**DETERMINATION OF HEALTH AND SAFETY PERFORMANCE AND COMPLIANCE IN CONSTRUCTION INDUSTRY**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PROJECT MANAGEMENT OF THE OPEN UNIVERSITY OF TANZANIA**

**2016**

# CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the Open University of Tanzania a dissertation titled "The Determination of health and safety performance and compliance in construction industry’’in partial fulfillment of the requirements for degree in Master of Project Management (MPM)

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...……………………...................

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.................................................

Date

**DEDICATION**

I dedicate this work to my family.

**ACKNOWLEDGEMENT**

I have taken effort in this study. However it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them. I thank God for providing me with everything that i required in completing this study. It was for him for taking me into his fold I was able to attain at this wonderful stage of success. I am especially grateful for my family for the understanding and bearing with me during the period, as less time was allocated for the family social life.

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**ABSTRACT**

Of recently, Tanzania has been experience sizeable growth of construction sector heightened by great demand in residential houses, office spaces, among others. This increased employment and equipment use and technological changes, on construction sites. Workers, at sites are very prone to accidents, injuries, and ill health. The objective of this study was to determine compliance and performance of health and safety in the construction industry, focusing the contractors’ workplace sites. Researcher studied the stakeholders’ role in relation with contractors’ compliance and performance for Health and Safety. Contractors are required by Law to ensure workplaces are safe and free of ill health. The study has used qualitative and quantitative methods with the use of a descriptive research design. Research looked purposive sample space of building contractors conveniently based in Dar es Salaam. Data were collected by use of Questionnaire and interviews including field observations of health and safety activities. The research finding has revealed that stakeholders regulatory role to health and safety management system is greatly poor, contractors’ performance and compliance to H&S were also found poor, and underlying causes being implementation costs being high, organizational system, and individual system, institutional system, and working environment system, among others. It was seen that responsibility of health and safety are totally left in the hands of contractor alone, with total less concern of client and other key stakeholders. On the other hand clients and consultants are poorly aware of their implied role, with a perception of H&S as costly item. Author recommended that stakeholders should be responsible in all levels of project execution phases, client to be legally involved, H&S personnel courses to be extend to other colleges including universities.

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**LIST OF ABBREVIATIONS**

AQRB Architects and Quantity Surveyors Registration Board

CEM Construction Economics and Management

CPD Continuous Professional Development

CRB Contractors Registration Board

ERB Engineers Registration Board

GDP Gross domestic Product

H & S Health and safety

HSE Health, Safety and Environment

ILO International Labour Organization

NBS National Bureau of Statistics

OHS Occupational health and Safety

OSHA Occupational Safety and Health Authority

OSHE Occupational Safety, Health and Environment

OSHMS Occupational Health and Safety Management System

PPE Person Protective Equipment

SC Safety Culture

TANROADS Tanzania Roads Agency

WCO Women’s Compensation Ordinance

**CHAPTER ONE**

**1.0 INTRODUCTION**

In many ways construction industry is very important; it is major employer in various professionals and is responsible for design and constructing infrastructures to facilitate the Countries economy development. Global economic growth necessitated development programs in terms of roads, railways, water infrastructures, bridges, residential housing estates, office facilities, Shopping malls, Sports arenas, Power dams and Stations, Warehouses and Harbours, to mention but few.

**1.1 Background**

Of recently, Tanzania has been experiencing considerable growth in construction activities especially in Dar es Salaam city and some few other cities. The high rate of urbanization has heightened demand for residential and commercial spaces. This, therefore, has provided employment opportunities to a number people of different categories, both skilled, and unskilled in the construction sector. Construction sites, have been regarded as very risky areas where workers are subject to Injuries, accidents, fatalities and ill-health problems due to its very nature of occupational undertakings. World Health Organization (WHO) lamented and alerts that poor occupational health and safety, hence, reduced working capacity of workers may cause economic loss up to 10-20% of the Gross National Product of a country.

Improving health and safety to the construction sites has been repeatedly shown to not only reduce ill-health but also save lives, time, money, and to increase business goodwill and good reputations (Kikwasi 2010). According to the regulations, employers are to provide workers with a workplace free from any recognized hazards risks impact, uncontrolled. In addition, management is to provide workers with adequate training to recognize hazards in the workplace, thus allowing them to behave safely and make safety-conscious decisions. Much effort has been invested in attempt to create a conducive work environment system, individual system well perceived in health and safety, committed organization system and institutional system. However, despite continued efforts, the industry has not gained any significant reduction in recordable injury rates in the last decade.

The accident and ill-health record of the construction sector compares poorly to that of other economic sectors such as manufacturing, mining and rail, leading to Construction’s reputation as the most hazardous industrial sector in urban areas. Moreover, deaths, permanent disabilities and severe injuries have been on the increase for building workers through major accidents and poor working conditions (Sarah; 2012). Previous studies looked at practice employed for health and safety risk assessment, communication and control at construction sites in Dar es Salaam, (Sarah; 2012). However, it is possible to have health and safe sites if effective safety management system is in place. Empirical studies suggest that the control of risks to the workplace areas should start right with inputs of external stakeholders, regulators and sound committed health and safety management system within the contractors’ organization.

The absence of Health and Safety research for Determination of Performance and Compliance studies, spotlights this gap in the research agenda that is worth further consideration in construction industry, Tanzania. The study conducted by Sarah; 2012, revealed that the active role and participation of clients, design teams and regulatory in the built environment in health and safety matters in the country is yet to be realized,(Sarah;2012) and Challenges encountered on sites, such as design complex, site configuration, site location and procurement system cannot be addressed only by a contractor, the need for a corporation of those who are involved in the project in design and procurement is necessary.

**1.2 Statement of Research Problem**

Construction industries in fulfilling the above mentioned undertaking attracts many people as employees. Employees on site need to be healthy and safer. The International Labour Organization (ILO) formulated an Occupational Safety and Health Management System (OSHMS) to facilitate the formulation, implementation and evaluation of interventions at a national policy, sector and organizational level in all countries. The Policy ingredients associated with this tool, among others, are focused as regulatory and institutional framework, a platform through which the occupational safety and health system may be implemented.

The Tanzania economic growth recorded 7% in 2015. The construction industry takes sizeable share in the economy of Tanzania, often seen as the driver of economic growth. Typically, in 2015 the Tanzania construction industry activities emerged high when compared to other economic activities in the same period. The economic growth registered was 16.8% as compared to growth of 14.1% in previous year of 2014. The contribution was due to many construction activities in residential housing projects. Also, the construction industry emerged the second in contribution of GDP as compared to economic activities in Agriculture. The contributions to the national GDP increased and reach 13.6% in 2015 compared with 12.4% in 2014. The industry also employed 3.6% of the workforce in Tanzania (NBS; 2013/2014). The nature of construction activities involving working at high altitudes, handling of hazardous materials, extensive use of machinery and equipment, etceteras, render the industry’s workers six times more prone to accidents than workers in other sectors.(John; 2008).

In Tanzania, Occupational health and safety has gained considerable attention, following putting in place, the OSHA act of no; 3 of 2003, which shifted substantial safety responsibility to employers. According to this Act, OSHA is government agency responsible to supervising and regulating all matters concerning safety and health in the workplaces. Various Initiatives have been undertaken in Tanzania to improve the industry’s image, productivity and financial standing as well as the H&S record. However, the consideration and implementation of H&S requirements on construction projects has been perceived as more of regulatory than a voluntary role, despite the tangible financial returns resulting from proper adherence. The imbalances in the growth of construction technology, the relative competences and skills of the operatives/manpower, and the infrastructure demands of the global market has led to increased H&S hazards, in construction projects.

In poor countries, like Tanzania, with fast growing workforce coupled with a growing informal sector, workers have tended to fight for job security neglecting the need for quality work life. It is argued that poor countries and companies cannot afford safety and health measures. However, there is no evidence that any country or company in the long run would have benefited from poor Health and Safety. Given the poor H&S standings in the construction industry, all the key stakeholders have an H&S role to play by virtual of their respective undertakings. Health and safety regulatory compliance and performance in the construction projects has repeatedly been indicated to save lives, time, and money, consequently, increasing business goodwill and good reputations. Safer and healthier working conditions make an important contribution to poverty alleviation and sustainable development.

**1.3 Objective of the Study**

**1.3.1 Overview**

The Construction industry has good understanding of the extent and pattern of ill-health and accidents but with little objective analysis to Health and Safety compliance and performance on the underlying influences. This study strives to provide a window to reality by providing a means of discovering what is really going on to safety and health management system practice, and latent organizational weaknesses and challenges.The study strived to theoretically and pragmatically report, the rather analytical differences in association between the occupational safety and health management system practice to objective health and safety performance. The study aims at addressing the problem with the following;

**1.3.2 Main Objective**

The general objective of study was to determine compliance and performance of Health and Safety in the construction industry, focusing the contractors’ workplace sites.

* + 1. **Specific Objectives**
1. To examine level of compliance and performance of health and safety among building contractors sites.
2. To investigate input participatory role of stakeholders in relation to contractors compliance to health and safety.
3. To determine factors determining Contractors performance and competence in identification of Hazards and associated risks assessment on sites.
	1. **Research Questions**

It is the eminent aim of this research to determine and reveal the underlying factors, compliance and performance and stakeholders’ role as they relate to performance and compliance of health and safety on sites that may not be known or just ignored for unknown reasons. This study therefore strives to answer the following specific three questions to achieve the objectives of study;

* + 1. What is level of Health and Safety compliance and conformance at contractor’s workplace?
		2. To what extent are the compliance of Contractors are related to commitment of tripartite stakeholders.
		3. What are the underlying factors for Contractors Compliance and Performance to Health and Safety?

**1.5 Significance of the Study**

The working population is exposed to several new stress factors as a consequence of globalization including the fast growing of construction and mining sectors. In addition to the well-known traditional hazards, new problems of information technology, nanotechnology and manufactured nano materials, biological risks and biotechnology, chemical risks, new organization of work and psychological stress are encountered by workers, managers and the experts. All these problems require new strategies; new approaches and new competencies. It is against this background that, the issue of workplace health and safety adherence is extremely relevant. Construction site works employed 52,000 people in Dar es Salaam region in 2014 (NBS; 2015, report).

It is believed by researcher that, the study findings, will also raise awareness level of stakeholders’ that is, Developers, Clients, Designers/Architects, Quantity Surveyors, Engineers and end users, and which will finally give new impetus to performance of health and safety, and hence wellbeing of workers on sites. Identified opportunities and challenges to Safety and health system may be utilized by Policymakers and Employers and Agencies to improving the workplace safety of employees and environment. Will, also, provide insight into key health and safety risks and control measures for site-based construction hazards and related risks.

There have been a number of H&S studies undertaken to address various challenges in the industry. These include; Performance of health and safety during construction activities by; (Jonathan, 2005*).* Evaluation of the draft occupation health and safety policy and assess its strengths and weakness by; (Nathan, 2006). The Study on maintenance of health and safety in the construction sites in Tanzania (Abdallah, 2006).Scope of previous studies mainly covered the role of contractors in different perspective, but the changes and recent development in the industry rendered and made this study appropriate.

**1.6 Scope of the Study**

Purposely sample space of contractors is strategically located in dare s salaam. Stakeholders and other participants in the study, also, located in Dar es Salaam. It is envisaged that the researcher shall adequately achieve and cover the desired sample space, forming representative for the situation in the industry. However, the difference in the level of construction activities, level of H&S supervision due to manpower shortage and technological advancements in urban and rural, construction methods might not adequately portray a clear picture, as the actual situation might be better or worse. With one of the key objectives being to investigate participatory role of stakeholders and determine compliance and performance of health and safety management system to contractors, responses to interview questions and questionnaires might not reveal a true reflection of the individual abilities, and hence shall requiring further sieving. In addition, researcher will also collect data by hold interviews and observe health and safety related activities at every contractor’s site, within sample space.

**CHAPTER TWO**

**2.0 LITERATURE REVIEW**

**2.1 Overview**

The construction industry is a vital component for many world economies as it enables the transformation of various resources, in terms of materials, labour skills, plant and equipment into constructed physical economic and social infrastructure required for social and economic growth. It embraces the process through which the physical infrastructure are planned, designed, procured, delivered, repaired, and altered maintained and demolished.

In the same respect, globalization forces coupled with extreme technological advancements has increased the demand for business premises and accommodation requirements for commercial and non-commercial purposes. This has necessitated infrastructure development in terms of roads, buildings and services, not mentioning improvement, refurbishment and renovations in already existing facilities to meet the quality demands of the market. As a result, new architectural designs taking shape in various sorts of forms and materials to achieve the desired aesthetic, have painted streets of many cities and suburbs all around the world.

The increased pace of production with reduced gangs, increased use of specialized sub-contractors, technological advancements, coupled with other factors such as unsafe designs, adoption of unsafe designs, adoption of unsafe production methods and human errors makes the nature of construction activities prone to occupational health and safety hazards and risk where incidents occasionally occur and operatives get injured and/or killed. These hazards and incidents may result from falling from high altitudes, equipment accidents, and poor handling of heavy and hazardous materials, fire, collapse of excavations and insecure works, nuisance to mention but few.

System ‘thinking’ Concept has been used in this study to show the setup on administration, roles and responsibilities in line management on construction projects organization and other stakeholders in achieving project objectives. The information flow, have impact to Safety performance. From the system thinking perspective, construction projects have been guided by regulations and system which influences the Performance, Conformance and Compliance of Occupational health and Safety in workplace. Construction activities are by nature prone to H&S incidents. These are a result of the hazards due to design complexities, human error, working from heights, use of semi-permanent structures in the execution of works, etc., leading to incidents with fatal injuries and at times death, in order to curb down on the associated hazards, Health and safety system management should be adequately implemented. This includes undertaking risk assessment and H&S consideration at design stage, H&S management during and after the construction process to eliminate all the inherent hazards.

 The enforcement of OHS issues on construction sites has been viewed as a task for the regulatory bodies such as CRB and OSHA and other international bodies like the International Labour Organization (ILO) to observe. These authorities have employed the regulatory powers vested within them to provide minimum standards for the protection of workers at work places. This has been manned through the use of Acts, Codes of Practice, By-laws, Guidelines and Regulations. The accident prevention aimed at the avoidance of specific occurrences must be planned at pre and post contract stages. The constantly changing nature of construction projects might not allow elimination of hazards resulting from the proposed time, materials, methods, procedures and equipment, and later on devise and accident prevention plan to combat them. Therefore, experience on incident analysis is a valuable requirement. Having established the ground rules of job safely, the commencement of field operation must be accompanied by the plan, it is important to note here that, accident prevention in construction is largely a human relations problem, people plan and emphasize the personal approach to job safely, through equipping workers with job safety analysis and hard identification skills.

**2.2 Definition of Key Words**

**2.2.1 Safety**

In this study, safety means freedom from danger, harm, and injury to the person involved in construction activities. Safety is related to external threats, and the perception of being sheltered from threats. Business Dictionary, it gives, safety is defined as a relative freedom from danger, risk, or threat of harm, injury, or loss of personnel and/or property, whether caused deliberately or by accident.

