substantial number of companies were to be of a smaller size - larger contractors tend to perform better compared to smaller companies generally because they have greater resources to do so. Large firms are associated with larger projects containing more risks and so are typically required to

implement better health and safety procedures. Small contractors and subcontractors on the other hand, generally perform poorly for similar reasons, although many of the surveyed companies had a good grasp of health and safety, with a good understanding of contractual and vetting procedures. It was also seen that a management commitment played a major role in health and safety performance, as it was discovered that the majority of training of health and safety legislation was done by the managing director. However, small companies seem to lack both the financial resources and management commitment to improve their own health and safety performance. Increasingly, the performance of these firms reflects on the manager of the facility, which may lead to liability. Future research may be needed to investigate how to improve health and safety within small enterprises in particular, and sample at least 5 respondents in each company, to the same aims and objectives as set out in this current research.

8.2 Future research

From the research undertaken, there is every reason why to encourage further health and safety investigations in the UK, with the same approach but to achieve improvements. As with this survey, there should be a well planned approach to this, using the same format and collective as before, this being all involved parties, namely governments, local government, companies, contractors and clients.

The following could be observed;

- Develop the questionnaire to cover more construction companies, especially larger companies, with at least 5 respondents to each one, with the same questions;
- Have interviews with health and safety officers or responsible people who are experts at the same;
- An investigation with the same agenda but to a European country, to see if any comparisons/contrasts can be drawn.

8.3 Contribution to knowledge

The writer suggests that a very small contribution to knowledge has been achieved with this research, however the size, it is one single step to increase the awareness of health and safety in the construction industry, specifically to the 5 areas looked at in a brief manner. The main focus point in looking at and to find out about the topic was the exhaustive literature review which was taken, giving a general overview

of the health and safety issue in companies based in the UK, to moving onto more specific and detailed synopsis of literature, to identify what is currently happening and how, if any, knowledge gaps can be closed. The vast majority of published work researched for the literature review was in the form of academic papers, journal articles, magazine articles and government directives/policies. The writer believes this research would be of great importance to anyone who would wish to take this very small contribution and increase this knowledge to everyone's interest.

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APPENDIX A: Cover letter



10th April, 2015

Dear Sir/Madam

I am a research student in the School of the Built Environment at the University of Salford.

Presently, i am conducting a study, within my thesis entitled "A Strategic Approach to Health and Safety in the Construction Industry".

This research is based upon 3 criterion, namely,

- How to improve a health and safety method through the monitoring of the procurement process;
- The issue of cost effectiveness;
- Strategic decisions regarding health and safety between the contractor and client.

It has a variety of questions about attitudes towards the 3 points outlined above.

If you agree to participate in my research, could you answer questions in a questionnaire i have completed for your perusal, which will be e-mailed over to you in the event you would agree to take part.

Your responses will not be identified with you personally, nor will anyone be able to determine which company you work for. Nothing you say on the questionnaire will in any way influence your present or future employment with your company.

Research Letter 2015

I hope you will take a few minutes to complete this questionnaire. Without the help of people like you, research on employees could not be conducted. Your participation is voluntary and there is no penalty if you do not participate.

If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me on 07510456779 or at malmcoonsteen@gmail.com.

I look forward to hearing from you.

Yours Sincerely,

John P Cooney

John P Cooney, P.Gc, M.Sc.,
Research Student
School of the Built Environment
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APPENDIX B: Questionnaire Pt. 1

General health and safety practices

My Thesis will deal with the following three issues, to bring a thorough data set of analysis, discussion, results and bring to a satisfactory conclusion.

First, the thesis tries to deal with the problem of how to improve organisational health and safety (OHS) through the monitoring of the process of procurement in construction projects; Secondly, the thesis will address the issue of cost-effectiveness in construction projects and how OHS is dealt with simultaneously;

Third, the thesis considers what type of strategic decisions and the responsibilities of both the contractor as well as the client in terms of dealing with OHS with regards to construction projects. Part 1 deals with and asks questions about general health and safety practices in the construction industry.

1. What is the name of your business?

2. How many employees does your business have?

3. In what aspect would you think a poor or good health and safety record reflect on your company?

- Business operations
- Business image

4. To which of these industries does your business belong?

- Agriculture
- Construction
- Service
- Extractive and utility supply
- Manufacturing
- Others

5. Do you have an appointed health and safety representative within your company?

- Yes
- No

6. Who else is involved in your company's health and safety duties?

- Senior management
- Health and safety committee
- Industrial network
- External consultants
- Trade unions
- Others

7. What percentage of the total working week of the person identified in Q.5 is spent on health and safety duties?

8. Who enforces health and safety in your business sector?

- The health and safety executive (HSE)
- Local authority's environmental department
- Don't know.

9. Have you ever been visited by a health and safety enforcement officer for the following?

- Routine inspection
- Complaint investigation
- Accident/incident investigation
- Advice

10. What was the outcome of the visit?

- Improvement notice
- Format caution
- Prohibition notice
- Verbal/written advice
- Prosecution
- Other

11. Which of the following Health and Safety legislation are you aware of that affects your business?

12. Which of the following do you have in place for managing Health and Safety in your company?

13. How do you keep informed on health and safety issues and regulations?

- Trade unions
- Health and safety executive
- Health and safety journals
- Local authority
- Industrial network/safety groups
- Head office

14. Do you have a formal Health and Safety policy that describes roles and responsibilities?

15. Do you have a policy that requires written accident/incident reports (injuries, property damages, near misses, fires, explosions)?

16. Do you conduct accident/incident investigations?

17. Do you document, investigate and discuss near miss accidents?

18. How do the following contribute to your motivations to manage Health and Safety effectively?

	Negligible	Small extent	Moderate	Great extent	Very great extent
Influence of UK's current health and safety legislation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fear of prosecution for health and safety offences	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To protect the company's/industry's reputation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To reduce possible health and safety impact posed by the company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Culture of the organisation promotes health and safety responsibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The managers commitment to health and safety improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To improve competitiveness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Requirements or encouragement from customers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pressure from suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To reduce insurance premium	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pressure from shareholders or investors (if applicable)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pressure from employees	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pressure from trade unions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. Which of the following affects your ability to effectively manage health and safety in your company?

- Lack of financial benefit
- Lack of financial commitment
- Lack of financial resources
- Complex health and safety legislation
- Lack of support
- Lack of knowledge of details and implications

20. Is your company part of an industry specific partnership that shares good practice?

21. Is your company part of a network that shares Health and Safety good practice or information?

22. Is your company part of a supply chain initiative that is involved in an active dialogue with stakeholders?

23. Would you be interested in participating to improve the Health and Safety criteria in your company?

24. We have received Health and Safety guidance from our customers?

25. We have benefited from workshops and visits by our customers to educate us on what Health and Safety improvements can be made?

26. How many suppliers does your company have?

Other (please specify)

27. We assess the Health and Safety standard and performance of our suppliers informally in our assessment process.

28. We assess the Health and Safety standard and performance of our suppliers in a formal process.

29. We set Health and Safety criteria that our suppliers meet.

30. Health and Safety performance forms part of our sub-contract conditions

31. In choosing our suppliers, Health and Safety performance rates as highly as cost

APPENDIX C: Questionnaire Pt. 2

Vetting Bidders for Contracts

My Thesis will deal with the following three issues, to bring a thorough data set of analysis, discussion, results and bring to a satisfactory conclusion.