**2.2.2 Hazards**

A hazard is the potential to cause harm. In practical terms, a hazard is often associated with a condition or activity that, if left uncontrolled, can result in an injury or illness.

* + 1. **Health**

Health is the general condition of a person in mind, body and spirit, usually meaning to be free from illness, injury or pain. In this study health means being free from illness, injury or pain which can be caused by construction activities.

* + 1. **Accident**

An accident is a detrimental event that occurs unexpectedly, undesirable and unintentionally. In this study the term accident means an unplanned event or occurrence which may result into injury to person and/or damage to property during execution of construction activities. An accident can be;

1. Natural fatal incidents which are beyond control of human being e.g, earthquake and storm
2. Man-made accidents; caused by lack of responsibility and carelessness and/or human error/intention.
	* 1. **Stakeholder**

The Macmillan dictionary defines a stakeholder as a person or company that has in business and owns party of it. In this research the term shall refer to actors, beneficiaries, direct and indirect participants and victims of HSE effects in the construction process and products.

* 1. **Background of Health and Safety**

**2.3.1 Occupational Health and Safety**

The significant number of work related fatalities, injuries and illness were reasons for concern in the early 1900s. These concerns led to the formation of the first national compensation laws and establishment of national safety associations to serve the industry. In America, the United States (US) Bureau of mines was established in 1910 with the principle objective to prevent accidents and health related problems (German et al 1998). OHS is defined by Kalejaiye (2013) to be an interdisciplinary area mainly burdened with protecting the safety, health and welfare of people in the workplace and people that will be affected directly or indirectly by the activities in a workplace.

During the World War II years, there was a dramatic in the number of industrial accidents, following the War, there was a decrease in accident rates, which then leveled off during mid 1950, and up to the 1969 there was also an increased interest in integrating safety into a professional management systems approach. This leveling off of accident rates, at an unacceptably high level, led to the enactment of a number of safety and health regulations in the early 1970s.

**2.3.2 The Tanzania Perspective**

In Tanzania, general consideration of safety and health aspects for the workforce evolved in the colonial period with the Workmen’s Compensation Ordinance (WCO) of 1949, which covered all workers regardless of the type and duration of their employment. The main cover involved personal injury and/or disabilities at places of work inviting compensation by the employer; it was based on the same Act 1925 of Britain. Later on the government gave guidelines in terms of laws and these include the Factories Ordinance 1950 which was fairly comprehensive in safeguarding the workman’s life and the Employment ordinance 1957 that catered for care and welfare of employees.

Due to increased production activities, the government announced another piece of rules, Factories (Occupational Health Services) Rules of 1985 as an advisory mechanism to workers, employers, representatives and supervisors. Due to increased infrastructure development, globalization and production methods, the government found it apparent to put in place regulatory bodies, and then saw the birth of OSHA in 1997 under the executive agencies Act to oversee the implementation of OHS issues. The CRB was also established under the Contractor Registration Act of 1997 with the major functions to register, regulate and promote contractors. The government also enacted the Occupational Health and Safety Act of 2003 which repealed the Factories ordinance of 1985. The above were established under the Executive Agencies Act.

All the above mentioned measures and efforts have come into existence given the various production activities leading to the respective health hazards and incidents. In the construction industry in Tanzania where the nature of operation is characterized by various incidents due to the use of labour intensive methods, unskilled labour force with minimal awareness of H&E requirements In a bid to counteract the losses, a couple efforts have been put in place to curb down on the earlier mentioned losses and minimize the level of incidents and accidents thereof. On the government level, efforts have been directed to establishment of the following rules, regulations and laws

**2.4 Occupational Health and Safety Act, 2003**

In Tanzania we have pieces of legislation covering the Occupational Health and Safety of an employee and these include the Employment and Labour Relations Act, 2004. However, a more specific, relevant and direct legislation is the Occupational Health and Safety Act, 2003.The Act is aimed at protecting workers’ rights in health and safety in the workplace. It also provides for the protection of persons at work against hazards to health and safety arising out of or in connection with activities of persons at work, and to provide for connected matters.

* + 1. **Duties of a Worker Imposed under the Law**
			1. Workers must take reasonable care for the health and safety of themselves and any other persons who may be affected by his/her actions or omissions at work. They also have a duty to cooperate with the employer to enable the duty or requirement imposed by the employer to be performed or complied with.
			2. They have a duty to carry out any lawful order given to him/her and to obey the health and safety rules and procedures laid down by employer or an authorized person in the interest of health and safety. To report to his/her employer or health and safety representative any unsafe or unhealthy situation coming to their attention. May also report to his/her employer or health and safety representative any incident or accident which may cause injury to their health as soon as practicable (not later than the end of a shift unless circumstances prevent so).
		2. **The Duties of Employer under the Occupational Health and Safety Act**
			1. To register workplace/business/Site with the Occupational Health and Safety Authority, and conduct regular medical examinations of his/her employees in accordance with the Act. Should choose health and safety representatives in a workplace with four or more workers. Must not allow any worker to do work that is potentially dangerous.
			2. They must inform workers of any possible dangers in the workplace.(risk communication), must reduce any dangers to a minimum before issuing protective clothing. Must, also, train workers for machines and materials, to make sure they know the safety precautions.
			3. They must prevent workers from using or working with dangerous materials or machines, unless all safety rules have been followed, ensure machines are in good working order and are safe to work with, make sure that dangerous machinery carries warnings and notices, they must make sure that somebody who knows the work is supervising the operations to ensure the safety of workers, must keep the workplace open so that workers can escape from danger if necessary.

**2.5 Punishment for Non-Compliance Act by Employer or Employee**

Where such a contravention has been occasioned by an employer and as a result an employee is killed or suffers serious body injury the employer may be liable to a fine of not less than 10 million or to imprisonment for a term not exceeding two years or both imprisonment and fine. If an employee contravenes the provisions of this law relating to health and safety, they will be liable for penalty or imprisonment or both penalty and imprisonment depending on the offence. The employer is required to report any incident or accident which has occurred at a place of work and has resulted in either death, body injury, lost of conscious, occupational illness or has permanently incapacitated a worker, within twenty four hours from the time the incident has occurred.  Within seven days from the day the incident was reported the employer is required to send a duly completed prescribed form containing information on the incident.

* 1. **Role of Regulatory Authorities**

. Civil and building construction works which involve excavation, and/or demolition, concrete work, painting, roofing, operations, call for attention from relevant authorities, regulatory bodies, societies, scientists, professionals and businessmen to establish safety and health management programs and laws governing construction works activities. Further, key players minimally consider or even completely ignore consideration of health and safety requirements on grounds of cutting cost.

It should be realized that implementation of safety and occupational health in construction works is not only for compliance purposes. Provision of Health and Safety (H&S) policies/programs such as working tools, conducive environment and use of safety gears, has positive result in the productivities for the company, hence increase profit and a good advertisement of the company. A study carried out by OSHA (2008) revealed that; there was lack OHS policy in the Construction Industry, lack of OHS management, low level of OHS knowledge among workers, site supervisor’s contractors, and OHS practice non-compliance in construction sites.

 In addition to the well known traditional hazards, new problem of the information technology, intensive work, the fast growing construction and mining industries, new technologies, new organizations of work and psychological stress are encountered by workers, managers and other expert who try to solve them. The introduction, implementation, sustainability and enforcement of Occupational Health, Safety and Environmental aspects cannot be manned by laws and regulations without observation team. The government has vested powers in its organizations and institutions to see to it that safe working procedures prevail on construction activities and these include: (1) Occupational Safety and Health Authority (OSHA) and Contractors Registration Board (CRB)

**2.6.1 Contractors Registration Board**

Among the different associations, bodies and institution in Tanzanian construction industry, the CRB is at the front line in ensuring the enhancement of safety in the Tanzania construction industry. Measures taken by CRB include;

* + - 1. Conducting a detailed study on H&S on construction site in collaboration with the factory inspectorate
			2. CRB also demand contractors to include the cost item for providing safety gear and other occupational health services in the bill of quantities and regular inspection of the construction site by CRB has been adopted.
			3. Establishing by laws, governing the conduct of contractors as follows;

**2.6.2 The Contractors Registration by-Laws 1999**

1. By- law 14(1), every contractor is required to maintain and provide to every person at site appropriate Person Protective Equipment’s (PPE)
2. Section 20 (3), a contractor shall maintain at every construction site as a register in which all accidents and causes there from are recorded and such accidents shall include all major and minor injuries sustained on the construction site.
3. Section 20 (4), non-compliance of the provision of paragraph (3), shall be punishable by a fine of 0.1% of the contract sum or one hundred thousand shillings or whichever is higher,
4. Section 20 (9), all building construction sites shall be hoarded and failure to do so constitute to offence punishable by fine equal to 0.5% of the contract sum or two hundred thousand shillings, whichever is higher.
5. Section 20 (11)), every contractor shall provide every person on site with appropriate PPE's and failure to do so shall constitute an offence punishable by a fine of twenty thousand shillings per person.
6. Section 20 (12), all contractor shall ensure that there is fire­ fighting equipment and hygienic facilities on site and failure to do so shall constitute an offence punishable by a fine of fifty thousand shillings.

***2.*7 Role of Other Key Construction Stakeholders (Client, Consultant & Contractor)**

Besides the use of regulatory authorities and other government organizations and institutions in enforcing H&S requirements, Clients, Consultants and Contractors along with the respective employees, too have a role to play. As earlier mentioned, all provisions direct a finger to the contractor, whose involvement comes last in the investment decision. As shall be discussed later, this paints a bad picture in changing the safety culture of the key actors on a construction project, as well as retarding the efforts in ensuring a safe and healthy construction environment.

**2.7.1 The Consultants**

Notwithstanding the absence of express provisions for the consultants' responsibility towards safety and health on construction sites, consultants perform duties which in one way or another impacts safety. In the table below the general responsibilities of consultants is reflected.

**Table 2.1: General Roles of the Consultants**

|  |  |
| --- | --- |
| **Consultant** | **Professional Role** |
| 1. Architect
 | Planning, Designing Determine construction methods, work posture |
| 1. Engineer
 | Planning, Designing Determine construction methods, work posture |
| 1. Quantity Surveyor
 | Prepare tender documents, draw up specifications, cost estimates or project management |

**Source:** Research Data (2016)

Apart from given responsibility above, they are supposed to conduct inspections to ensure conformance to the construction requirements. It is clear here that consultants cannot escape responsibility on liability for the impact of their design and specifications, they cannot also escape the responsibility of any impact on health and safety, as a result design integrity. It is against the above argument of design integrity made all concerned cadres on the collapsed building in Dar es Salaam recently to be responsible. From the above, in order to ensure effective adherence and implementation of Health and Safety requirements on construction sites, Smallwood (2003) proposes that consultants should ensure the following; Training (induction) of employees before start works on site, holding regular health and Safety coordination meetings for the purposes of ensuring that due regard is directed to the safety and health of the persons working on the project, provision of requirement for Permit-to-work for specified type of high risk work.

* + 1. **Building Contractors**

According to CRB the purpose of the contractor's H&S requirements is to ensure that contractors maintain an environment that is free of ill-health and safety risks as practicable as possible to the required standards. To the contractor, it means completing the project without being hampered by occupational diseases, accidents or injuries, as it result to loss of time and unforeseen costs to the contractor. Therefore the contractor should ensure the following;

* + - 1. **Safety Culture**

Adoption of an occupational health and safety culture within the organization is the foremost strategy. Contractor should care for the well being of everybody who works in the organization and the general public without being forced through regulation, and should be a commitment from the top down to the ground, on sites.

* + - 1. **Safety Organization**

Contractor should establish a safety organization system, entailing putting in place a safety policy, working standards, procedures, training systems, training levels and efficient supervision and communication systems. He should also ensure that, all employees at all levels of management are involved in planning, development, implementation and review of the H&S systems in their respective areas.

* + - 1. **Safe Environment**

Provision of necessary environment which means ensuring plant, equipment, substances, materials and working conditions are procured and maintained in the mindset of safe working condition.

* + - 1. **Awareness of Health and Safety Regulations**

The contactor should be aware and well acquainted with the regulations governing OHS, for compliancy purposes and prevent any necessary costs that may be incurred through un-adherence. The contractor should be aware of OHS regulations and practice in Tanzania; Occupational Health & Safety Act, 2003, (2) Factories (Building Operation & Works of Engineering Construction) Rules, 1985 (3) Workmen's Compensation Ordinance (Cap 24-Supp.57), (4) Workmen's Compensation Amendment Act, 1983, (5) Accidents And Occupational Diseases (Notification) Ordinance (1953), (6) Contractors Registrations Act No. 17 Of 1997 and,(7) Contractors Registrations By- law of 1999.

Other specific requirements that the contractor should ensure in the procurement process and during the actual execution of the project may include the following:

1. Submit personnel documentation prior to arrival on site to establish credentials and competency of workforce to the consultants/project managers.
2. Submit weekly Daily Manpower Reports, showing the number of employees working on the site by classification for all staff and wages employee.
3. Ensure personnel undertake training inductions as required, induction may be in terms of training of new and continuing employees on site.
4. Ensure personnel are issued with site identification Pass, which they then carry at all, times whilst on site.
5. Ensure that all plant and vehicles undergo a Pre-mobilization Inspection. Avail copies of inspection report on request and ensure vehicles and equipment are inspected regularly to ensure safe working conditions are maintained. Ensure all operators are issued with site licenses.
6. Document weekly toolbox meetings
7. Document Monthly Safety review and discuss safety topics and ensure that all work tasks undertaken have the correct Permits and Certificates issued prior to work start, and that all safety requirements are fully complied with, these including demolitions and all other works
8. Ensure that daily Pre-start meetings are undertaken to ensure that all personnel are fully aware of any changes in the work environment that may affect safety.
9. Report and investigate all incidents and accidents immediately using the standard incident reports.

The contractor should also provide PPE as required to safely undertake the work being done.

**2.7.3 Client**

The client is the initiator for the project, and has a final say in the project since he/she is the one who finance the project, as the other bodies work to have his requirements and specifications fulfilled. The following responsibilities are the expressed need for the Client to assume (Smallwood, 2003)

1. Prepare and provide principal contractor with Health and Safety specifications
2. Provide Contractor with any information that may affect Health and Safety
3. Provide sufficient H&S information when changes made to design and construction
4. Ensure that Contractor makes provision for the cost of HSE in their tenders
5. Discuss contents and approve H&S plan
6. Appoint an agent in terms of the responsibilities, who must be competent and have the resources.

The roles of key stakeholders have been discussed in detail. Where a collective approach is eminent, all parties to a construction process ought to judge their actions and omissions based on the above roles to see their respective levels of compliance.