First, the thesis tries to deal with the problem of how to improve organisational health and safety (OHS) through the monitoring of the process of procurement in construction projects;

Secondly, the thesis will address the issue of cost-effectiveness in construction projects and how OHS is dealt with simultaneously;

Third, the thesis considers what type of strategic decisions and the responsibilities of both the contractor as well as the client in terms of dealing with OHS with regards to construction projects.

Part 2, will deal with the following areas, namely;

- 1. Vetting bidders for contracts.**
- 2. The monitoring of procurement.**
- 3. Financial and legal implications with construction accidents.**
- 4. Cost effectiveness in construction projects.**
- 5. Contractor and stakeholder strategic decisions in construction health and safety.**

1. What is the name of your company?

2. What is the name of your ultimate parent company?

3. What is the type of your organisation?

- Public limited company
- Limited company
- Limited liability partnership
- Other partnership
- Sole trader
- Other (please specify)

Cost effectiveness in construction projects.

24. Does cost effectiveness affect your company's objectives?

- Yes
- No
- Other (please specify)

25. Are you aware or use any of the following methods within a health & safety remit?

- Cost effectiveness analysis
- Cost benefit analysis
- Multi criteria analysis
- Project efficiency
- Project management
- Other (please specify)

26. In case you are familiar with any of the methods highlighted in Q25., could you point out any positive or negative sides to these methodologies?

27. Do you have any arrangements or current plans to consider a cost effective analysis methodology?

- Yes
- No
- Don't know
- Other (please specify)

28. Which type of methodology do you think should be applied to promote cost effectiveness in your company?

29. From experience, would you agree with methods to promote cost effectiveness in your company - (to value from 0 totally agree to totally disagree 5)?

- 0
- 1
- 2
- 3
- 4
- 5

30. Could you point advantages and disadvantages of using a cost effectiveness methodology?

	Advantage	Disadvantage
Simplicity	<input type="radio"/>	<input type="radio"/>
Quantitative analysis	<input type="radio"/>	<input type="radio"/>
Qualitative analysis	<input type="radio"/>	<input type="radio"/>
Accuracy	<input type="radio"/>	<input type="radio"/>
Complexity	<input type="radio"/>	<input type="radio"/>
Technical demanding	<input type="radio"/>	<input type="radio"/>
Importance	<input type="radio"/>	<input type="radio"/>
Effectiveness	<input type="radio"/>	<input type="radio"/>
Success in a project	<input type="radio"/>	<input type="radio"/>
Achievement	<input type="radio"/>	<input type="radio"/>

Other (please specify)

31. What is the importance of cost effectiveness in your company?

- Very high
- High
- Adequate
- Low
- Very low
- Do not know
- No answer
- Other (please specify)

32. In which way is your company involved in a cost effective methodology?

- For functionality
- For profitability
- Legal undertakings
- Awareness of costs
- Other (please specify)

33. Does your company recognise or believe that enough is being done regarding cost effectiveness?

- Yes
- No
- Do not know
- Other (please specify)

34. What aspects, if any ,should be improved to enhance cost effectiveness?

- Management
- Staff
- Resources
- Methodology
- Efficiency
- Legal
- Financial
- Other (please specify)

35. Do you think that there are issues that are not being addressed in cost effectiveness?

- Yes
- No
- Do not know
- Other (please specify)

36. If yes to Q.35., what issues would you highlight?

37. Do you consider that the use of a cost effectiveness methodology/analysis would improve your company?

- Yes
- No
- Do not know

38. If yes to Q.37., which ones?

39. What would your company think, from prior experience, the priority to promote cost effectiveness should be given to?

- Project functionality
- Client/company satisfaction
- Level of effectiveness
- Value for money
- Profitability
- Legal undertaking and proceedings
- Other (please specify)

40. Would your company adopt a cost effectiveness strategy?

- Yes
- No
- Do not know
- Other (please specify)

41. If yes to Q40., to develop such a strategy, what kind of legislation or norms would be taken into consideration?

- EU directive
- National legislation
- Regional legislation
- Local legislation
- Norms defined by your company
- None
- Other (please specify)

42. What would be the reasons that would lead or create a cost effectiveness strategy in your company?

- An important project
- Sequence of events
- Effective utilisation
- Company objectives
- Competition
- Schedules
- Budget
- Other (please specify)

Contractor and stakeholder strategic decisions in construction health and safety

43. Within your company, who is ultimately responsible for making decisions regarding health and safety?

- Managing director
- Director
- Stakeholders
- Other (please specify)

44. Who would make decisions for training to be given regarding health and safety in your company?

- Managing director
- Director
- Stakeholders
- Manager
- Supervisor
- Operatives
- Office staff
- Other (please specify)

45. Do you use outside regulatory bodies to influence health and safety issues in your company?

- Yes
- No

Other (please specify)

46. Based on your experience, what kind of decisions are made with reference to health and safety legislation, within your company?

	By the company	By the stakeholder	By staff	By a sub-contractor	By legislation
Changes in products or services, i.e, design, guarantee.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sales and distribution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Marketing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manufacturing process, i.e, production technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Purchasing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitoring and controlling quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Introduction of new technologies and new products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Budgeting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Approval of financing for major or minor products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Employment of sub-contractors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Salary/wages	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

APPENDIX D: Courses

Number	Summary of Postgraduate Training Seminars/Papers Written	Date
1	PhD Induction Course	14/02/12
2	Literature Review Overview	22/02/12
3	Client Procurement Strategies in the Construction Industry	07/03/12
4	PhD Progression Points	29/03/12
5	Critical Thinking in Research	04/04/12
6	Endnote – Managing Bibliographies and References	11/04/12
7	Preparing for the Interim Assessment and Internal Evaluation	25/04/12
8	Grounded Theory Methodology	08/05/12
9	Thesis Writing	16/05/12
10	Quantitative Research	23/05/12
11	Preparing for Viva	06/06/12
12	Constructive Research	13/06/12
13	PhD Showcase Event	20/06/12
14	Preparing for the Interim Assessment and Internal Evaluation	05/07/12
15	Links between BIM & Lean Construction	22/11/12
16	Preparing for the Interim Assessment and Internal Evaluation	12/12/12
17	Building your Design Profile	09/01/13
18	Arcom Conference Paper	13/04/14
19	MPhil Paper Submission	10/05/16

APPENDIX E: PAPERS PRESENTED

A - Arcom conference - Birmingham City University June 2013

Using a Mobile BIM based Framework to Enhance Information Provisioning Support in HealthCare Projects.

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Abstract: This paper investigates the relevance of mobile BIM in healthcare projects theoretically. The research will present healthcare and its design and construction aspects, utilising building information modeling and its technologies. The literature review identifies and highlights how BIM is utilised within a healthcare environment and gives a brief account of how this process has been implemented, with case study overview. Moreover, the review also indicates and discusses any advantages and disadvantages this process has within such a scenario. From this, the paper discusses the relevance of mobile BIM for better information provisioning, information flow and decision making. Conclusions are drawn about the future impact of emerging mobile BIM technologies to enhance construction processes.

Keywords: Building information modeling, cloud system, health care, mobile computing.

1. Introduction

In recent years, the construction industry has come under increasing pressure from its clients to improve its productivity and to address communication and coordination challenges that often result in projects missing their golden triangle (i.e. cost, time and quality) targets. Also, new demands have been put in place on construction projects because of increasing complexity of design, sustainability, health and safety and other increasingly stringent regulations. Rapid uptake of building information modeling technologies has resulted in major changes in organisational structure, processes and technology uptake

within construction organisations. While BIM is defined as “the provision of rich, integrated information-from conception through design to construction and demolition of a building over its life cycle”, Eastman (2008), industry is still in early stages to fully materialise life-cycle information management benefits offered by BIM. This paper focuses on implications of BIM uptake on healthcare design and construction. Section 2 discusses how BIM has come into being, and how it is being utilised within various sectors of the construction industry, particularly within healthcare. Section 3 reviews relevance of mobile technologies and parallel developments in cloud-computing, intelligent interfaces to ensure better connectivity of field personnel in existing workflows and access to information stored in BIM databases. The final section draws conclusions about possible future impact on construction processes.

2. Use of BIM in HealthCare Design - Literature Review

BIM “Represents a migration in the architectural design field from two dimensions to three dimensions by creating intelligent, multi-dimensional building models” Reddy (2007). It is widely proposed to be a suitable method to manage all design and construction issued within current IT orientated building projects and process environments. Thomson and Miner (2007) highlighted the dynamic nature of a BIM platform and how it allows multiple geographically dispersed groups to work collaboratively on projects. Such dynamic collaboration is particularly relevant for health care project which are inherently complex by their very nature.

The effect of building information modeling within healthcare design has been known for quite some time, particularly with an emphasis on various stages of design, and how it affects the construction process in the overall project. Ulrich (2000) proposed and looked at the effects of healthcare environmental design on medical outcomes. It focuses on the improvement of healthcare design and suggests various parameters within healthcare outcomes such as noise, sunny rooms and their impact on patients, multiple occupancy vs single rooms, flooring materials and furniture arrangements. The paper would indicate from its findings, a need for a BIM contingent/process to be considered, which would encompass most if not all factors discussed throughout the text. Barista (2012) identified improved coordination of ultra-complex building systems and ability of real-time visualizations as key

advantages of using BIM for healthcare facilities design. Sullivan (2007) highlights advantages of BIM to support various construction processes such as health and safety, planning, constructability and coordination, risk and so forth. He also highlights the benefits of a fully coordinated BIM to reduce risks associated with health care industry projects. Similar views have been expressed by Pommer et al (2010), who have looked upon favorably on relevance of lean construction methods in BIM healthcare design. Manning & Messner (2008) discussed case studies in BIM implementation for the programming of healthcare facilities. They drew attention to a rising cost of construction and inherent complexity of healthcare construction projects and highlighted the opportunity of BIM-based information and analysis early in the development of healthcare construction project. In a similar study, Pommer et al (2010) highlighted various complexities of healthcare projects particularly related to building systems such as indoor environmental quality, cooling and heating loads, quantity of medical equipment and relevance of BIM to address these complexities.

Chanfeng et al (2007), introduced and presented a case study in developing a space centred CAD tool which gives designers an insight of how to effectively manage information and user requirements during conceptual design. They focused on areas related to healthcare, using BIM within an Alzheimer clinic, paying particular attention to how all design criteria can be stored and shown within building space areas, focusing on how the use of information mediums such as pictures, how photography can be transmitted in an effective way, and suggests it is a good way of remembering a room or structure, as it can be seen like a photograph visually. They also highlight and make an emphasis on what space in a building is and how it affects any or all activities being carried out, including limitations dictated by existing space and surroundings. Oloffsen, Lee & Eastman (2007), discuss a case study relating to the advantages seen by implementing virtual design models for the coordination of elements, such as mechanical, electrical and plumbing (MEP) within a healthcare facility. This discussion brings to the attention the advantages of BIM and how it can be used to integrate the various disciplines such as MEP within healthcare to be coordinated. Particular emphasis was made to how costs could be reduced using this overall process, and the type and level of information that needs to be attained using BIM. Leading from this, benefits of such an appraisal within a healthcare facility are also shown and discussed in a case study presented by Chen, Dib & Lasker (2011). They bring to the attention initially the benefits of building information modelling in healthcare facilities, and indeed do concur with Oloffsen,

Lee & Eastman (2007), the importance of this process within MEP. However, they bring to attention its role in the commissioning process and discuss how this is related to the building's lifecycle, suggesting that commissioning and validation process starts as early in the buildings acquisition process as is possible, and through its lifetime. These benefits looked favourably at the healthcare establishment used to present this case study.

Leite, Akinci & Garret (2009), presented a case study to discuss the identification of data items needed for automated clash detection in MEP design coordination. The authors highlight a similar vain of thought regarding MEP, however emphasis is placed on the use of clash detection within the MEP contingent. It compares a manual method of clash detection using 2D drawings, to a BIM process, and suggests that the BIM process was far more accurate. Rizal (2011), identifies and discusses the challenging roles of clients, architects and contractors through BIM, paying attention to how these disciplines correlate within a BIM environment. Building information modeling has seen to be a very useful and creative tool within the AEC industry and healthcare design, to centralise all information within one model and to be able to see a functionality of the components within such a model. Generally, this process could be seen to have advantages and disadvantages, and are generally seen as;

- Drawing reduction – a continuous 3D CAD model for all stakeholders to view the single model on one central network , Chanfeng et al (2007);
- To improve productivity – time saving measures with centralised information;
- Reduces conflicts and changes during construction – adds value to the project because of minimal errors during production of the BIM model;
- Clash detection – advises the end user of any structural clashes that have taken place or are about to take place, design can be reintroduced into that are of construction;
- Group members should be able to communicate any and all technical developments and design, and be able to implement any changes;
- Be able to assign responsibilities;
- Contractor can use BIM, and have the appropriate software to read drawings either remotely, i.e, from a laptop on site, to full operation and input of information from the main contractors original software and access from a central web server, Chanfeng et al (2007);

- Insurance - design mistakes, errors puts the project out of time and so compensation and/or liquidation damages/ costs could be incurred.

Howell & Batcheler (2005), highlight that lessons were also learned from the early preconception of such systems, within it's development, and also concurs to what was suggested by Yan & Damion (2007) - "BIM has its flaws". The points highlighted in their paper are indicated;

- The size and complexity of the files that BIM systems create, Kaleigh (2009) also concurs to this observation, and carries on, for complex projects, the scalability and manageability of a fully loaded BIM project database represents a major challenge;
- Sharing BIM information as drawing files;
- The need for increasingly sophisticated data management at the building object level;
- A contradiction in work process when using a single detailed BIM to try to represent a number of the alternative design schemes under consideration;
- Managing "what if" scenarios for engineering design – Using a single BIM model for building performance modelling (i.e. energy analysis, sunshade studies, egress simulation, etc.) does not provide the flexibility needed by consulting engineers to conduct a multitude of "what if" scenarios to study alternate approaches and to optimize design alternatives in order to maximize energy efficiency, ensure fire and life safety compliance, achieve structural integrity at minimum cost, etc;
- The expectation that everyone on the project team will adopt one BIM system.