**2.7.4 Conclusion**

In a nutshell, observation, implementation and enforcement of health, safety and environmental requirements on construction sites are key requirement given the associated negative impacts emanating from the reverse. This chapter has discussed in detail the effects due, the measures put in place by the government and other stakeholders with the mandate to execute on its behalf.

* 1. **Theoretical Review**
		1. **Hazards and Risks Controls Management Systems**

An effective planning for health and safety requires Construction company organizations to establish and operate a health and safety management system which controls risks; reacts to changing demands; sustains a positive health and safety culture.(HSE; 2008). The results of successful health and safety management are often expressed as a series of negative outcomes, such as an absence of injuries, ill health, incidents or losses. But it is often a matter of chance whether dangerous events cause injury or loss. Effective planning is concerned with prevention through identifying, eliminating and controlling hazards and risks. This is especially important when dealing with health risks which may only become apparent after a long latency period. Prevention can only come from an effective health and safety management system, and organizations need a framework or benchmark against which to judge the adequacy of the current situation, although health and safety management system vary.

**2.8.1.1 Workplace Precautions**

The ultimate goal of any health and safety management system is to prevent injury and ill health in the workplace. Adequate workplace precautions have to be provided and maintained to prevent harm to people at the point of risk. Risks are created during construction process as resources and information are used to fulfill project goals.

**2.8.1.2 Risk Control Systems**

Risk control systems (RCSs) are the basis for ensuring that adequate workplace precautions are provided and maintained. The following are activities for which risk control systems may be needed. At the input stage, the aim is to minimize hazards and risks entering the organization. At the process stage, the focus is on containing risks associated with the process. At the output stage, the RCSs should prevent the export of risks off-site, or in the products (building) and services generated by the process activities. The nature and relative importance of RCSs will vary according to the nature and hazard profile, which again depend on the magnitude of work (project), scope of the project, complexity of activities involved and the workplace precautions designed. Nevertheless, the design, reliability and complexity of each RCS need to be proportionate to the particular hazards and risks.

**2.8.1.3 Devising Workplace Precautions**

The control of risks is necessary to secure compliance with the requirements of the OSHA Act and the relevant statutory provisions. There are three basic stages in establishing workplace precautions.

* + - * 1. **Hazard Identification**

This entails to identify hazards which could cause harm to workers and propert.

* + - * 1. **Risk Assessment**

Risk has to be assessed which may arise from hazards.

* + - * 1. **Risk Control**

Decide on what suitable measures to eliminate, minimize, accept or control risk. This approach applies both to the control of health risks and safety risks. Health risks do, however, present distinctive features which require a particular approach. Health and safety at work law places a duty on employers to ensure the health and Safety to their employees. The principles for controlling health through risk assessment are the same as those for safety, (HSE 2008). However, the nature of health risks can make the link between work activities and employee ill health less apparent than in the case of injury from an accident.

Unlike safety risks, which can lead to immediate injury, the results of daily exposure to health risks may not become apparent for months, years and in some cases, decades. Health may be irreversibly damaged before the risk is apparent. It is therefore essential to develop a preventive strategy to identify and control risks before anyone is exposed to them. Failure to do so can lead to workers’ disability and loss of livelihood. It can also mean financial losses for the organisation through sickness absence, lost production, compensations. Risks to health from work activities include:

1. Skin contact with irritant substances, and inhalation of respiratory sensitizers, triggering immune responses such as asthma.
2. Badly designed workstations requiring awkward body postures or repetitive movements, resulting in upper limb disorders, repetitive strain injury and other musculoskeletal conditions
3. Noise levels which are too high, causing deafness, too much vibration, exposure to ionising and non-ionising radiation including ultraviolet in the sun’s rays, causing burns, sickness and skin cancer; infections ranging from minor sickness to life-threatening conditions, caused by inhaling or being contaminated by micro-biological organisms; stress causing mental and physical disorders.

Assessing risks to help determine workplace precautions can be qualitative or quantitative. To assess risks, you need a similar knowledge of activities and working practices as to conduct hazard identification. Again, the knowledge of employees and safety representatives can prove valuable. Risk assessments should be done by competent people. All final decisions about risk control methods must take into account the relevant legal requirements which establish minimum levels of risk prevention or control. The following is a summary of the preferred hierarchy of risk control principles (HSE; 2008).

**Eliminate Risks**

Substituting the dangerous by the inherently less dangerous, eg: use less hazardous substances; substitute a type of machine which is better guarded to carry the same work;

**Combat Risks**

Combat risk at source by engineering controls and giving collective protective measures priority.

**Minimize Risk**

Designing suitable systems of working; Using personal protective clothing and equipment; this should only be used as a last resort. The hierarchy reflects the fact that eliminating and controlling risk by using physical engineering controls and safeguards is more reliable than relying solely on people.

* + 1. **Measuring Performance and Compliance**

The primary purpose of measuring health and safety performance is to provide information on the progress and current status of the strategies, processes and activities used by an organization to health and safety.Performance and Compliance information sustains the operation and development of the health and safety management system, and so the control of risk, byProviding information on how the system operates in practice,identifying areas where remedial action should be required, providing a basis for continual improvement, andproviding feedback and motivation.Performance measurement provides information on both the level of performance and why the performance level is as it is.

* + 1. **Performance & Compliance Indicators**

There are various processes to examine and evaluate safety performance. Typically, these metrics utilize lagging, current, or leading indicators. A lagging indicator is a ‘reactive measure’ that occurs after a form of loss, such as, inspection results, extent of physical damage, and incident rates. Conversely, a leading indicator is an activity measurement benchmarked before a loss occurs. Examples of leading indicators include number of completion of safety audits, percentage of planned risk assessments completed, and number of safety committee meetings conducted. Current indicators are measurements that establish what is occurring in the system at the present time. (HSE; Guidance, 2008). For the purpose of the study more interest is invested in three indicators, (1) Performance Indicators, (2) Process indicators, which will concentrate on Safety System Compliance, and (3) Compliance indicators.

**2.8.4 Indicators for Evaluation of Safety Performance**

Within the safety performance measurement, lagging indicators are predominately utilized. These indicators are tangible outcomes, e.g. incident rates, Workers' Compensation claims, and insurance experience modifiers. Lagging indicators, by definition they are indictors after a loss. Losses are symptoms of errors in management system and are not true causes of the occurrence. For Health and safety, the only measure would be injury statistics which often are negative measures. Injury and health statistics measures of failures. Low injury and ill-health rate is no guarantee that risks are being controlled and will not lead to injury or ill-health in failure.

In this circumstance historical record can be deceptive information on a range of health and safety activities. Reactive indicators may only reflect random fluctuations within the workplace. By focusing on management of the system and increasing accountability, employee involvement, (80%) eighty percent of incidents could potentially be avoided (Bird and Germain, 1985). There are benefits to incorporating other safety performance measurements along with lagging indicators. These include current and leading indicators, both measures are evaluated before a loss occurs. These measurements focus on the inputs into the system. Current and leading indicators include percentage of compliance to organizational standards and guidelines, completion of trainings and audits, and housekeeping practices.

When all of these indicators are utilized they help identify deficits in the system which can thereby be addressed and in result prevent losses from occurring and reducing their associated costs. (Bird and Germain, 1985). Using and focusing on incident rates and other lagging indicators are unreliable and ineffective benchmarks for safety system Performance. Proactively measuring safety performance is more effective for safety system improvement. By utilizing leading and current indicators, an organization would more effectively and efficiently address issues within their safety system.

* 1. **Safety System Performance Measurement Models**
		1. **ISMEC Model System**

One approach to measure safety performance is systems safety management. "Systems safety management is the science of continual measurement and appraisal of management oversights, diagnosed as operational mishaps, having an adverse effect upon the best utilization of human, material, and economic resources" (Pope, 1990, p. 4). By utilizing systems safety management the associated risks may be identified and therefore controlled. There are various systems / models that could aid in this process and they include (1) ISMEC model system, (2) Occupational Health and SafetyAssessment Series (OSHAS) 18001, and (3) OSHA Voluntary Protection Program (VPP). Safety systems utilizing these models, position themselves for proactive performance measurement. TheISMEC system and OSHAS 18001, specifically, have control loops that integrate continualimprovement into the processes. Through these safety system frameworks, standards andelements may be developed for the utilization in safety performance measurement. Author is inspired to use OSHAS 18001 model in this study for reasons narrated later.

* + 1. **OSHAS 18001 Model**

OSHAS 18001 is a safety system framework developed by British Standards Institution (British Standards Institution [BS1], 2010). This framework was developed to be able to integrate with other International Organization for Standardization (ISO) standards, such as ISO 9001 and ISO 14001 (BSI, 2007). These standards are respectfully concerned with quality and environment management systems. There are several benefits of this system they include: potential reduction in incidents, associated costs, and downtime, while increasing participation, improving management, and promoting a more proactive management system (BSI, 2010). Within OSHAS there are several elements that need to be implemented in order to conform to the standard. The OSHAS 18001 System Elements are (1) General Requirements (2) Occupational Health and Safety (OHS) policy (3) Planning (4) Implementation and operation (5) Checking (6) Management review.

* + - 1. **OHS Policy – Model Element**

This aspect should be developed by top management and it is a statement of commitment by the organization regarding their intentions and principles for overall safety and health (BSI, 2007).

* + - 1. **Planning – Model Element**

 Organization must develop and uphold procedures for the following, (i) Hazard identification, risk assessment, and determine controls (ii) Legal and other requirements (iii) Objectives and programs.

* + - 1. **Implementation and Operation – Model Element**

Aspects include; resources, roles, and responsibility, accountability and authority,

Competence, training, and awareness, Communication, participation, and consultation Documentation, Control of documents, Operation control, Emergency preparedness and response.

* + - 1. **Checking**

The various aspects of this element include; performance measurement and monitoring, evaluation of compliance, incident investigation, nonconformity, corrective and preventive action, Control of records, Internal audit. The ultimate responsibility of the system is on top management (BSI, 2007). Top management is in control of the system, and as stated earlier, eighty percent of incidents are management controlled (Bird and Germain, 1985). This ensures that the system will be effective in preventing potential occupational illnesses and injuries. All individuals that may have an effect on the system must be aware, competent, and trained regarding the risks and elements of the safety management system (BSI, 2007). Procedures need to be established, implemented, and maintained to address all of the aforementioned aspects. For performance measurement quantitative and qualitative as well as, proactive and reactive measures shall be used. These measures should be appropriate for the organization and monitor the extent of conformance to prescribed procedures. On regards to evaluation of compliance, the conformance to the OH&S policy, performance measurement, and legal requirements shall be examined; this ensures that policies and procedures set forth are being upheld.

* 1. **Theoretical Conception**

**2.10.2 Empirical Review**

To date most of the research on Occupational Health and Safety has been localized in the risk assessment and suggesting mitigation measures. They never went as far as looking at Safety process system, within the concept of system management Approach. This has been done somewhere else and not sufficiently in Tanzania and precisely in construction sector. In research (Sarah; 2012) findings revealed that performance on health and safety to Tanzania sites are poor; however her conclusion based on research done focusing on risk assessment, communication and control. Her study aimed to ascertain the current practice of health and safety risk management on Tanzanian construction sites. In pursuing her objective, the case study strategy was adopted, with a holistic view of health and safety risk assessment, risk communication and risk control on construction sites.

The study revealed that the responsibility for construction site health and safety lies with the main contractor, resulting in many designers, consultants and clients absolving themselves from responsibility if accidents occur on the site. The active participation of clients and design teams in the built environment in health and safety matters in Tanzania is yet to be realized. Meanwhile an appropriate procurement practice that promotes the adoption of good health and safety risk management is an issue.

On contrary, considering that safety matters need wide spectrum of involvement, the primary focus for performance measurement should meet the internal needs of the organization, there must be an increasing need to demonstrate to external stakeholders (regulators, insurance companies, shareholders, suppliers, contractors, members of the public etc) that arrangements to control health and safety risks would be in place, operating correctly and effective if they are effectively involved. While the higher hazard industries may have recognized that they have in effect been granted ‘license to operate’ by their local community and society, pressure for accountability is reaching other sectors through routes such as corporate social responsibility. The challenge for organizations is to communicate their performance in ways which are meaningful to their various stakeholders. Research on OHS management in organizations has tended to follow either a more pragmatic specialist route concerned with prescribing ways of doing OHS and best management practice or a more theoretical base from earlier research largely grounded in the disciplines of psychology or sociology.

Studies within the more traditional social science disciplines have been concerned with the development of concepts that are theoretically robust, for example, within psychology the focus has been in developing theories at the level of the individual, whereas sociological studies have placed more emphasis on social relations and systems of management control. However, this earlier focus has lost impetus with the segmentation of discipline focus and the growth in more pragmatic specialist interests in the field of Occupation Health and Safety. For example, much of the more grounded industrial relations research draws on empirical data in assessing Occupation Health and Safety, in the workplace and the effectiveness of systems and management action or inaction in response to their legal obligations.

While there is a large body of work that covers a range of important areas and concerns in relation to OHS management; it remains disparate and fragmented. This gap needs addressing through examining OHS within management and important questions remain under-researched. Over the last twenty years, there has been a growing body of literature on what appears to be a global trend in the adoption of systematic Occupational Health and Safety System management, (Zanko, M. & Dawson, P. 2012). According to Frick and Wren (2000: 19), systematic Occupational Health and Safety System management ‘aims to identify sources of injury and ill health early in the production process and to produce countermeasures before injury or ill health occurs’. They view this as an outgrowth of quality management’s emphasis on enacted managerial responsibility, as well as integrated, systematic production management.

 In studies conducted by Sarah Phoya 2012; emphasize was analysis of risks in view of formulating control measures. Research does not seem to insist the identification of Hazards. In Occupational Health and Safety System management approach the process of controlling risks on site, should start by identifying presence of Hazards and related risks and finally develop method statements (HSE 2009). The study focuses on the practice employed for health and safety risk assessment, communication and control at construction sites in Dar es Salam, Tanzania.

The main objective was to map out the current practices employed for health and safety risk assessment, communication and control on Tanzanian construction sites with a view to develop preconditions necessary to improve health and safety risk situations in construction sites. Author, is of the opinion that through examination and determination of compliance level, the study asserts that effective risk management lies at its core, namely, ‘the systematic identification of hazards, assessment and control of risks, evaluation and review of risk control measures to ensure they are effectively implemented and maintained.’ Given the acknowledged breadth and looseness of the above definition, systematic OHS management is found in a variety of mandated and voluntary forms and at a number of different environmental levels (international, national, state, organizational).

Bluff (2003, 5) identifies how systematic Occupational Health and Safety Management is variously mandated by public regulation in a number of countries as well as by the European Union under its Framework Directive, and notes how there has been a ‘proliferation of corporate systems, proprietary products, standards, guidelines and certification tools’. Given such diversity, it is hardly surprising that systematic OHS management is also difficult to operationalise. Nevertheless, based on a number of standards and guidelines from a number of countries, OHS policy; planning and resourcing of Occupational health and Safety management; designation of responsibility and mechanisms of accountability; policy; procedures and documentation; risk management; worker participation; development of OHS competency; reporting, investigating and correcting deficiencies; and monitoring, auditing and reviewing Effective risk control is founded on an effective health and safety management system performance’.