3. Relevance of Mobile BIM to Support Onsite Work.

This section discusses relevance of mobile computing with a focus on construction phase of healthcare projects. As identified previously, construction projects are relatively complex in terms of their scale. Sites for major healthcare facilities, such as hospitals are hazardous and dynamic by their very nature. Also, specialist nature of various health-care projects make projects quite information intensive. Key advantage of mobile computing for such large projects include reliable and updated information, decrease time and cost in construction operation, decline in faults, accidents, increase in productivity, better decision-making, quality control, etc.

Fragmented nature of various construction operations coupled with site conditions pose challenges to free flow of information to and from the construction site. Even though in recent years there has been a great deal of automation and use of sophisticated BIM programmes to support design work, benefits of such automation are usually limited to design offices. Out on the construction site, printed drawings are still most prevalent method of communication. Recent developments in the area of broadband wireless technologies, mobile technologies and cloud computing provide tremendous potential to enhance construction management practices by readily providing relevant information to concerned professionals. A key challenge in construction management has always been lack of communication and collaboration between key stakeholders. Developments in technologies and corresponding processes promises to address these challenges by bringing improvements to the whole project starting from initial design to the lifecycle of the facility through an integrated approach to information management. As highlighted by Shen et al (2009), “these technologies provide a consistent set of solutions to support the collaborative creation, management, dissemination, and use of information through the entire product and project life cycle”. The use of mobile BIM particularly for the construction phase will make more improvement to project management mainly by reducing the uncertainty and limitations and overcome the challenges by organising and controlling as-built with as-planned progress in construction project. “The emergence of mobile computing has the potential to extend the boundary of information systems from site offices to actual work sites and ensure real-time data flow to and from construction work sites” Chen et al, (2011). Mobile Computing also plays a key role in management of information generated during a construction project. Construction projects are very information intensive and a typical project generates tens of thousands of documents in the form of drawings, change orders, request for information, etc. For effective communication and coordination, it is important to manage this information flow in an effective manner. Wilkinson (2005) defines ‘construction collaboration technology’ as a combination of technologies that together create a single shared interface between two or more interested individuals (people), enabling them to participate in a creative process in which they share their collective skills, expertise, understanding and knowledge (information) in an atmosphere of openness, honesty, trust and mutual respect, and thereby jointly delivering the best solution that meets their common goal. Using mobile BIM it is possible to create such a collaborative platform bringing together site-based and office based personnel. Mobile computing technologies provide engineers

unprecedented opportunities to innovate the existing processes of construction projects Kim et al, (2011). However, a lot of recent implementation of mobile technologies within construction has failed. A key reason has been technologies have been implemented without adequate consideration of organizational need and corresponding process change. If technologies are not implemented without corresponding process change, they may automate existing workflows without bringing any tangible process improvement. In his landmark report, Egan (1998) advised construction industry, stating that, “New technologies can simply reinforce outdated and wasteful processes. The change should be approached by first sorting out the culture, then defining and improving processes and finally applying technology as a tool to support these cultural and process improvements” Egan (1998). Thus, for effective implementation of mobile computing and BIM technologies, it is important to understand the organizational and process context prior to implementation of technology.

In order to ensure good alignment between BIM technology and corresponding processes and organisational strategic objectives, it is imperative to explicitly outline how the needs and requirements of the project will be mapped to technical standards, team member skills, construction industry capabilities, and the technologies that will be used. Through the development of this plan, the project team members and project management outline their agreement on how, when, why, to what level (e.g. site supervisor, foreman, worker) , and for which project outcomes BIM modeling will be used Autodesk (2012). Having such plan in place will ensure that there are adequate supporting processes in place to support implementation of BIM technology. Integration mobile construction workers in the BIM workflow and information distribution chain, the decision-makers’ obtains reliable data and real-time from point of work to speed up workflows and enable informed decision making. However, industry needs to overcome various technological challenges to enable smooth workflows. Industry Foundation Classes (IFCs) are currently the key method of data exchange. However, the initial problem with IFCs is that it is not intended to store and carry relevant data for all multi-featured construction processes. Furthermore, not all relevant data can be structured in a single super schema Redmond et al, (2012). This may necessitate learning from experiences in other industries to ensure smoother dataflows. Recent developments in the area of cloud computing can also support uptake of mobile computing. Mobile platforms are limited by their size and memory. By making only relevant bits of information available from the cloud using intuitive interfaces has the potential to further drive uptake of

mobile BIM in construction. This will allow construction project information to be much lighter, easily reached from any computers or tablets such as iPad and iPhone, and are easily updated. The function of this system is simply store the project information in the cloud computing and access it by for example, the project team in the field or where and when they want, even without the internet. In the meanwhile, the internet operates with computer and other devices and combined with cloud-based tools which would make data and information more accessible to the staff, yielding key benefits such as cost/time savings, owner satisfaction, improvements in information access, sustainability, team integration and access to BIM visualisation Bringardner & Dasher (2011).

4. Conclusions.

The review indicates huge potential to improve current delivery of healthcare projects using mobile BIM technology and processes. The case studies discussed in the review highlight and give an indication of how BIM is being utilised, and suggests any and all impacts this process may have within a healthcare environment. While a key emphasis of existing BIM deployments has been on certain low hanging fruits such as trade coordination and construction documentation, the future possibilities of a multitude of applications using analytical capabilities of BIM technology are enormous. The dominance of VDC and BIM in the design and construction industry will “tip” when it becomes measurably more efficient, productive and profitable to use that project process” Strazdas (2011), has proposed and highlighted that BIM is becoming more “mainstream”, and also suggests that, “one expects to build the models with much more information on a systematic basis as time goes on”. Parallel developments in the area of mobile computing, cloud computing by providing real-time information and applications to and forth from field personnel. However, it is important to realise uptake of mobile BIM will require industry to address various process and organisational level challenges and take adequate steps to facilitate uptake of improved processes using improve technologies.

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B - GRIN - April 2016

HEALTH AND SAFETY IN THE CONSTRUCTION INDUSTRY: AN OVERVIEW OF THE EFFECT OF GENERAL PROCUREMENT AND HSE LEGISLATION ON CONSTRUCTION CONTRACTORS AND EMPLOYEES

SUBMITTED: April 2016

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SUMMARY: The management of health and safety is an issue that is relevant and crucial to all organisations across all industries, to include traditional industries, commercial, information technology (IT), the National Health Services (NHS), care homes, schools, higher educational institutions, travel and leisure, etc. Health and safety is specifically significant and crucial for the construction industry. In the United Kingdom, the construction industry is the largest of all industries. It accounts for about 8% of gross domestic product, employs about 10% of the national workforce and generates an annual turnover of up to £250 billion. The UK construction industry has a global reputation for the quality of its work and yet it remains one of the most dangerous industries in the nation. The research is based on a strategic approach to dealing with three major issues with regards to health and safety in the construction industry. First, the paper will identify and deal with the problem of how to improve organisational health and safety (OHS) through the monitoring of the process of procurement in construction projects. For instance, there is a strong belief in the construction industry that any organisational culture of any bidder chosen for a particular project will have an influence on the entire project. Hence, there is a need for the contractor to properly scrutinize bidders with regards to how they handle OHS and how this reflects on their organisational culture. In addition to the proper scrutiny of a client's OHS record, there is also an issue of financial and legal status of a client with regards to indemnity or any insurance considerations in the case of construction accidents. That is, can a client be

held accountable for an accident? What type of accidents that will happen during work on the project that the client will be accountable for? Secondly, this paper will address the issue of cost-effectiveness in construction projects and how OHS is dealt with simultaneously. For instance, in the process of choosing a bidder, sometimes contractors may tend to ignore health and safety issues and decide to choose a client that will result in cost savings, or choosing the highest bidder irrespective of OHS concerns. Hence, there is a risk management concern to be dealt with in such cases. Third, the paper considers what type of strategic decisions and the responsibilities of both the contractor as well as the client in terms of dealing with OHS with regards to construction projects.

KEYWORDS: NHS, OHS, construction, finance, health & safety, bidder, cost, risk, management, strategy.

1. INTRODUCTION

While the figures for the number of work related injuries in the construction industry have been steadily dropping since 2010/11, when 50 workers were fatally injured in 2014/15 where 35 workers died as a result of work related accidents (Health and Safety Executive, 2015), the economic costs still add up to about £500 million and 1.7 million working days lost due to work-related injuries and ill-health (Health and Safety Executive, 2015).

1.1 OVERVIEW

Health and safety is very important to all areas in the building/ construction industry. It has always been considered very important as it is considered to be a greatly exposed sector when it comes to occupational accidents. Indeed, improvements have been made in health and safety performance in some aspects of the construction industry, very little attention has been given to how the process of procurement impacts within the industry, with underlying themes of financial and legal liabilities and accountability for accidents. This has been seen in most countries – the reality is that the construction industry continually has injury and fatality statistics that make it one of the most dangerous industries in which to work predominantly, and how these statistics bear up within the organisational culture. Cutting corners, to deliver a project on time and to forego any relevant health and safety legislation, indeed to win a contract illegally, within the jurisdiction, is becoming a concern. In view of this and as a result of

the increasing number of accidents, the development and publication of standards and good engineering practices based on experience and codes started. In the UK for example, the required documentation is published in accessible outlets and forms such like official governmental publications, laws, directives and in standards, such as Health and Safety at Work Acts (HSWA, 1974). The principle aim of this paper is to give a general overview of the current state of health and safety in the construction industry, and to discuss the procurement, monitoring, cost effectiveness and strategy. It will explore methods used by stakeholders in the construction industry in terms of improving OHS, it will look into various aspects of these strategies, to include those to improve OHS through procurement, the economic priority of these strategies and the various responsibilities and duties of the stakeholders involved in the industry in terms of designing and implementing strategies that improve OHS

2. LITERATURE REVIEW - GENERAL DOCUMENTATION AND SOURCES FOR RESEARCH

Research into effectiveness of HSE programs and best practices are relatively plentiful. This paper will focus on reports, studies and other sources that examine the UK construction industry or are otherwise most relevant to conditions in the UK. The Health and Safety executive releases yearly statistics on construction work place injuries and their economic implications. Their yearly publications can be compared to understand the trends in workplace injury and illness numbers. The Statistics For Workplace Injuries in Construction reports also give figures for specific economic costs like healthcare losses and productivity losses due to injuries and illnesses.

2.1 STATISTICS FOR WORKPLACE INJURIES IN CONSTRUCTION WITHIN THE UK

A report published by HSE in 2014 revealed that about 69,000 cases are reported in the construction sector pertaining to work related illnesses in the UK. Of these around 64% relate to musculo-skeletal disorders. The report further highlighted the fact that around 3% of total workers in the sector sustain injuries such as slips, trips and fall, lifting and handling, falls from height, and being struck by object. These injuries have led to loss of 0.5 million working days for the companies in the country. The loss in working hours due to injuries in the sector is in addition to the loss of 1.2 million working days due to work related illnesses.

2.2 INDEPENDANT REPORT CRITICALLY EXAMINING CURRENT RULES AND SHORTCOMINGS OF THESE RULES (INCLUDES PROBLEMS WITH OVER-REGULATION)

An independent report published in 2011 examined shortcomings of the current health and safety rules and regulations. The report examined about 200 regulations and 53 approved codes of practices of HSE. It was found that the main problem is not with the rules and codes per se, but the way that they are implemented. There are inconsistencies in the way that regulators enforce health and safety rules. Moreover, the problem is also sometimes caused due to influence of the third parties that focus on unnecessary paperwork or go above the regulatory requirements when implementing workplace safety rules in the company. Lastly, there are some problems with some of the safety rules themselves in that they lack clarity, structure, and in some cases application.

2.3 HOW USING A COST BENEFIT ANALYSIS MODEL CAN HELP REDUCE WORKPLACE INJURIES

Another pertinent issue relating to workplace safety and health in the construction sector is that there has not been any significant focus on conducting cost benefit analysis (CBA) of activities to help prevent accidents at the workplace. A research study surveyed 79 contractors to find out their view on whether the benefits outweigh costs involved in accident prevention actions. It was found that the benefit to cost ration according to contractors as 3:1. Using a CBA analysis model can help influence the decision making process that relates to preventing accidents and injuries at the workplace.

2.4 SUGGESTIONS FOR SPECIFIC COST BENEFIT ANALYSIS MODELS TO ASSESS COSTS OF ACCIDENTS TO CONTRACTORS

The HSE had introduced an on line interactive tools in 2005 for the contractors to evaluate associated costs of accidents for the company. That said, the online tool did not offer sufficient details to properly gauge the true costs of accidents. Companies need to be provided with an effective CBA framework that helps them better manage health and safety issues. The framework should include such tools as net present value (NPV) and willingness to pay (WTP) that will better help decision makers in assessing

outcome of different strategies, and thereby make decisions in a structured manner.

2.5 REPORT CONCERNING BEST PRACTICES IN PROCUREMENT TO DECREASE ACCIDENTS

Institute of Civil Engineers (ICE) had published a report in which they highlighted best practices to prevent workplace accidents. The report stated that workplaces accidents and injuries can be prevented by focusing on health and safety during procurement of construction related services and works. Companies need to ensure that the contract terms on which services are procured comply with work and safety legislations. Subcontractors must be chosen based on the criteria of adhering to health and safety regulations, and not on the basis of price alone.

2.6 STUDIES ON OHS ISSUES IN WORKPLACE AND CREATING INTERVENTION STRATEGIES.

In 2007, HSE had analyzed health and safety issues relating to procurements in the construction sector. The report surveyed public sector clients and private sector suppliers. It was found that only some of the public sector clients performed well when it came to meeting health and safety obligation. There is a lot that needs to be done to embed safety and health responsibilities with the procurements process. HSE conducted similar survey two years later in 2009 and found that respondents feel little progress has been made during the intervening period in this regard. Most of the respondents stated that there needs to be significant improvement on how the public sector clients fulfil their responsibilities related to health and safety during the procurement process.

2.7 STUDY ON HOW WORKERS ARE AFFECTED BY HSE REGULATIONS

A number of factors have been identified by research scholars that influence attitudes regarding safety at the construction sites. Langford, Rowlinson, and Sawacha studied attitudes using a research model that linked safety management implementation strategies, attitudes of workers about safety, and behavioural factors displayed by the workers at site. The study was able to identify 56 variables that directly influences attitude of the workers towards safety. Of these five factors were found to have a major influence on safety attitudes that include industry norms and culture, organizing for safety supervision and

equipment management, management behaviour, and risk taking attitude of the workers.