 In a similar manner to Bluff, Gallagher et al (2001) assert that senior management commitment, effective communication, employee involvement and consultation are critical for effective occupational health and safety management systems. How this occurs within an organization is not discussed. From this brief review, it is evident that studies on systematic Effective risk control are founded on an effective health and safety management system. Management largely lack detailed insight into its holistic form and implementation. However, Study of compliance and Performance on OHS system management Approach will provide insight into challenges related to its compliance and regulatory mishaps.

There has been research (Sarah; 2012) conducted with aim of looking at the practice employed for health and safety risk assessment, communication and control at construction sites in Dar es Salam, Tanzania. The main objective was to map out the current practices employed for health and safety risk assessment, communication and control on Tanzanian construction sites with a view to develop preconditions necessary to improve health and safety risk situations in construction sites. To accomplish the above, Author, he looked the nature of the health and safety risks in the Tanzanian construction industry, methods and tools used for assessment, communication and control. Also looked at Factors influence and hinder risk assessment, control and communications on sites. The researcher, confined to health and safety risks in two large construction sites in Dar es Salaam, and only two sites were selected for the study. In conclusion, Author, discloses that the Contractor has been sole responsible for risk control on sites. Secondly, with no systematic definable methods employed.

Inspired of above findings, Author came to realize that contractors receive health and safety regulations inputs from stakeholders, who also have participatory efforts in achieving effective risk control on sites. From the fact above, the study on Performance of health and Safety system management in compliance with the standards based on Safety System management approach became eminent. This is wider, as far, looking at the stakeholders and regulators responsibility and roles. What are the challenges facing regulators. OSHA act of 2003 set out a number of actions in revitalizing Health and Safety system programs that were aimed at promoting and encouraging greater corporate responsibility and accountability for health and safety across private, public and voluntary sectors. Research carried out for the HSE in 2002 on corporate social responsibility highlighted the potential influence that stakeholders say Investors, Regulators, Designers, and Clients, can have on health and safety.

The work environment is the condition in which the individuals are working. The construction site is a workplace and workers are working as a team to accomplish the construction project. The site as organizational system, there are some information being passed from one team (design) to another (construction), which is required for compliance health and Safety requirement, e.g. Preparation of method statement. Meanwhile the physical space, the working procedure (site operation), tools and methods used and resources available are factors influencing performance of Health and Safety system management. This study considers the physical space, instruments, tools and equipment as well as the working team and working procedures as factors in the work environment system.

**2.10.3 Perception of Stakeholders in the Industry**

It is generally believed that construction industry is one of the most expensive industries; therefore, anything that will increase cost of construction should be avoided. This view is echoed by Windapo (2013) that construction contractors in South Africa perceive compliance with construction regulations as costly, time consuming and unnecessary, hence they deem compliance with OSH regulations as unnecessary. The same argument is repeated in Nigeria, where most construction organisations spend little or nothing on OSH management (Diugwu et al., 2012), perhaps because they perceive it as cost. This view simply results to nothing in terms of budget allocated to OSH management; consequently, there is likely to be high level of non-compliance with OSH regulations in these organizations. The health and safety management system comprises three levels of control:

1. The key elements of the health and safety management system: the management arrangements (including plans and objectives) necessary to organise, plan, control and monitor the design and implementation of RCSs.
2. Risk control systems (RCSs): the basis for ensuring that adequate workplace precautions are provided and maintained.
3. Effective workplace precautions provided and maintained to prevent harm to people at the point of.

**2.11 Research Gap**

In view of the above, it’s evident that a number of similar researches have been done in similar themes, but there are a number of gaps left ranging from geographical to time as well as nature of the organization studied. (Sarah; 2012,) conducted the research on Health and safety risk management on building construction sites in Tanzania (The Practice of Risk Assessment, Communication and Control). The research did not mention on the process of Hazard identification and method statement preparation as two important techniques in design and formulation of workplace precautions (measures).

Benjamin Close; 2010, conducted research on Analysis of the safety performance measurement system at Company XYZ, The research focused on the methodology of measurement indicators. The study pointed out that a primary purpose of safety is to develop intervention strategies to avoid future accidents." (Grabowski, Ayyalasomayajula, Merrick, & McCafferty, 2007, p. 405). By measuring before a loss or accident, leading and current indicators are more effective measures than lagging indicators for performance measurement (Dial, 1992). Leading and current indicators, also known as activity measures, are measures before a loss occur.

By utilizing these indictors and developing intervention strategies, they may be utilized to depict current system performance prior to an accident or loss occurring. The study was conducted by (Benjamin Close; 2010; University of Wisconsin-Stout), outside Tanzania, in different geographical location, but with similar concept of performance measurement. There are various advantages for implementing current and leading indicators in the safety performance measurement system. These indicators depict what is currently happening within the organization in relation to safety performance (Kunju Ahmad & Gibb, 2002.). Few studies have been in Africa, South Africa, Nigeria and Tanzania. This study will fill the existing gap left by previous literatures, especially on current level of performance and compliance in the construction industry, particularly building contractors in Dar es Salaam.

Input Variables (Moderators)

**Institutional System,**

Policies, Regulations,

Control Mechanism.

**Work environment System,**

Working tools, methods, Locations, Working Procedures, Physical Shape

**Organizational system,**

 Policies on OHS, Management Style, Resource Locations

**Individual System,**

Perception/Attitude, Experience, Education Level, Power Relations, Trust

Independent Variables

Practice

**Health and Safety System Management,**

Hazards identifications, Risk Assessment, Quantification of risks,

Methods Statement,

Control measures

Health and safety Compliance & Performance

**Dependent Variable**

**Health and safety,**

 Compliance and Performance on site

(Safe and ill-free workplace)

**Figure 2.1: Conceptual Frameworks**

**CHAPTER THREE**

**3.0 RESEARCH METHODOLOGY**

**3.1 Over view**

This Chapter presents Research approaches and are discussed in sub sections which are; Aims and Purposes of research, research paradigm, research design, area of research, population of the study, Sample and sampling techniques, methods of data collections, Data analysis plan, Validity and reliability of data, ethical issues and establishing the report.

The aim of research as stipulated in chapter one is to determine Health and Safety performance and Compliance in the industry in a view of determining the challenges facing system and stakeholders in the effort to achieve effective risk control at workplaces. The study also will raise the awareness among the stakeholders and contractors as core implementers of health and safety regulations as provided in the legislations. This chapter describes the research design and methods of data collection procedures. Research methodology is an action plan for getting from’ here to there’. ‘Here’ may be defined as the initial set of questions to be answered, and ‘there’ as the set of conclusion (answers) about these questions. (Noum, 1998).

In order to achieve this, major steps may be employed, including the collection and analysis of relevant data. This research has been undertaken through the use of qualitative and quantitative methods with the use of a descriptive research design, describing the state of affairs as they exist. Author collected data from the key players in the industry, who have a clear understanding of the state of affairs. A descriptive methodology has been used since the information collected is about people’s attitude, habits opinions or any of the variety of social issues (Kombo & Tromp, 2006). The causes of safety incidents and occupational health outcomes are complex and interrelated. Root causes of undesired OHS outcomes may be found in any combination of human, technological, activity-based, process, systems and administrative factors, close to the incident (proximate) or distant from it.

**3.2 Research Approach**

Research Approach is defined as a systematic and logical procedure for solving a problem with the support of facts (Yin 2003). Paton, (2002) and that research involves the diagnosis of information and the selection of relevant interrelated variables about which valid and reliable information is gathered, recorded and analyzed. For the purpose of this study both research philosophy were used that are positivism and inter-pretivism (quantitative and qualitative). The researcher use quantitative design to obtain different measurements of data and qualitative design to obtain different views and opinions from people.

## 3.3 Research Design

Research design is the conceptual structure within which research was conducted. The function of research design is to provide for the collection of relevant information with minimal expenditure of effort, time and money (Ranjit, 2005). Research design is one of the most important tasks in carrying out the survey. Explanatory/descriptive research design was adopted in this study as it strives to explore compliance of the Health and Safety Management System Performance on construction industry with major emphasize on Contractors Workplace Sites. The quantitative research method adopts a deductive and objective view, which is characterized by tangible data such as counts, weight, mass, and other physical measures (Fellows and Liu, 2003). It usually includes the investigation of frequencies and different measurable variables with the aim of explaining a certain phenomenon. Qualitative research on the other hand, adopts the inductive and subjective view of knowledge of the real world. It views individuals or organizations in a holistic manner rather than isolated variables and hypotheses. Creswell; (2003)

The nature of this the study is descriptive, this research has been undertaken through the use of qualitative and quantitative methods with a descriptive research design, describing the state of affairs as they exist and also that collected information is about people’s attitude, habits opinions. The researcher had constructed questions (in the form of Questionnaires and Interview guide), the site interview and observations record forms, requesting the desired information relevant to the study, from the identified sample space.

**3.4 Location of the Study**

Author managed to undergo survey to 18 building contractors of different class limits, ten design consultant firms and four regulators to the construction industry (Stakeholders). A purposive sampling technique was used to obtain participants sample space. It was assumed that all types of contractors would be found in Dar es Salaam, which was the case. Dar es Salaam hosts large number of practicing contractors in Tanzania. Also, it is assumed that all contractors working in Dar es Salaam are facing similar challenges affecting their work.

**3.5 Strategies and Population**

Researcher interviewed 30 respondents from 18 construction companies of Class One, Class Two and Class three, approached. Contractor is a firm or person, registered by Contractors Registration Board (CRB). Contractors are classified in seven class groups i.e. Class Seven to Class One in ascending order. In this arrangement contractor Class Seven is lowest, and is assumed to have lowest capability technically and financially. Author also interviewed four key stakeholders out of five stakeholders approached, and ten Consulting firms (Architects, Engineers and Quantity Surveyors) were approached for their useful views by using questionnaires.

**Table 3.1: Target Populations**

|  |  |  |
| --- | --- | --- |
| **S/N** | **Types of Respondents** | **No. of Respondents** |
| 1 | Building contractors, classes 1&2 (10), and Class 3 (8)  | 36 |
| 2 | Consulting Firms, (Architects, Engineers, Quantity surveyors) | 10 |
| 3 | Other stake holders (AQRB, ERB, OSHA, CRB, and DCC) | 4 |
|  | **Total number of respondents** | **50** |

**Source:** researcher, 2016

Dar es Salaam hosts large number of practicing contractors in Tanzania, Consultants and head office for all regulators. Questionnaires were distributed and collect responses in person to all possible respondents. In the case of building contractors, two respondents for interview were contacted. Safety Managers interviewed at their offices, and site supervisor/safety inspector at site (workplace). Site works (H&S activities) observations were conducted on the same day of interview with Supervisor/safety inspector. Researcher selected five Contractors from Class One Group, five contractors from Class Two Group, and eight Contractors from Class Three Group to get different sizes of organizations designed according to their respective classes at sites. The classification would mean they are different in technical and financial capabilities to undertake certain projects of different volumes and complexities.

**3.6 Types of Data**

Data is thought to be the lowest unit of information from which other measurements and analysis can be done. Data can be numbers, images, words, figures, facts or ideas. Data in itself cannot be understood and to get information from the data one must interpret it into meaningful information. The study of Performance and Compliance of Occupational Health and Safety Management System, two kinds of data must be collected, primary data and secondary data. The primary data are those, which are collected afresh and for the first time and thus happen to be original in character. In this study, primary data was collected from respondents through questionnaires, interview and observations. Questionnaires were specifically designed to answer research questions and attain research objectives. Secondary data for this study was collected from books, journals, articles, reports, newspapers, economic reports, site records, local government laws and other institutions and regulators, relevant to this research.

**3.7 Data Analysis**

Data analysis has been done using qualitative and quantitative approach and with use of Relative Importance Index, Spearman’s rank correlation, for analysis of data observed on sites, collecting data using in-depth interviewing technique and questionnaires. All the interviews were conducted by the researcher at the respondents’ respective desired locations, mostly at workplaces. About 15 workplaces were observed. Researcher, while on site for interview with inspectors/site agents/safety officers observed work activities for three to four hours. The research findings were organized and presented in form of words and numbers by using frequency tables, histogram, charts and simple percentage method. Data analysis, also, concerned with the computation of certain measures along with searching for pattern of relationship that exist among data group.

The major aim of analysis in this study was to determine whether the observation conducted in the field support objectives and answers research questions that were formulated earlier or before going to the field, or reject them. In the question of this study, the researcher employed the Relative Importance Index, Spearman’s rank correlation, for data analysis observed on sites. Relative Importance Index or weight is a type of relative importance analyses. RII was used for the analysis because it best fits the purpose of this study, (Le Breton et al; 2004). RII aids in finding the contribution a particular variable makes to the prediction of a criterion variable both by itself and in combination with other predictor variables.

Researcher was interested to determine how each specific aspect of Health and Safety conformance contributes to health and safety performance or effective Health and Safety compliance judgment. In other words what is relative importance contractors health and Safety conformance place on OSHA regulations; [(a) Health tests, Environment and welfare (b) Certified Health and safety personnel on site. (c) Hazards and Risk assessment (d) Health and Safety committee site visit (e) First Aid Kit And Aider on site (f) Budget location to H&S plans on site (g) Accident and incident records and reporting (h) PPEs Provision and warning signs, etcetera] in determining overall effectiveness on Health and Safety on site. In the calculation of the Relative Importance Index (RII), the formula below was used.

 ∑W

 A x N

 RII =

Where, *W*—*weighting given to each statement by the respondents and ranges from* 1 *to* 4; A—*Higher response integer* (5); *and N*—*total number of respondents.*

Self-administered surveys were used and questionnaires were delivered to participants in person, and responses were also collected in person after four days from the date delivery. Participants filled in the questionnaires in their own time and decisions without any assistance from the researcher. This approach removes any undue pressure from the respondents and gives them the freedom to fill in the questionnaire as truthfully as possible. Questionnaires developed for data collection, focused on the defined research questions. The study participants (population) comprised of Building Contractors, Regulatory Institutions and Boards.

* 1. **Construction Site Observations and Interviews**

Author conducted interview/discussions on site, at the same time making observation of how work activities were actually being executed. The aim was to observe performance and compliance of the workplace precautions and the points of interests, among others, were as follows;

* + 1. **Premises**

Include the place of work, entrances and exits, the general working environment, housekeeping, welfare facilities, and all plant and facilities which are part of the fixed structure, such as permanent electrical installations, signs, assembly area, and emergency preparedness, Provision of Hoarding, Warning signs in place.

* + 1. **Plant and Substances**

Observed items included the arrangements for their handling, transport, storage and use; plant operation, maintenance, signage for safety.

* + 1. **Procedures**

Observed items included the design of jobs and work procedures and all aspects of the way the work is done, presence of incidents records and record book, incident inspection and reporting arrangements, communications, Sign boards for project information.