2.8 DISCUSSION ON CONTRACTOR SELECTION METHODS

Contractors should be selected carefully by using effective selecting modelling methods. These include Multi-attribute analysis, Bespoke approaches, Cluster analysis, and Multivariate discriminant analysis, Multi-attribute utility theory. Multiple regression, and Fuzzy set theory.

2.9 LEXIS NEXIS RESOURCES ON LEGAL IMPLICATIONS OF WORKPLACE INJURIES

There are legal implications for the companies of workplace related injuries. UK laws states that a claimant can sue the company in court and receive compensation if it is proved that (1) the company had a duty of care, (2) there was some business relationship with the party, (3) the injury incurred by the claimant was foreseeable, and (4) it is just, fair, and reasonable to impose the duty of care.

2.10 MIT MODEL FOR STRATEGIC DECISIONS FOR STAKEHOLDERS AND CONTRACTORS

The legal complications and other costs attached with workplace injury necessitates the need for implementing tool to assess and lessen the risk of injury at the workplace. One such tool that has been suggested by scholars that can help companies to integrate OHS risk management in the process is ToolShed that has been currently being tested in the Australian construction industry. It is an innovative decision support and information management tool that relies on a web-based architecture to offer support through knowledge acquisition and work process modelling.

2.11 HSE IMPLICATIONS IN THE DESIGN STAGE

A number of studies looked at the implications of health and safety during the design stage. It has been found that decisions that are made upstream from the construction site greatly influence worker safety. A definite link has been found between design for construction safety and fatalities at the site. In fact, a study had found around 224 fatalities that were somehow related to inefficient workplace safety design. This shows important role of designers in ensuring safety at the construction site. A study has found that

designers play an important role especially during the initial stage of the projects. The importance of construction contractors increases during the middle and final leg of the project. This is contrary to the common view that construction contractors are solely responsible for safety at the workplace. In the US, for instance, only one third of design firms stated that they made design decisions based on safety conditions at the workplace.

2.12 DECISIONS FOR STAKEHOLDERS

Construction companies are recommended to select contractors based on multi attribute analysis technique and prequalification criteria using weightings to mirror the importance of the respective criteria. The goal according to some scholars should be to select the most suitable contractor that is able to deliver the project while ensuring the best value for money. Note that the selection should be based on the best value for money and not price. This is possible by implementing fuzzy decision model that takes into account multiple criteria for selection of construction clients, relationship among decision criteria, and preferences of construction clients relating to criteria for selecting the contractor.

3. MONITORING OF PROCUREMENT

Unlike many other industries that are involved in mass production, the construction industry tends to focus on one-prototype projects (Sabol, 2007). However, according to Lenzen and Lundie (2012) there are certain comparisons to be made between construction and mass products: cases where a prototype from construction emerges as a model, and this model in turn is then replicated. Also, unlike the case of mass production, in construction the client is normally the one that takes the initiative in having the constructions designed and build (More and Joshi, 2014). In such as a case, the client pays for the construction and remains the actor (More and Joshi, 2014). The client is the one that places the order for the construction - hence he may sell or even let the construction for a later period (More and Joshi, 2014). And in all construction projects, there are different types of clients: those involved in one-off requirements (Takim, 2008), organisations involved in a regular process of development, as well those with huge development programmes that tend to employ technically skilled staff (International Labour Organisation, 2001). So, as the clients take the initiative in placing an order for a construction project, the contractors and other industry consultants on the other hand work on the continuous

process of developing markets for their products and services (Rundquist *et al.*, 2013). This comes with the development of certain private to public partnership models that involve a process of pre-financing the initial costs of construction to the client. Contractors and consultants are also often involved in trying to convince potential clients through the provision of feasibility studies for upcoming projects as well free costs (Vadnjal, 2011; Stroe, 2013). Some studies have tried to identify a procurement path, for example, (Smith *et al.*, 2004; Babatunde, Opawole and Ujaddughe, 2010). Such a path involves the client trying to engage the private sector for various construction activities, such as conducting feasibility studies, design, building, operation, and maintenance (Smith *et al.*, 2004). The client therefore has the onus of defining a procurement path. Hence according to Miller *et al.* (2009) depending on the in-house capabilities, knowledge and understanding of the construction process itself, as well as the client's demands, the client must define a procurement path. However, Janak (2010) states that the most common form of procurement for all construction contracts is general contracting. In this regard, the client engages a team of designers; such a team designs the product to be built; and then the design team, on behalf of the client, engages the services of the contractor who only has a relationship with the design team. However, Hagstedt and Thideman (2013) in their Master's thesis, they state that such a model is only useful in the case of simple and straightforward construction projects. Nowadays, many construction projects require multidisciplinary skills during the design phase. The design team often needs the support of specialists. Hence, the design team may have to procure the services of specialists such as subcontractors and advisors. This kind of model is one recommended by O'Brien, Soibelman and Elvin (2003). However, according to Sacks *et al.* (2015) the problem with such a model is that the design team will have to coordinate the inputs of the various advisors to the construction project. Therefore, as Sacks *et al.* (2015) state a lack of coordination will often lead to a mismatching of design inputs and that of construction inputs. Most often the contractor has a responsibility of filling in or adjusting the design that was provided by the design team. In addition to this, according to Sacks *et al.* (2015) the contractor will also have to plan delivery of inputs. The procurement time of some specialist equipment may normally take a long time - such as the entire construction process. Hence there is a need to procure the services of subcontractors well ahead of the commencement of the project (Clegg, Kornberger and Pitsis, 2011).

3.1. Strategy

A "strategic" point of view of an inventory network idea was developed in the 1980s which in this way advanced into strategic procurement (Porter, 1985; Christopher, 1992; Lamming, 1992; Lamming and Cox, 1995; Ross, 1998). Regularly this included situating such a method intensely in the commercial area by creating proper sourcing and administration methodologies for suppliers. Porter (1985) built up the idea of a "value chain" as an apparatus to enhance aggressive advantage in an industry. In addition, the idea of key acquirement organization, which is the progression of an outside sourcing and supply method planned to keep up a reasonable position for that organisation, in regards to procurement Lamming (1995), identified the significance of supplier advancement through united business associates and vital strategic community oriented organizations to empower an enhanced production within the company to occur. He termed this lean supply. Lamming likewise suggested that fulfilling a lean method technique is a matter in perspective of the method for competition in business areas, in light of the way that the suppliers are incorporated in the meantime in a couple of other distinctive chains Strategic procurement is much more extensive than the lean development. It is an idea relevant to architectural, engineering and construction disciplines. An important part of strategic procurement can be seen with the co-operation of multiple companies, and as such has developed since the 1980's as such collaborations have indeed developed in one business after another (Gomes-Casseres, 1996).

Ross (1998), recognized and suggests two levels in conceptualizing production network administration, to be specific the strategic and tactical, his examination focused on the rising vital abilities of the production network administration idea. He states that, quote - "Procurement management is a continuously evolving management philosophy that seeks to unify the collective productive competencies and resources of the business functions found both within the enterprise and outside in the allied business partners located along intersecting supply channels into a highly competitive, customer-enriching supply system focused on developing innovative solutions and synchronizing the of marketplace products, services and information to create unique, individualized sources of customer value". However, procurement issues, within the AEC area, does lead and can produce traits for the unscrupulous, to obtain an advantage over other rival companies in the need to seek contracts.