* + 1. **People**

Observed the placement of employees, competence (among the workers) for the job and any health surveillance needed, any test record on health issues, awareness on HIV/AIDS, toolbox meeting and induction, PPE compliance. Researcher, had to insert score points against the item observed for its being in place, implementation and adequacy, the maximum point per item was 10 distributed as follows; (i) being in place = 3pts, ( ii) Implementation = 4pts and (iii) adequacy = 3pts.

**3.9 Stakeholders Roles in Implementation of OHS as Regulator**

The Author captured various roles of key stakeholders from previous researchers, publications and workshop proceedings as presented in the literature review. Through question 6-9, the researcher wished to assess the individual opinion on the compliance, provision and implementation of the respective H&S roles of key stakeholders. The key roles were listed and respondents required ranking the degree of conformance to the same on projects with the highest contract value undertaken. This aimed at satisfying the opinion variable, through individual assessment on projects undertaken and supervised. Given the nature of projects, in a given period in the industry, the researcher shall be able to assess the level of implementation of the respective roles.

**3.10 Field Data Analysis Techniques**

For proper interpretation of the collected data, analysis was done after careful reading of the answered questionnaires, recorded text, keeping track of their reactions and interpretation of ideas. Developing and refining the interpretation of the data involved bringing together and analyzing all the data, bearing in mind on major themes, ideas and concepts to get the right conclusion. Data was also collected by reviewing HSE reports, previous studies and other publications like articles, journals, news papers, internet search. The use of Excel spreadsheet software helped to establish relationships, trends and the level of dependency of each underlying variable. The data was initially tabulated, as per source (respondent's role), magnitude and ideas. The use of histograms, charts, graphs and tables enabled to give illustrative trends.

**3.10.1 Statistical Inference**

Given the magnitude of the data collected, the researcher believes that statistical inference will add an understanding to the data and also help reveal some underlying relationships.

**3.10.2 Reliability and Validity**

In order to arrive at the reliable findings, and hence conclusion and recommendations, the researcher used questionnaires approach structured to pursue the desired research objectives. Areas of interest covered were i.e. Stakeholders' participative role to OHS, Contractors’ level of awareness and implementation of effective H&S management on site, efficiency of the prevailing H&S approach and systems, and proposal for measures. Enhanced with the applied sampling procedure, Reliability and Validity of respondent's answers can be trusted once analyzed to produce reliable and valid conclusion and recommendation. The research was conducted in Dar es Salaam which is the capital City of Tanzania, where most of well experienced Consultants and Contractors with substantial exposure are based. Further, the headquarters of all contacted Associations and Regulatory Boards are in Dar es Salaam. It is therefore, based on this fact the selected sample can generalize to represent all Stakeholders in the Construction Industry in Tanzania.

**3.11 Limitation of the Study**

 It is envisaged that the research shall adequately achieve and cover the desired sample space, forming representative for the situation in the industry. However, the difference in the level of construction activities, level of compliance to H&S activities supervision due to manpower shortage and technological advancements in urban and rural construction methods might not adequately portray a clear picture, as the actual situations might be better or worse.Responses to interview questions and Questionnaire might not reveal a true reflection of the individual abilities, and hence requiring further sieving. Results from data collection questionnaires will be tabulated and graphically represented in order to derive correlations and interpretations for concise recommendations and observations. The next chapter will discuss results emphasizing findings.

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**CHAPTER FOUR**

**4.0 RESULTS AND FINDINGS**

**4.1 Introduction**

This Chapter reports on the study results, involving the administration of questionnaires and interviews. The main aim of the study was to explore and determine health and safety management system performance and compliance among construction industry, mainly Building Contractors. Author strived to investigate in put participatory role of Government Regulators and privately practicing Consultants. The Questionnaires as appended in this research puts across variables for the satisfaction of research objectives. The results are presented in series of tables and graphs. In the discussion hereunder, Stakeholders were categorized into Consultants, Contractors and regulatory authorities.

**4.2 Results**

The self-administered questionnaires were distributed in person to the respondents. The individual responses to each of the items will be discussed in detail. The questionnaires to Building Contractors Class one, Class two and Class three. Also questionnaires were delivered in person to Consulting firms, ten of them. The interviews were conducted to contractors and Regulatory authorities. The Questionnaires required information on; Personal Particulars,Health and Safety Awareness,Risk Perception.

The Questionnaire, also required to know from contractors if the has Health and safety policy and how is structured to satisfy the organization, involvement of workers in the issues of health and safety on. In a total of 69 approached to participate in the research, the researcher achieved 64% response rate, and 62.7% response rate for interviews. Non response of 50% for interviews among contractors has early inference significance on awareness and participation to health and Safety management system as per regulations

**Table 4.1: Data Collection Summary Details**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Description** | **Approached** | **Responses** | **Remarks** |
|  | QUESTIONNAIRE RESPONDENTS |  |  |  |
| **Contractors** | Building Contractors Class I | 5 | 5\* | Certified H&S officers |
| Building Contractors Class II | 5 | 4\* | Certified H&S officers |
| Building Contractors Class III | 8 | 6³ | Certified H&S officers |
|  | **Total** | **18 (100%)** | **15 (83.3%)** |  |
| **Consultants** | Architectural Firms | 4 | 2 |  |
| Quantity Surveying Firms | 3 | 3 |  |
| Civil Engineering Firms | 3 | 2 |  |
|  | **Total** | **10 (100%)** | **7(70%)** |  |
|  | INTERVIEWED FIRMS |  |  |  |
| **Contractors** | Building contractors class I | 10 | 6 |  |
| Building Contractors Class II | 10 | 5 |  |
| Building Contractors Class III | 16 | 7 |  |
|  | **Total** | **36(100%)** | **18(50%)** |  |
| **Stakeholders** | ERB | 1 | 1 |  |
| AQRB | 1 | 1 |  |
| CRB | 1 | 1 |  |
| OSHA | 1 | 1 |  |
| DAR CITY COUNCIL | 1 | No response |  |
|  | **Total** | **5(100%)** | **4(80%)** |  |
|  | **GRAND TOTAL** | **69(100%** | **44(64%)** |  |

**Source:** Field Data (2016)

Key;\*designated site health and safety officers and H&S managers at head office

 ³Out of six responded contractors only three had site H&S office

**4.3 Socio-Demographic Characteristics of Respondents**

The part of Questionnaire for contractor’s respondents briefly required respondents to reveal their background. It is imperative because, the background of the respondents will help generate confidence in the reliability of data collected; and eventually the findings of the study. Accordingly, Adinyira and Anokye (2013) argued that, it is always important to have a fair idea of the respondents so as to situate the responses within context. Researcher included the relevant socio-demographic variables of respondents that this research covered included sex, age, level of education and experience (occupational status).

**4.3.1 Gender of Respondents**

Males have been identified as the main actors in construction industry who normally build Melesse (2006) and Adjei Mensah (2010). Accordingly, the results,confirmed this observation as, 100% percent of the respondents were males. Similarly, this could be attributed to the nature of Industrial involved with this research the cultural systems in Tanzania where males are expected to work to provide for the family, including shelter, whilst females, usually, are stewards of the household. However, the respondents were not gender bias; the sampling technique ensured inclusion of all members of the population being sampled for the study.

**Table 4.2: Age of Building Contractors Respondents**

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **AGE (Years)** | **FREQUENCY** | **PERCENTAGE%**  |
| **1** | **20 - 29** | **2** | **13%** |
| **2** | **30 - 39** | **3** | **20%** |
| **3** | **40 - 49** | **7** | **47%** |
| **4** | **50 - 59** | **3** | **20%** |
| **5** | **60+** | **None** |  |
|  |  | **15** | **100%** |

**Source:** Field Data (2016)



**Figure 4.1: Age Distribution of Contractor Respondents**

**Source:** Field Data (2016)

**4.3.2 Age of Respondents**

Accordingly, respondents were asked to indicate their age. The age of the respondents were categorized in ten year intervals in order to know the particular age range that contains the majority of respondents. The mode age of the respondents spanned from 40 – 49 representing 47% with only 13% respondents ageing below 30 years (see Table 4.2). This matured active working age. More so, the distribution of Table 4.2suggested that, matured persons provided the needed information for this research.

**4.3.3. Level of Education**

Respondents, appear to be are educated to a degree level, this depicted in the results below on table 4.3. According to Idubor and Osiamoje (2013) maintain that the performance and productivity of staff is a function of the level of their expertise and skill, which is a function of the standard of training and education received.

**Table 4.3: Education Level of Respondents at Contractors Office**

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **Education Level** | **Frequency** | **Percentage%** |
| **1** | **Secondary Education** | **0** | **0%** |
| **2** | **FTC or Ordinary Diploma Level** | **2** | **13%** |
| **3** | **Bachelors Degree level** | **11** | **74%** |
| **4** | **Post Graduate / Masters Level** | **2** | **13%** |
| **5** | **Doctorate Level** | **0** | **0%** |
| **6** | **Others** | **0** | **0%** |
|  |  | **15** | **100** |

**Source:** Field Data (2016)

**4.3.4 Respondents Experience in the Construction Industry**

Results revealed that over 65% of respondents among contractors had worked in the construction industry for more than 10 years. And since sample space of contractors comprises high class and medium, the researcher has confidence that the sample has quite an understanding of the construction and activities related to Health and safety thereto.

**Table 4.4: Industrial Experiences**

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **Experience (Years)** | **Frequency** | **Percentage %** |
| **1** | Less than 1 year | 0 | 0% |
| **2** | 1 - 5 | 3 | 20% |
| **3** | 6 - 10 | 2 | 13% |
| **4** | 11 - 15 | 6 | **40%** |
| **5** | 16 - 19 | 1 | **7%** |
| **6** | 20+ year | 3 | **20%** |
|  |  | **15** | **100%** |

**Source:** Field Data (2016)

**NB:** About 67% of respondents for questionnaires have experience more 10yrs in the construction industry



**Figure 4.2: Industrial experience for Respondents in Building Contractors (H/O)**

**4.5.1 Health and Safety Policy**

On aspect of health and Safety awareness building contractors responded, in questionnaire, to have been aware of Health and safety policy as formulated by OSHA, for use in the Construction industry. All contractors were responded to have the policy in place. In practice, however, the companies are at liberty to restructure the Occupational Health and Safety policy to suit the size and environment of the organization. This may cause slightly changes to the structure of the policy although it might not deviate from general objective of the organization. The restructured policy should still demonstrate commitment characteristic of management for management to the organization.

**4.5.2 Workplace Measures Design Process**

In determining building contractor’s commitment for health and safety management system. Most of contractors responded to have been doing the hazard identification and risk assessment in the process of determining measures necessary to control risks at points of risk.

**4.5.3 Workers Involvement on Site**

 Again, what is the extent of involvement in the procedure? The response showed that all Class One contractors have set up system for workers involvement through gang leaders and site supervisors and Class II contractors responded are conducting standard procedures in effort to provide workplace precautions,

Table 4.5 depicts level of Involvement of Gang Heads, Site Agents of Supervisors in Risk Assessment Process among contacted Contractors.

**Table 4.5: Contractors Workers Involvement Process**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Involvements** | **Frequency** | **%Respondents** | **Remarks** |
| **1** | **Gang Heads** | **1** | **7%** |  |
| **2** | **Site Agents or Supervisors** | **2** | **13%** |  |
| **3** | **Projects Managers** | **6** | **40%** |  |
| **4** | **All of the Above** | **7** | **40%** | **Class (I) 5 + Class (II) 2** |
| **5** | **Total** | **15** | **100%** |  |

**Source:** Field Data (2016)

**4.5.4 Toolbox Meetings**

Researcher wanted also to know if Tool Box meetings are conducted on site, and topics dominance in the discussions. All class one and two responded to have been conducting toolbox meetings differing in frequencies from their respective targets.

**4.5.5 Involvement in Preparation of Method Statements**

There is a planned and systematic approach to implementing the health and safety policy through an effective health and safety management system.The aim is to minimize risks. Risk assessment methods are used to decide on priorities and to set objectives for eliminating hazards and reducing risks. Wherever possible, risks are eliminated through selection and design of facilities, equipment and processes. If risks cannot be eliminated, they are minimized by the use of physical controls or, as a last resort, through systems of work and personal protective equipment. Performance standards are established. The next step in achieving the above is to prepare well detailed method statement. Method statement is a safe works procedure document. Comprises the details of how works would be performed safely on site with all precautions.Generally, should comprise

1. **Physical Resources** including the design for activity operation sequence, plant and materials, to be used by the site team
2. **Human Resources** including, the recruitment and selection of all employees competent enough to the work

**Table 4.6: Involvement in Preparation of Method Statements**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Involvements** | **Respondents** | **%Respondents** | **Remarks** |
| 1 | Gang Heads | none | 0% |  |
| 2 | Site Agents or Supervisors | 2 | 13% |  |
| 3 | Projects manager | 6 | 40% | Class II (2), class III (4) |
| 4 | All of the Above | 7 | 47% | Class I (5), Class II (2) |
|  | Total | 15 | 100% |  |

**Source:** Field Data (2016)

Informationincluding information relating directly to health and safety, such as standards, guidance and aspects of the law, and any revisions.

**4.5.6 Budgets for Implementation of OHSMS**

In the workplace risk controls process procedures, as observed above, junior contractors are not following up standard process as to arrive at Health and Safety risk control standards. Researcher noticed, from interview, that, the difference between high class contractors and low class contractors is Competence of organizational staff, financial capabilities, and mostly Capital base etc. Respondents 67% were resounded to have found costly to implement health and Safety effectively.

**Table 4.7: H&S Implementations Costs Responses**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Description** | **Respondents** | **% Distribution** | **Remarks** |
| **4** | Low | 0 | 0% |  |
| **5** | Affordable | 5 | 33% | All class I firms |
| **6** | High | 3 | 20% | Class II (3) |
| **7** | Very high (not affordable) | 7 | 47% | CL III(6), Class II (1) |
|  | **Total** | **15** | **100%** |  |

**Source:** Field Data (2016)

It is the requirement of the legislation that for very contractor should set up Health and Safety management system by employing personnel knowledgeable in health and safety issues. Effective planning is concerned with prevention through identifying, eliminating and controlling hazards and risks and hence requiring very specialized professional and of well experienced, which, researcher has a doubt on the capability of lower class contractors. This is especially important when dealing with health risks which may only become apparent after a long latency period.

**4.5.7 Prioritizing Hazards**

Prevention can only stem from an effective health and safety management system, and organizations need a framework or benchmark against which to judge the adequacy of the current situation. Although health and safety management systems vary in detail they have some general characteristics. However, for any characteristic, the ultimate goal of any health and safety management system is to prevent injury and ill health in the workplace. Adequate workplace precautions have to be provided and maintained to prevent harm to people at the point of risk. Risks are created in the business process as resources and information is used to create products. Workplace precautions to match the hazards and risks are needed at each stage of work activity.

**Table 4.8: Ranked causes of Accidents/Injuries/Near miss at Sites**

|  |  |  |
| --- | --- | --- |
| **1** | **Falling from height** | **60%** |
| **2** | Hit by falling object | **53%** |
| **3** | Manual handling of cement, blocks etc | **47%** |
| **4** | Slip / trip hazards & Noise | **47%** |
| **6** | Workers Crushed or struck by vehicles or focal lift | **33%** |
| **7** | Inhaling dust (causing respiratory system problems) | **33%** |
| **8** | Electric tools ( Getting shocks) | **27%** |
| **9** | Working with heavy equipments around | **27%** |

**Source:** Field Data (2016)

**4.6 Stakeholders Participatory Role to Effective H&S on Sites**

**4.6.1 Board of Architects and Quantity Surveyors (AQRB)**

This is one of regulatory board established under architects and Quantity Surveyors act of 2010. The duties of the Board as per the law are;

1. To register Architects, Quantity Surveyor meeting the requirement and conditions envisaged in the provisions of the law.
2. To regulate the activities and conducts of Architects and Quantity surveyors, as individuals and firms.
3. To ensure that ensure that design works undertaken by a registered Architect and Quantity Surveyor firms comply with all governing regulations and Laws of the Country including requirement of safety.

An interview with the Board denied concern over issues of health and safety on building contractors site. This appears contrary to provisional of the law above. When interviewer questioned respondent to give opinion as to level of safety, and compliance on our sites, he estimated to have attained 50% and Compliance is 75% in our formal sector, while in informal sector has gone to 30% performance and compliance. The respondents, however, laments to have no responsibility for H&S, although as stakeholder can alert the responsible board for any unsafe situated witnessed as he visiting the site for his duties.

**4.6.2 Engineers Registration Board**

ERB is statutory board established by Act of Parliament (Engineers Registration Act no 15 of 1997), and vested with the following roles;

1. Regulating Engineers Activities,
2. Regulating consulting firms activities and
3. Monitor conduct of Engineers

The board conducts Inspection/visits to Construction sites, and mainly to see the structural designs meet and comply with all governing regulations and Laws of the Country. Researchers approached the ERB Board for an interview, and respondent specified being responsible for regulating and see to it that contractors are performing their duties on site to specifications and safe manner. Also, ERB have a duty to convict contractor for not fulfilling and comply with OSHA regulations.

**4.6.3 Contractors Registration Board (CRB)**

CRB is statutory board established under act of parliament of 1997. Role of the board among others are;

1. To regulate the act of contractors, and ensure that all construction projects are undertaken by registered contractors and that all regulations and by-laws are observed on site.
2. To liaise and interact with local and foreign professional boards and association related to the construction industry.
3. To promoting local contracting by providing expertise through training. Have duty to offer training to local contractors on Occupational health and Safety. But not under certification program.

In response to researcher’s interview question the respondent briefly outlined the role of CRB in respect of H&S on site, as being to make sure that

1. Contractors abide with H&S regulations to safe guard workers and public.
2. Contractors provide PPEs to his workers, Hoarding, and netting.
3. Make sure also that sign is erected showing also stickers for respect cadres.
4. Contractor provide facilities for care of health on site, say Clean drinking water, Toilet, first aid kit and aider,

Apart from the above, CRB responded to the Question no. 5, which researcher wanted to know if CRB is conducting any inspection on site. CRB is doing inspections for three days a week and that 2015, the target was to have total of 1100 visits in the whole country and have accomplished the target by 120% visits.

**4.6.4 Role of OSHA**

The primary aim is to improve the health and safety and well being of workers, and of workplaces. This would be achieved by promoting occupational safety and health (OSH) practices in order to prevent occupational injuries and diseases, and ultimately achieve better productivity. The authority has employed Labour Inspectors whose duty includes the inspection of health and safety in workplaces. After they prepare a report, the same is submitted to the Chief Inspector for relevant action which could be:

1. Advising the employer accordingly.
2. Issuing an improvement notice.
3. Issuing a prohibition notice.
4. Referring the matter to court.

Again it has duty of advising the Government on all matters related to Occupational Safety and Health activities in the country by enforcing the Occupational Safety and Health Act. It also conducts research, consultancy and training in Occupational Safety and Health. The Agency’s services extend to all workplaces as defined by the prevailing legislation i.e. the Occupational Health and Safety Act. No. 5 of 2003 and other subsidiary legislations. OHS regulations are enforceable, unequivocal and compliable legal products designed to enforce the protection of safety, health and welfare of people that may be directly or indirectly affected by the activities in a workplace.

**4.7 Performance and Compliance with OSHA Regulations**

Performance standards are the foundation for a positive health and safety culture. At the planning stage, decisions are needed about the appropriate standards to match the needs of the site activities and the health and safety management systemon a particular site.Researcher interviewed the OSHA research officer and mentioned the following as being the performance standards contractors have to abide with as to achieve effective health and safety performance on site and at risk points.

1. policy formulation and development;
2. methods of accountability; (organization set up), health and safety committee and similar consultation meetings;
3. involvement of people in risk assessments and writing procedures;
4. collection and dissemination of information from external sources;
5. the involvement of senior managers in safety tours and accident and incident investigations, preparation of health and safety documentation, performance standards, rules and procedures;
6. health and safety plans and objectives, the risk assessment process;
7. implementation of RCSs and workplace precautions, the active monitoring arrangements including inspections;
8. the accident and incident reporting and investigation system, Audit and review,

**4.7.1 Site Agents**

Researcher interviewed the site Agents on site, and observed the activities on sites which were related to performance and compliance of the above health and safety objectives. The findings analyzed at next section 4.7.2**.** However OSHA officials tend to admit the compliance of OSHA regulation at site is still very poor predominantly at low class contractors, ascribing situation for lack of professional staff for Health and Safety, Managerial Commitment among contractors, Clients absolving on the health and Safety issues, fund allocation for implementations on site and general safety culture.

Key performance indicators for reviewing overall performance can include:

1. assessment of the degree of compliance with health and safety system requirements.
2. Identification of areas where the health and safety system is absent or inadequate.
3. assessment of the achievement of specific objectives and plans; (HSE 2007)

**4.7.1 Workplace Measures Compliance at Sites**

Researcher, in order to arrive at the main objective of the study, and as the process to collect data for more valuable inference on the actual performance and compliance level, had to undergo interview with site agents/safety officers on site. In some of sites safety officers were present for interview on compliance and performance of H&S on site. Researcher took time to observe activities and assign score points accordingly. Site Agents ranking data and researcher observations were combined and agreed on site before closure of exercise.

For a four-point response item, Relative Importance Index (RII) produces a value ranging from 0.2 - 1.0 (Badu. E. et al 2013). Accordingly, the group index is the average of the relative importance index for the variables in the various groups ( Fugar, F.D.K. and Agyakwah-Baah, A.B. (2010). The values 0.71, 0.67 and 0.62 indicate respectively, the RII values of Health and Safety Management System, Workplace Precautions & Risk Control measures and Active monitoring System as shown in Table 4.9. OSHA 18001 model, for health and safety was utilized with all model elements applied. Likewise, the RII values indicate that, primarily, Active Monitoring and Workplace measures compliance and performance are worse on site despite satisfactory Management commitment level with a value of 0.71. Researcher is not puzzled finding higher value for group of Management arrangement variables due to fact that, of recently, tendering procedures pre-condition H&S Policy statement for Award of tenders.

This makes all contractors to have this document although implementation on site after awards becomes an issue to reckon with. Similarly, it suggests that, Workplace leading indicators ranked the first and second significantly influential factor for overall non performance of Health and Safety on sites, hence non effective risk control. It should be noted, as previously revealed, duties of a worker imposed under the law; is that workers must take reasonable care for the health and safety of themselves and any other persons who may be affected by his/her actions or omissions at work.

**Table 4.9: RII for Compliance and Performance Leading Indicators**

|  |  |  |
| --- | --- | --- |
| **S/n** | **H&S Compliance and Performance – Relative Importance Index** |  |
|  | **Leading Indicators - Scale** | **1** | **2** | **3** | **4** | **W** | **RII** | **Rank** |
| **A** | **H & S Management arrangement** | 0.71 | 3 |
| **1** | Health and Safety Policy | 0 | 0 | 0 | 15 | 60 | **1.00** |  |
| **2** | Organizing (accountability ;) | 0 | 3 | 3 | 9 | 51 | **0.85** |  |
| **3** | Planning of H&S | 1 | 4 | 5 | 5 | 44 | **0.73** |  |
| **4** | Implementation of Plans | 4 | 2 | 6 | 3 | 38 | **0.63** |  |
| **5** | Performance | 7 | 4 | 0 | 4 | 31 | **0.52** |  |
| **6** | Review and auditing | 6 | 3 | 5 | 1 | 31 | **0.52** |  |
| **B** | **Active monitoring** | **0.67** | **2** |
| **1** | Tool box meeting | 3 | 6 | 3 | 3 | 36 | **0.60** |  |
| **2** | Health and safety Inspection | 6 | 3 | 3 | 3 | 33 | **0.55** |  |
| **3** | Induction and trainings | 0 | 7 | 2 | 6 | 44 | **0.73** |  |
| **4** | Hazards Identifications | 6 | 0 | 2 | 7 | 40 | **0.67** |  |
| **5** | Best practice | 5 | 3 | 7 | 0 | 32 | **0.53** |  |
| **C** | **Workplace Precautions & Risk Control Systems** | **0.62** | **1** |
| **1** | Health tests, Environment and welfare  | 6 | 5 | 4 | 0 | 28 | **0.47** |  |
| **2** | Health and safety personnel on site | 3 | 0 | 0 | 12 | 51 | **0.85** |  |
| **3** | Hazards and Risk assessment | 3 | 3 | 2 | 7 | 43 | **0.72** |  |
| **4** | H & S committee site visits | 0 | 5 | 7 | 3 | 43 | **0.72** |  |
| **5** | First Aid Kit And Aider on site | 6 | 4 | 1 | 4 | 33 | **0.55** |  |
| **6** | PPEs Provision and warning signs  | 0 | 4 | 3 | 8 | 49 | **0.82** |  |
| **7** | Hoarding and Netting at high levels | 3 | 0 | 0 | 12 | 51 | **0.85** |  |
| **8** | Workers Involvement to H&S on site | 5 | 4 | 0 | 6 | 37 | **0.62** |  |
| **9** | H&S documentation, Rules and Procedures | 5 | 4 | 3 | 3 | 34 | **0.57** |  |
| **10** | Accident & incident records and reporting | 5 | 2 | 2 | 6 | 39 | **0.65** |  |
| **11** | Budget location to H&S plans on site | 6 | 4 | 1 | 4 | 33 | **0.55** |  |

**Source:** Field Data (2016)

**4.7.2 Class One Contractor**

The average Compliance and Performance level in each of the stages in health and Safety management System is as depicted in the table 4.10. Class one contractors seems to have been improving in implementation of System management to have effective and reliable hazards and Risk Control at site, and to the great extent have made site safe by almost 91 percent.

**4.7.3 Class Two Contractors**

Researcher revealed the compliance is satisfactory to contractors class II. The observations conducted by researcher on site visited, workers are reluctant to adhere to the workplace precautions. For instance operatives are reluctant to wear hard hats for reasons that weather is very hot. However, the Site supervisors confirm that the tendency of workers of not wearing harder hats is not periodic. The behavior is seen to prevail throughout a year regardless of whether conditions. While contractors class I have managed to employ Health and Safety inspector on site, lower classes are still unable to comply with this regulatory requirement. In the table 4.12, indicate average score for each leading indicators. Assessment for score points was done with the site agents on site as we were observing the activities on site.

Chart; 4.13 shows work precautions average score for sites observed by researcher and site agents in respective sites. Work precautions mean score for are as shown in the table 4.10 above. The result depicted in the table is average score for every workplace precautions Indicate that contractors in class three compliance level was poor compared to the contractors class one.

**Table 4.10: Leading Indicators**

|  |  |  |
| --- | --- | --- |
| **S/N** | **(H & S Management arrangement** | **Average score points** |
| **A** |  | C.1 | C.2 | C.3 |
| **1** | Health and Safety Policy | 10 | 10 | 10 |
| **2** | Organizing (accountability ;) | 10 | 10 | 6.3 |
| **3** | Planning of H&S | 9.5 | 8.1 | 5.0 |
| **4** | Implementation of Plans | 9.0 | 6.9 | 3.8 |
| **5** | Performance | 9.0 | 3.1 | 3.3 |
| **6** | Review and auditing | 8.0 | 5.6 | 2.5 |
| **B** | **Active monitoring** | Average score |
|  |  | C.1 | C.2 | C.3 |
| **1** | Tool box meeting | 9.0 | 5.6 | 5.5 |
| **2** | Health and safety Inspection | 9.0 | 4.4 | 3.3 |
| **3** | Induction and trainings | 10.0 | 7.5 | 5.0 |
| **4** | Hazards Identifications | 10.0 | 8.8 | 2.5 |
| **5** | Best practice | 7.0 | 5.0 | 2.5 |
| **C** | **Workplace Precautions and RCSs** | Average Score |
|  |  | C.1 | C.2 | C.3 |
| **1** | Health tests, Environment and welfare  | 3.5 | 1.3 | 0 |
| **2** | Health and safety personnel on site | 10 | 10 | 5 |
| **3** | Hazards and Risk assessment | 10 | 8.8 | 3.8 |
| **4** | Health and Safety committee site visit  | 8.5 | 7.5 | 5.8 |
| **5** | First Aid Kit And Aider on site | 10 | 10 | 10 |
| **6** | PPEs Provision and warning signs  | 10 | 8.8 | 6.3 |
| **7** | Hoarding and Netting at high levels | 10 | 10 | 10 |
| **8** | Workers Involvement to H&S issues on site | 10 | 6.3 | 2.9 |
| **9** | H&S documentation, Rules and Procedures | 9.0 | 5.6 | 2.9 |
| **10** | Accident and incident records and reporting | 10 | 7.5 | 2.9 |
| **11** | Budget location to H&S plans on site | 10 | 10 | 9.2 |

**Average Score at Site Observations**

**Source:** Field Data (2016)

Substandard Performance and compliances to health and safety needed to be explained as an outcome to the study. The average Compliance and Performance level in each of the stages in health and Safety management System is as depicted in the Figure 4.3. Class one contractors seems to have been improving in implementation of System management to have effective and reliable hazards and Risk Control at site, and to the great extent have made site safe by almost 91 percent. The stages associated with system safety are as follows:

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**Figure 4.3: Performance of Leading Indicators for Group Companies**

**4.7.4 Class Three Contractors**

The situation is even worse to class three sampled as regards to adherence to health and safety regulations. This can be seen from the results obtained from site observation conducted by Author. In six class III contractors’ site visited, four sites were found with workers without PPEs, worse enough, one of workers were working to a height more that 12m without Safety belt. More badly, the belt was not supplied to workers working at height, and they were none on site. Most accidents happen because people commit active failures, which are called "unsafe acts". Not wearing safety glasses is one example. In terms of system safety, unsafe acts and unsafe conditions are substandard practices and substandard conditions, i.e. deviation from an accepted standard or practice.