4. VETTING BIDDERS FOR CONTRACTS

Under the current Health and Safety laws in the UK, both the client and the contractor have responsibilities to reduce the risk of work-related injuries and illness. Clients need to develop and deliver a clear policy in regards to the HS standards they expect from contractors. This policy needs to be well publicised so that agents on the client side like procuring officers and contractor side like the tendering officers understand the priorities of the client (Wells and Hawkins, 2013). The clients should also have realistic expectations in terms of health and safety and this can be achieved with a survey of the market and making sure that the criteria they are setting can be met by the available market. This analysis of the market should include the OHS regulatory framework already set in the market and a study of the common OHS strategies used by contractors in the market.

In the past few years, there has been an increase in the risk models that contractors can use during the bidding process to allocate risk contingencies. Some of the risk models that have been introduced for assessing risks include influence diagramming based technique (Al-Bahar and Crandall, 1990), fuzzy set model (Tah et al., 1993; Paek et al., 1993; and Zeng et al., 2007), and logic based ANN model (Liu and Lang, 2005). However, most of the recent research studies have shed light to the fact that the risk assessment tools are not commonly used by the contractors. Only seven contractors in UK were found by Tah et al. (1994) to have used risk assessment tools to assess the risks during the bidding process. Moreover, Akintoye and MacLeod (1997) and Norman, 1993; etc.). Capital market and portfolio theories state that there are two types of risks present in the market (Fisher and Jordan, 1996). The first is the systematic risk that is outside the control of the organizations such as interest rate and market risk, purchasing power risk, and natural calamities. The second type of risk is the unsystematic risk that is inherent to organization and can be controlled. It includes financial and business risk. Both these risks are also relevant to the construction sector according to Dorfam (2002) and Tah et al. (1993). Fisher and Jordan (1996) state that one way of estimating the price that meets the profit target is through quantifying the risk and setting a required rate of return. The rate of return takes into account a risk free rate and also compensation of the individual risk factors. Connolly (2006) said that the risk element contains costs that in some cases can be catastrophic. But estimating the price risk is not that easy as has been revealed in a survey of 400 top contractors in the US (Mochtar and Arditi, 2001).

Mulholland and Christian (1999) conducted a conceptual study in which an analytical approach was

taken to assess the risk in the construction projects. It was found that projects that are undertaken in dynamic and multifaceted environment results in high risks and uncertainty that is compounded by the time constraints. Flanagan and Norman (1993) say that every construction project has some unique features and risks. On the other hand, Wright and Ayton (1994) are of the view that risks are not unique in the sector. Hughes and Hillebrand (1985), state that there are a number of factors that makes the construction industry unique. They are of the view that the there are a number of factors that are contractual, economic, environment, and political in nature all affect how construction work is awarded, reported, and described. Some of the factors outlined by the authors that affect construction sector include competitive tendering, production, preliminary expenses, low fixed capital requirements, tendency to operate with low working capital, delays to cash inflow, government interventions, seasonal fluctuations and effects, and uncertain weather conditions, unpredictable ground conditions, and no long term guarantees or performance liability.

5. STRATEGIC DECISIONS IN CONSTRUCTION PROJECTS

It is important to consider health and safety issues through the entirety of a project, from planning and design to construction and evaluation. This will not only reduce costs but improve productivity through better predictive capabilities and management of operational and production costs. Proper integration of Health and Safety strategies into the processes will also allow for innovations in the design and construction processes of the project (WorkSafe Victoria, 2010). Contractors undertake the construction project using a team comprising of different department. Most of the contributors make decisions that affect health and safety at the worksite. In some cases, the project team consists of external members such as advocacy groups or regulatory agencies. It is important that the construction company identify health and safety issues relates to the sector during the decision making process. A construction company should understand interests of all the stakeholders and establish proper processes while complying with the highest quality health and safety standards that are specific to the sector. The company should make sure that decisions made in response to interests of the stakeholders are consistent with the OHS standards.

The supply chain in the construction industry is fragmented with very little communication taking place between the individuals that initiate, manufacture, design, utilize, and/or maintain the facilities. Lack of

communication between different team members can prevent establishment of shared goals and objectives that will negatively affect health and safety at the organization level. Poor communication and the formal distance between the construction and the design department is especially identified as a major barrier to implementation of effective health and safety procedures within the organization. It has also been linked with higher incidence of fatalities at the construction worksite. As compared to other department, constructors have a deep understanding of the processes mainly due to specialized knowledge, training and expertise of the individuals. Moreover, they are directly responsible for the project outcomes. As a result, they usually have a greater interest and motivation in ensuring the work is performed safely with minimum safety and health risk for the workers. They can provide advice to the decision makers about OHS before the start of the construction process. When they fed knowledge about the construction process 'upstream' at the initial phase of the construction project, it will result in better decision making with greater chances of health and safety risks being reduced eliminated completely at the source

6. FINANCIAL AND LEGAL IMPLICATIONS WITH CONSTRUCTION ACCIDENTS

There are several pieces of legislation relevant to workplace injuries and accidents in the UK. The first concerns reporting and is called the Reporting of Injuries, Diseases and Dangerous Occurrences Regulation (RIDDOR) and was enacted in 2013. The regulations state that employers and people in control of the workplace are responsible to report the included accidents, diseases and any dangerous occurrences. In the UK, the Health and Safety Executive monitors and enforces health and safety laws and regulations. There are several pieces of legislation relevant to workplace injuries and accidents in the UK. The first concerns reporting and is called the Reporting of Injuries, Diseases and Dangerous Occurrences Regulation (RIDDOR) and was enacted in 2013. The regulations state that employers and people in control of the workplace are responsible to report the included accidents, diseases and any dangerous occurrences. In the UK, the Health and Safety Executive monitors and enforces health and safety laws and regulations. The construction sector plays a major role in the economic development of almost every country in the world. That being said, the work involved in construction is regarded as the most hazardous as compared to other industrial activities. Injuries incurred while performing

construction work is about 50% higher as compared to all other work (Schneider, 2001). The risk of musculo-skeletal injury is especially higher among construction workers. Accidents and mishaps at the construction sites results in injury and/or death of many worker every years. That is why it is of fundamental importance for the construction company to assess the risk at the work site, and take effective measures to minimize the risk. Through continuous monitoring and surveillance, the work related injury risk can be minimized (Odetoyinbo, 1986). According to Lucy et al (1999), work related accidents are unexpected and unplanned occurrences that results in loss of productivity due to disturbance in the planned work sequence, injury, and damage to the plant and equipment that interrupts normal flow of production. O.S.H.A (2005) reports that about 60,000 deaths occur every year around the world due to mishaps at the construction sites, and the rate of fatalities in the sector is much higher as compared to others. A study conducted by Jaselskis and Suazo (1994) showed that most of these accidents occur due lack of commitment to workplace safety.