**Figure 4.4: Compliance Level among the Contractors**

**4.8 Accountability of Consultants to H & S on Construction Sites**

The researcher was interested in the respondent’s opinion as per whether the consultants should be held accountable for incidents and loss of properties and lives as result of the poor management, provision and implementation of Occupational health and Safety requirements on construction sites.



Figure 4.5: Accountability of the Consultants for Poor OSH on Construction Sites

The Figure 4.5 shows majority of total respondents seconded the opinion of having the consultants accountable and penalized for shortfalls and provision of OHS requirements. This was aimed at gathering a view that would suggest collective approach for accountability of all key stakeholders in the construction industry. Resembling question was also asked to ERB, AQRB regulatory boards, and denied being responsible for any Health and Safety issues as enforced by legislature. The figure 4.15 shows that eight one percent of the total respondents seconded the opinion of the consultants being held accountable and possibly be penalized for shortfalls and poor health and safety management in the part of contractors. It was further noted that 19% of consultants opposed the idea of them being accountable.

**4.9 Adequacy of the OSHA Systems and Measures**

Respondents were required to rate the level of adequacy, and effectiveness of the prevailing systems including the authorities and clients. The figure 4.16 details received responses.



**Figure 4.6: Adequacy and Effectiveness for H&S System Approach**

Figure 4.6 shows that stakeholders rating of the prevalent system emerged to be good. This is an individual opinion, depending on the understanding of the entire system for effectiveness requirement. Response of 25% ranging from fair to satisfactory cannot be overlooked. The result might be depicting the really picture of the industry as it concedes with the results obtained on site Agents interviewed. Some of interviewed site Agents on sites claimed that measures are fairly adequate but are costly, and that there is need to, seriously, consider the matter outright from tender stage with the client being involved.

**4.10 Challenges facing the Construction Sites In Implementing H&S Management System**

The research design details out the boundaries of the study to meet the requirement of the problem and objective, including answering research questions, for later recommendations. The author appreciated the fact that factors affecting health and Safety standards in the construction sites are not limited to those forming part of the research problem, but also other challenges prevail and would be partially covered in this thesis, or even for basis for further research agenda. Contractors seen to miss understand that by providing PPE to workers is viewed as complete measure on site with regard of other requirements. With this author found that the training among contractors should the first agenda of stakeholders, CRB and OSHA.

The Two key stakeholders, OSHA and CRB responded to the researcher question demanded to know as to whether they have any training programs plans with main themes of health and Safety management designated for contractors. OSHA has certified training, although admit not adequate compared to industrial requirement, and CRB is has none of the sort. It is to Researchers belief that tackling strategy for poor performance on health and safety need to start with Awareness programs and building up health Culture among the employers. OSHA has training program leading to equip the certified Safety officers whom Contractors would utilize as site safety officers.

Construction industry is among the most competitive sector. In tendering (bidding) process the contractors are required to submit priced bid items with rates built in with materials costs, labour, overheads and profit. This is ought to be done considering all aspects that might affect ones’ bid and at the same time, consideration for the budget constraint on the part of investor needs to be put in mind. Given the above aspects and other uncertainties in the industry, there is too much competition.

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**Mean Ratings of OHS Measures**

**Figure 4.7: Ratings of Measures to Improve Health and Safety Management System**

The fact that stakeholders are not well informed about the benefits of H&S, contractors tend to under grade its importance in totality. This leads to a small allocation of money to effectively carter for health and Safety activities on site, or even ignores the H&S item in order to reduce the bid price. In the same spirit, where clients are not properly advised by consultants for considerations of health and safety matters as required by law on construction sites, omission of H&S requirement is regarded to as a saving to the client. This tie back to a collective H&S role that is ought to be assumed by all the respective players in the industry.

Construction activities employ quite a number of individuals ranging from professionals, skilled and unskilled labour. Therefore there is a lot of labour mobility in terms of entrants and exists especially the unskilled labour force. The fact that the unskilled labour is not permanent employees of construction companies makes the notion of sustainable implementation of H&S skills challenging. Changing stakeholders’ mindset to H&S implementation in the industry should be of major significance. Equipping people with skills to identify hazards, and think safely and healthy requires much effort. This would require the implementation of a ‘safety culture’ programs with a collective role by all key participants in the industry in the bid to improve safety performance to standards in the industry. It will be appreciated that the questionnaire involved opinion and descriptive questions that required the respondents’ opinion. The responses to the questions put across will form basis for discussion in the preceding section.

**4.11 Discussion of Findings**

This study strived to examine performance and compliance of health and safety in the industries. The study found the compliance and performance of health and safety among the contractors is very poor as you go down the Class Categories. The compliance is satisfactory across the sample contractors examined. Many factors ascribe the underlying the trend which has been revealed. Contractors of high Class were revealed to be capable employ and maintain Professional Officers on Health and safety. This contrary to the tendency revealed to the contractors of Lower Classes. Finding is in line with research question number one about the level of performance and contractors among the sample contractors’ workplaces.

This finding revealed that the procurement system is one of underlying factor for poor compliance and performance whereby as (Sarah; 2012) revealed that lowest tender and stiff competition has led to health and safety provision being ignored, has been a challenge for contractors to invest in health and safety. Furthermore, (Sarah; 2012) health and safety section in the preliminaries in the tender documents has provided a sum, which does not show details of the issues contractors have to consider in pricing health and safety, (Sarah 2012) augment predicts the situation to be more as go down to lower class contractors in the industry.

The Contractors Registration Board put in place various measures as detailed under section 2.5.2 and 2.5.4 in chapter two. The government also established an executive agency OSHA under the Executive agencies Act 1997. The agency's services extend to all workplace as defined by the prevailing legislation and other subsidiary legislation. In line with research question no. ii, the outcome of research showed that consultants sampled had no H&S Policy. It is ironical to note, that regulatory authorities too did not have OHS policies in their organ. AQRB as regulator to the professionals’ duties denies responsibility on health and safety issues on site, which further, reveals the lack of safety culture within the stakeholders, leaving the OHS role to two organs to administer.

With such situation, where deficiencies bar the authority to effectively pursue the assumed role, the H&S standards in the industry would not get any better. Nzuve and Lawrence (2012) found that low level of inspection and examination of workplaces might determine the level of compliance with OHS regulations as evident in Contractors workplaces. Where lack of enforcement characterizes regulatory institutions (Idubor & Osiamoje, 2013), most laws appear to fulfill all righteousness or are used for political or victimization reasons.

These ill characteristics of the regulatory institution weaken its legal system. The contention being that the efficiency and effectiveness of the OHS enforcement bodies may determine the level of compliance with OHS regulations in workplaces. This explain why researcher, out of findings as detailed in section 4.7 posit, that lack of: strict legislation enforcement; competent professionals i.e. OHS officers, trained safety officers, all enable non-compliance with OHS regulations in construction industry. However, although the quality of enforcement may be marginal, enforcement at organizational level perhaps via safety officers should be made mandatory to construction contractors, as it will improve OHS enforcement.

Further in line with research question no.iii, as regards to underlying factors for Contractors non-compliance and non-performance to Health and Safety revealed evidently that roles of Regulatory Authorities, roles of other tripartite Stakeholders (Client, Consultant and Contractors), Compliance and Performance standards, Inadequate Budget funding, are found to be underlying factors for non-compliance. Researcher revealed out of literature review that Perception of stakeholders in the industry, Inadequate training of H & S professionals, Activities of the informal construction sector, tendering process, are also main underlying factors for non-compliance and non-performance in the construction industry.

**4.11.1 Participatory Roles of Regulatory Authorities**

It has been further revealed that key players minimally or even completely ignore consideration of safety and health requirements. Irrespective of existence of regulatory and other government organizations in enforcing H&S requirements, the underlying factors for the poor OHS performance of the construction industry has been discussed as being low level of stakeholders' participatory roles, and inefficiency of authorities. This was revealed in the interview discussion with key stakeholders. The research finding is in line with the research question three as to the underlying factors for non-compliance. This findings are in line with previous empirical works of Sara Phoyah (2012) found that consultants and other stakeholders lack commitment at design and implementation stages.

**4.11.2 Inadequate Budget Funding**

Oisamoje (2013) contend that capital is required to provide adequate facilities in order to avoid cutting corners. In that lack of facilities may mean that desperate workforce will risk lives instead of going hungry, hence will not comply with OSH regulations. This explains why Diugwu et al. (2012) argue that lack of resources can hinder OSH management efforts. On the other hand, most enforcement bodies/institutions in the developing world lack the basic tools and amenities, which need funds to promote OSH regulations, educate the society, enforce the regulations, and disseminate information. Research findings showed to demonstrate similar phenomena, see section 4.5.6, and table 4.9, where 67% lamented on implementation costs to H&S as un- affordable.

**4.11.3 Clients’ Influence**

Famakin and Fawehinmi (2012) acknowledge the influence of clients in improving OSH in the construction industry by citing Huang and Hinze (2006), who assert that clients’ involvement is a core requirement for ensuring a zero accident rate in construction projects. This is reinforced by Smallwood and Haupt (2007), who propose that “clients should take the lead when it comes to OSH in their projects, as the OSH regulations like the South African Construction Regulations of 2003 place high level of responsibility on the client”. These above suggest that low level of compliance with OSH regulations can be traced to the client who should ensure that the regulations are adhered to, hence ensuring optimum OSH in all projects. Author, identified the new GN of 17th, 2015, which apart from being under OSHAs’ custodian already, but is not yet disseminated to stakeholder for implementation.

**CHAPTER FIVE**

**5.0 SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS**

**5.1 Summary of Findings**

In order to achieve the research objectives, Researcher has undertaken an analysis of the field study in Chapter Four, and the main objective of study was to determine compliance and performance of Health and Safety in the construction industry, focusing the contractors’ workplace sites. Civil and Building Contractors registered with CRB are 6643 and only 5% are registered in class One to Three

Various statistical techniques used to analyze data derived from objectives of study. Research questions were answered. The study findings show that majority of the respondents 47% were aged between 40-49 years. All of them were male respondents. Also those, 67% have experience between 11yrs – 20yrs in the construction industry. On the other hand, the findings revealed that 67% of the respondents showed concern on costs as being high for funding H & S on site. In addition, 74% of respondents were university graduates with Bachelor degree and 13% were master degree holders.

The study achieved response level of 83.3% for the contractors approached for questionnaire and 50% approached for interview. Observations and interview (discussion) on site the response was 90% out of approached site Agents. Regulatory boards the response was 80% and Consultants the level response reached at 70%. However, the study achieved overall response of 64% out of sample space. The following are summarized findings;

**Compliance and Performance of Health and Safety:** The study found that the compliance and performance level of health and safety among the contractors is very poor as you go down the Low Class Categories. However, it has been satisfactory across the sample contractors examined. But compliance is improving to construction firms of First Class as compared to medium and lower class. Many factors ascribe the underlying the trend which has been revealed. Contractors of high Class were revealed to be capable to employ and maintain Professional Officers on Health and safety. This is contrary to the tendency revealed to the contractors of Lower Classes. Finding is in line with research question number one about the level of performance and contractors among the sample contractors’ workplaces.

**Stakeholders Role:** The level of participatory efforts and awareness for H&S was found to be poor, as reflected by respondent’s individual ranking of their H&S knowledge, showing uncertainty and more so inconsistence in that respect. Stakeholders’ are poorly knowledgeable of their respective role, this was revealed in interview with stakeholders, AQRB and ERB denied of being responsible to enforce H&S regulations on site.

**5.1.3 OSHA Regulations on Site**

Building contractors compliance and performance to OSHA regulations for health and safety on site is poor. The situation is satisfactory and is improving to firms of high class.

**Financing, Skills, Accountability, Training:** Researcher, out of site observation, revealed deficiencies in the prevalent Health and safety management system and risk control measures in place. Areas identified included accountability, supervision, financing, skills and training, manpower and coverage.

 **Misconception and Poor Perception:** The study, further, revealed a misconception and poor perception of stakeholders to H&S issues. Building contractors refer H&S requirement as being expensive, intangible to final product, time consuming.

**Consultants Lack of Liability:** Consultants’ lack of liability to omission action that jeopardizes OHS on sites was cited as a catalyzing factor to H&S hazards on site. Consultants need to incorporate health and safety concept during the design stage and with sustainability.

**5.2 Conclusion**

The alarming nature of health and safety observation / consideration on many construction sites in Tanzania has formed the backbone for undertaking this research. And before concluding and recommending as per the findings through the reviews, discussions and data analysis, it's tentatively important to measure all the above, basing on the research objectives. Primary data for this study was obtained through semi-structured questionnaires and direct interviews and discussions to different officials from respective boards, regulatory authorities and contractors on sites and head offices.

In chapter four, field study data has been concisely synthesized, studied and evaluated in order to derive interpretations aimed at meeting research objectives. The present study purposely done to examine the compliance and performance of H & S by contractors on sites. Specifically the study looked at performance of health and safety in relationship to tripartite stakeholders participatory role, as an input, for achieving effective hazard and risk control at contractors workplace (sites). The study investigated level of compliance for H & S in three stages of implemetations, i.e H & S Management Arrangements, Workplace Precautions & Risk Control Systems and Active monitoring.

The findings in all three dimensions are carrying interpretations showing mishaps to contractors as implementers and key stakeholders as regulators, including Clients as liable entity. OHS challenges to the industry as affects the compliance and performance of H&S were the main areas of assessment. Research revealed inadequacy of legislation coverage in the part of regulators and monitoring boards. It will be appreciated that the construction of any building project is a process involving many stakeholders with and including other 'secondary actors' like banks for source of finance, material suppliers, and manufacturers, (not covered under this research). However, it has been noted that the roles of the key stakeholders and construction companies in ensuring compliance, performance in H&S as considered within the process, is far from satisfactory, and poor.

Data were analyzed using various statistical techniques, Relative Importance Index, Spearman’s rank correlation, Relative Importance Index. The study findings revealed that two dimensions, (i) Workplace Precautions & Risk Control Systems and (ii) Active monitoring, to have significant effects on contractors performance and compliance among contractors. The study revealed that the responsibility for construction site health and safety lies with the main contractor, and that, stakeholders’ i.e designers, consultants and clients don’t seem to have any responsibility if accidents occur on the site. The active participation of clients and design teams in the built environment in health and safety matters in Tanzania is yet to be realized, and awareness of key stakeholders as regulators, authority is low and site visits should aim to sensitizing health and safety issues and not for mindset of hunting H & S violators.

**5.3 Recommendations**

**5.3.1 Identification of Hazards Process and Risks Assessment**

Regulation standards requires the process of recognizing assessing Hazards and risks to involve site supervisors and gang leaders (heads), as they are ones supposed to supervise the activities at grass root and see to it that all work precautions and risk control are well in place. This study observed that there are shortage of well trained personnel on health and Safety. OSHA have a duty of producing certified H&S personnel and CRB can only produce uncertified training as part of promotion role to local contractors.