7. COST EFFECTIVENESS

Compromising on health and safety for short term cost benefits when designing HS strategies is not always beneficial. Any cost-benefit analysis done on the project should take into account the risk of injuries and illnesses and their expected costs when adjusted for risk. Most models predict that making decisions after factoring in possible costs from injuries and illnesses will show that greater priority on health and safety results in cost savings. Industrial and academic model creation tools like including multi-variation analysis, fuzzy set theory and multiple regressions can all be used to create an optimal model that takes into account HS considerations. According to Baccarini (1999) the success of a project is synonym to effectiveness. In other words the degree of achievement of project goals determines its effectiveness. Project team is formed to achieve and accomplish goals and the success of the project is determine how well those goals have been achieved. The top project priorities include completing the project on time, within the budget, and meeting technical specifications and mission. This corroborates with findings of De wit (1988) who found that that success of the project depends on the achievement of project objectives relating to quality, cost, time, and mission. According to a number of researchers the success factor in the construction industry relates to *effectiveness* and *efficiency* measures (Atkinson, 1999; Belout, 1998; Crawford and Bryce, 2003; De Wit, 1988; Brudney and

England, 1982; Pinto and Slevin, 1988:1989; and Smith, 1998). The term efficiency refers to maximum output obtained by utilizing a given level of resources, while effectiveness refers to achievement of objects and goals relating to the project. Pinto and Slevin (1988:1989) say that both the *effectiveness* and *efficiency* measures determine success of the project. Efficiency measures relate to internal organizational structures and strong management such as adherence to budget and schedules, basic expectation regarding performance, etc. It can also be said that efficiency of a project relates to user satisfaction, meeting project goals and objectives. All the factors jointly play an important part in success of the project. A project that is completed within the budget, delivered on time, but does not conform to user's requirement will not be confirmed a success. Project efficiency can only be achieved when the a standard methodology and system are out in place by the company management (George, 1968). This aligns with the findings of Nyhan and Martin (1999) and Smith (1998) who says that the efficiency of the project relates to effective utilization of human resource and equipment, while effectiveness relates to outcome of the project. Maloney (1990) suggest that the efficiency of projects in the construction sector depends on the effective utilization of resources. This may be represented by the ratio of resources required divided by the resources consumed. Effectiveness of the project, on the other hand, depends on the achievement of organization's objectives. Cameron and Whetton (1993) contributed to the knowledge of product effectiveness and efficiency by demonstrating that a system is effective only when the objectives of the project are achieved. Since most of the construction projects focus on client's needs, an effective project is one that effectively meets the needs of the client. Crawford and Bryce (2003) state that the success of the project is determined by evaluating effectiveness and efficacy of the project. Project efficiency or 'doing the things right' relates to process and cost efficiency. In other words, it refers to efficient conversion of inputs to the output while remaining within the schedule and budget. Efficiency also relate to evaluating project success based on the effectiveness and efficient utilization of financial, human, and natural resources. Effectiveness on the other hand refers to 'doing the right thing' is related with development of appropriateness and worthiness of the chosen project goal. A project may be executed efficiently or implemented ahead of cost and time schedules , but if the goals are not set right or that does not address the core vulnerabilities of the project it will not be considered a success. For this reason it is important to conduct a strong initial development problem analysis to ensure that the project goal address all the factors that will have a

great bearing on the success of the project. Atkinson (1999) suggests that measuring efficiency requires assessing project success based on project management process criteria. On the other hand, effectiveness means assessing the results or outcome of the system in terms of organizational benefits and achieving project goals. In lighting of the above discussion, it could be concluded that the success of the project depends on both the efficiency (project output) and effectiveness (project outcomes) that covers a wide area (Abdel-Razek, 1997; Atkinson, 1999; Cameron and Whetten 1993; Maloney, 1990; Mbugua, 2000; Nyhan and Martin 1999; Pinto and Slevin 1988:89; and Smith 1998). In view of this, the paper discusses and documents the analysis of factors that relate to effectiveness of a project in the construction sector in the eyes of four project stakeholders namely private clients, contractors, Government, and consultants. In the first stage of the study, we examined mean values of the responses and ranked them on the basis of importance. Afterwards a detailed comparison of ranking order was made between the different groups. The second stage of the study consisted of testing the hypothesis by using non parametric testing method known as Kruskal-Wallis One-Way ANOVA (Analysis of Variance) test for an independent sample. The purpose of the study was to analyze difference in the individuals' opinions relating to the individual factors among the four groups at a significance level of 5%. The mean ranking technique showed that all the variables were significant. However, this result is meaningless and superfluous. Therefore, we conducted factor analysis technique using principal component analysis (PCA) to test the effectiveness of the variables and identify main factors so as to gain deeper understanding of the factor group that underpin success of the project.

8. CONCLUSION

The overall findings from the paper conclude and highlight statistics to accidents and ill-health within the construction industry, and gives account of several parameters to enable and deduce practices regarding the monitoring of procurement, vetting bidders for contracts, strategic decisions, financial and legal implications with construction accidents and cost effectiveness. Initially, the literature reveals several factors of sources from other areas of commerce, indeed educational institutions such as MIT, who justify a software model that can offer support through knowledge acquisition and work process modelling. Construction companies have used this software for building development in a time continuum, known as BIM, (Building Information Modelling), the knowledge acquisition element could

prove useful in such a model. The literature review depicts and highlights areas of importance to the effect of OHS. It suggests the importance of the correct implementation of rules and regulations and indicates drawbacks such as excessive paperwork, hence raising costs. It found also that organisations and companies in the public sector performed averagely when applying health & safety legislation, and also to suggest that a relatively few on-site employees knew about management implementation strategies. It was found through the research that unlike many other industries that are involved, for example mass production, a company tends to focus on one particular product or project. This was confirmed to enable easier procurement methods, to then be replicated. Numerous methods can be attributed to good monitoring, as discussed – feasibility studies, developing markets particular to the product or build and the development of “in-house” techniques or methodologies for monitoring buyers. The introduction of strategy is discussed, thus bringing forward the idea of a “supply-chain” idealism, to give an aggressive advantage in the industry hence to evolve a clearer management philosophy and to create unique, individualised sources of customer value.

Risk models for vetting bidders for contracts have indeed increased over time, using specific set modelling such as diagramming techniques, fuzzy set modelling and logic based ANN models. The research suggests that contractors tend not to use such models, which further highlights that the award of a contract from the vetting process stems from contractual, economic, environmental and political – all have an effect. Other factors discussed to conclude no long term guarantees of performance or liability. The attitude of health & safety to planning and design is also considered, highlighting and giving reason to improve costs through better predictions and management of operational and production costs. The research also deduces that very little communication takes place in the supply chain, hence the need for proper strategic decisions being able to be made and justified, within a health & safety overview in the organisation. Financial and legal implication are seen also to be of a concern, and highlighted with the use of government publications, documentation and other sources. This being said, the construction industry does observe and recognises all such legislation, however much more has to be done. Cutting costs can also have a considerable effect on health & safety strategies, research suggests that a company showing greater respect for the legislation results in cost saving. Its effectiveness is seen as the product of good management, the observation of good budget controls and a basic expectation of a good performance.

Cost efficiency would require a building or project success based on the project management system. It can be seen from this paper that many entities and parameters affect the general procurement and HSE legislation on construction contractors and employees, however further research would prove beneficial for the advancement and overview of contractor selection methods, strategy, monitoring of procurement, vetting bidders, financial implication and cost effectiveness, for subsequent development and understanding of points in the abstract.

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