It seems the pace for exercise is not encouraging with all this alarming situations in the construction sites. OSHA performance indicators could be reflected on the data of Convictions, enforcements, training outputs, financial fines, inspection frequencies imposed to local contractors, however, data related to the indicators were not available. However, performance of OSHA, as health and safety regulator could be reflected on the other side of implementers for having workplaces with zero death. It is recommended to expand training capacity of H & S personnel by allowing other institutions and university colleges establish training program.

**5.3.2 Measures to Improve OHS**

Researcher found the relaxation of clients, regulators and consultants on the issues of H&S was detrimental for safety of workers at their respective workplaces (sites). This is due to inadequacy of Legislation Coverage. Researcher suggests improving regulations in a way that H&S is considered as BOQ item and contractor is at liberty to price basing on the specification issued by client. Also, new GN of 17 July 2015, which now shares liability on H&S to Client and Consultant (designers), should put in operations by OSHA immediately. Clients have not taken it up to themselves to provide the conformance costs as the provisions within the tender documents. Hence, author, recommends a need to address the H&S in terms of attitude, culture, H&S contractual provisions and other deemed requirements.

**5.3.3 Limitation**

The researcher focused on the performance and compliance of building construction firms as implementers of H&S in virtual of their work on site and input role of key stakeholders as regulators. Stakeholders have role of ensuring sustainable occupational health and safety in the construction industry, and Contractors have legal obligation to ensure sites are safe and healthy by complying with OSHA regulations. The study did not cover the roles played by informal sector in the construction industry, however the researcher feels that many stakeholders especially clients and contractors, are a derivative of the informal sector. To highlight the demands of the proper implementation of safety culture, one needs understand the roles played by each stakeholder in the construction industry. The study was limited only to objectives listed under section 1.3 of chapter one.

**5.3.4 Responsibility of Clients and other Stakeholders**

This research has revealed that stakeholders are not well aware of their roles. From the questionnaire responses, consultants and regulators were found to be fairly aware of their H&S roles, meaning that they are knowledgeable though poorly in practice. As a result, Occupation health and safety issues in the construction industry have been more of a contractor's role, with less preventive and ' on-job' measures by the other key stakeholders (OSHA, CRB, AQRB ERB, CLIENTS, CITY COUNCILS etc). On the other hand, from consultants’ views, Clients were inferred to be poorly aware of their roles, with a perception of H&S requirements as a costly item without any tangible returns on the projects. This as weakness of clients, in the long run, the whole burden over H&S is carried by contractor.

**5.3.5 Training and Sensitization**

The researcher suggests training with use of seminars, fliers, brochures and workshops conducted by the respective regulatory authorities and professional bodies. Career programs like Continuing Professional Development (CPD) should be tailored to address and ensure H&S issues for the consultants to implement. Generally, equipping the general public with safety skills is necessary, and on top of teaching 'safety and health' for instance to students of the Construction Economics and Management (CEM) in the final year, the same should be introduced to secondary school curricular for the work force that does not make it to university level but are employed by the industry. The public should be educated though media such as Television, radio and newspapers to subsidize the current use of journals and newsletters with less coverage and accessibility

**5.3.6 Government Notice (GN) of 17th July, 2015**

This research has identified existence of subsidiary legislation by GN of 17 July 2015. No contractor is aware of it leave alone Clients and Consultants (designers). Under new legislature Clients and his design team will now be held responsible for unsafe acts, fault designs and any other issue which would seem to jeopardize health and safety of workers at site or public. Further the by-law leaves no allowance for any building and civil contracts above or equal to one hundred million will operate without safety officer on site, and to be accredited by OSHA. This will mean that every contractor should employ a safety officer to be on site. Research smells another challenge under strict implementation of this legislation.

According to CRB there are about 6650 active contractors in Tanzania. From the sole trainer (OSHA), certified safety officers output is far from enough for absorption in construction industry. Researcher recommends that, with this requirement, training of certified health personnel cannot be left to OSHA alone. The government should expand training effort to other institutions, colleges and universities. Government should take initiative to grant sponsorship for training Health and Safety officers.

**5.3.7 Activities of the Informal Construction Sector**

The informal sector play both an important and controversial role as it provides jobs and reduces unemployment and underemployment. Tanzania being a developing country the operations of the sector is quite diverse unofficial business activities; tax evasion, avoidance of regulatory requirements or even underground activities such as crime and corruption. The informal construction sector has little or no access to occupational health. It has to be noted that, Author, has been working in the construction industry for the past 26 yrs, and would like to assess that about 68% output volumes in the construction industry constitute the informal sector. The point here is that their main methods of project execution involve employing workforce who do not have ideas of adequate safety practices required, therefore cannot advise the client to comply with OSH regulations.

This study aimed at determining compliance and performance level in occupational health and Safety in the construction sites. It also aimed at determining participative roles and responsibilities of stakeholders and their participatory obligation in health and safety in relation to performance of contractors on sites. The argument therefore is that if 60% -70% of the construction activities are executed through the informal practice, contribute to majority of the unsafe construction activities, thus hindering OHS improvement. Greater attention should be given to this sector perhaps through adequately extended regulations to cover the informal sector. However, it can be argued that the informal sector is difficult to regulate because of the nature of its operations. From the above, it is therefore not misleading to state that this sector contributes hugely to non-compliance with OSHA regulations.

**5.3.8 Institutionalizing of Dialog with Workers**

Failure of any system is not only a result of lack of intelligence or even poor understanding of the underlying factors, but also arrogance, dismissive behavior and poor listening skills are key barriers to success. In order to improve the safety standards of the construction industry, managers and key stakeholders should listen to issues and concerns of the site personnel. Workers are the best source of information about the weakness of the site, their feedback and information should be encouraged. This exercise should be made whenever the construction team makes a site visit or site meeting. Achieve effective communication on site, dialogue should be encouraged from top to bottom levels. This should aim at establishing problems, challenges and collect proposal for improvement.

**5.3.9 Areas for Further Studies**

Imposition of New Subsidiary Law on Health and Safety, GN of 17th, July 2015, researcher findings proposes further studies on consequential challenges of the legislature in a view to establish strategically implementation of law for effective control of risks at work place. The Study, further, will strive to explore the training capacity of OSHA and New legal demand for professional personnel on health and Safety. Author suggests Universities should now be encouraged establishment of H&S certificate / Diploma and degree courses.

**REFERENCES**

Adinyira, E. and Anokye, P. (2013) Illegal Appendages to Residential Buildings in Kumasi, Ghana—A Case Study of North Suntreso. *Journal of Construction Project Management and Innovation*, 3, 511-529.

Adjei Mensah, C. (2010) Causes and Consequences of Informal Settlement Planning in Ghana: A Case Study of Aboabo, a Suburb of Kumasi Metropolis. M. Phil. Thesis, University of Cape Coast, Cape Coast.

Advanced learners dictionary; Cambridge; (online)*wwwy.com/definition/safety.html.*

Andersson, R. (1999). Injury Causation, Injury Prevention and Safety Promotion – Definitions and Related Analytical Frameworks. In: *Safety Promotion Research, Laflamme, L., Svanström, L.* *and Schelp, L*. (Eds.) 15-42. Karolinska Institutet, Stockholm.

Aneziris, O.N., Papazoglou, I.A., Baksteen, H., Mud, M., Ale, B.J.,Bellamy, L.J., Hale, A.R.,

Argent, P and Forman, J. (2002). *The Power of Corporate Communication: Crafting the Voice and Image of Your Business*, McGraw-Hill, New York.

Ayyub, B. M. (2003). *Risk analysis in Engineering and Economics*. Chapman & Hall/CRC.

Badu, E., Owusu-Manu, D., Edwards, J.D., Adesi, M. and Lichtenstein, S. (2013) Rural Infrastructure Development in the Volta Region of Ghana: Barriers and Interventions. *Journal of Financial Management of Property and Construction*,142-159 <http://dx.doi.org/10.1108/JFMPC-11-2012-0040>

Barnard, F. J. (2005). An integrated health, safety and environmental risk assessment model for the South African global systems mobile telecommunications industry; *Doctorial Thesis*.University of South Africa.

Behm, M. (2005). Linking Construction Fatalities to the Design for Construction Safety Concept. *Journal of Safety Science*. 43 (8): 589-611.

Bentley, T. A., Hide, S., Tappin, D., Moore, D., Legg, S., Ashby, L. & Parker, R. (2006). Investigating risk factors for slips, trips and falls in New Zealand residential construction using incidentcentred and incident-independent methods. *Journal of Ergonomics*, 49, 62-77.

Bibbings, R (2004) Measures of Performance. Corporate Health and Safety. Royal Society for the Prevention of Accidents 2004 12-14.

Bohrmann, B. (2000). A Socio-Psychological Model for Analyzing Risk Communication Process; *The Australian Journal of Disaster and Trauma studies*; 2000.

Breakwell, G.M. (2007). *The Psychology of Risk*, Cambridge University Press, Cambridge, UK

Bremer, B. (1980). In one word: not from experience, *Journal of Acta Psycologica,* 45, 223 241.

Bryman, A. (2006). *Integrating Qualitative and Quantitative research: how is it done?*, *Qualitative* *Research* : SAGE Publications.

Caccia L.E. (2009). Risk communication in the Workplaces: An analysis of the Communication Toolkits

Contractoractor registration board act, (GN no 17 of 1997) by-law 1999 9Tanzania)

Contractors Registration Board (CRB), (2008). *Proceedings of CRB Annual Consultative Meetings 2008 "Corporate Governance*: A Key to Successful Contracting Business" 17th – 18th July

Deborah Walker; Hazard and Risk Management, Business School, Loughborough University, LE11 3TU, UK.

Dejus T. (2007). Accidents on Construction Sites and their Reasons. (online) [www.vgtu.lt/leidiniai/leidykla/MBM\_2007/2pdf/Dejus.pdf](http://www.vgtu.lt/leidiniai/leidykla/MBM_2007/2pdf/Dejus.pdf).

Famakin, I. O., and Fawehinmi, O. S. (2012). Quantity surveyors‘ perception of construction health and safety regulation in Nigeria. *Journal of Building Performance*, Vol 3 (1). Federal Republic of Nigeria: *Labour, Safety Health and welfare Bill of 2012*.

Formal sector economic report EE -2014 Tanzania Mainland

Fung, I. W., Tam, V. W. Lo, T. and Lu, L. (2010). Developing a Risk Assessment Model for construction safety; *International Journal of Project Management* 28; 593-600

Gambatese, J., Behm, M., and Hinze, J. (2005). Viability of Designing for Construction Worker Safety. *Journal of Construction Engineering and Management*. 1029-1036

German, E. (1994). Safety, health, Environ ment and Quality Management 2nd, ed America Internation Risk control, America.

Hali ya uchumi wa taifa 2015

Health and safety climate survey toolInformation pack HSE Books 1997 ISBN 0 7176 1462 X*.*

HSE, (199). Health and safety benchmarking. Improving together. INDG301.

HSE, (2001) A Guide to measuring health and safety performance.

Idoro, G. I. (2008). Health and safety management efforts as correlates of performance in the Nigerian construction industry. *Journal of Civil Engineering and Management*. Vol 14(4), 277

International Electrotechnical Commission (IEC) 2008. Draft IEC 31010 Ed. 1.0, Risk Management – Risk Assessment Techniques. May 2008.

Johnson, J.W. and LeBreton, J.M. (2004) History and Use of Relative Importance Indices in Organizational Research. *Organizational Research Methods*, **7**, 238-257. <http://dx.doi.org/10.1177/1094428104266510>

Kiiza, J. (2008), Role of stakeholders ensuring sustainable occupation health and safety in construction industry, unpublished, South Africa.

Mansley, M. (2002). Health and Safety Indicators for Institutional Investors. Report to the HSE; Claros Consulting.

Marsden, S., Wright, M., Shaw, J., & Beardwell, C. (2004). The Development of a Health and Safety Management Index. Research Report RR217; HSE Books.

Melesse, M. (2006) City Expansion, Squatter Settlements and Policy Implications in Addis Ababa: The Case of Kolfe Keranio Sub-City, Addis Ababa. Department of Geography and Environmental Studies, Addis Ababa University, Addis Ababa.

 Nathan, M 2006 Evaluation of the darft occupation health and safety policy and assess its strengths and weakness. Unpublished dissertation, Dare s salaam.

Nzuve, S. N. M., and Lawrence, B. A. (2012). The extent of compliance with occupational safety and health regulations at registered workplaces in Nairobi. *International Journal of Business,* *Humanities and Technology,* Vol. 2 (2) 115-120.

Occupational health and safety Act 2003 (Tanzania).

Redinger, C. F., and Levine S. P.: Evaluation of an occupational health and safety management system performance measurement tool—II: Scoring methods and field study sites. *Am. Ind. Hyg. Assoc.* *J. 62*:34–40 (2001).

Report 2008 - HSCO - System Performance Measurement.

Smallwood, J. J. (1997). Achieving an accident free workplace and the concept of zero injuries, South Africa Institute of building construction health and safety Seminar. Gauteng Johnnesbug.

Subsudiary Legislation for The occupational safety and Health (building and Construction industry) Rules, 2015 Vol/GN 17 96, dated 17th, July 2015.

**APPENDICES**

**Appendix A: Questionnaire**

Dear Participant

The following are questions aimed at facilitating data collection for dissertation. You are kindly requested to respond by ticking, filling up or comment, as appropriate.

**Part One: Personal Particulars**

Instructions: (Tick the appropriate answer /fill the blanks were necessary)

1. District: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Company / Firm / Institution\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What is your rank/title/Position? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Gender: (i) Male ( ) (ii) Female ( )
4. Please indicate your highest qualification

i) Form four ( ) ii) Form six ( )

iii) Certificate or Diploma ( ) iv) Bachelor’s degree ( )

 v) Master’s degree ( ) vi) Doctorate ( )

 vii) Others, specify\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is your age group?

 i) 20-29 ( ) ii) 30-39 ( )

 iii) 40-49 ( ) iv) 50-59 ( )

 v) 60+ ( )

* 1. How long have you worked in your current position?

i) Less than 1 year ( ) ii) 1 - 5 years ( )

iii) 6 -10 years ( ) iv) 11 - 15 years ( )

v) 16-19 years ( ) vi) 20+ years ( )

 7. How long have you worked in the construction industry?

i) Less than 1 year ( ) ii) 1 - 5 years ( )

iii) 6 -10 years ( ) iv) 11 - 15 years ( )

v) 16-19 years ( ) vi) 20+ years ( )

 **Part two; Health and Safety Awareness**

* 1. Are you aware of presence of health and safety policy?

 Yes ( ) No ( )

* 1. Does your Company/firm have this policy?

 Yes ( ) No ( )

1. How is health and safety system structured at your company?

…………………………………………………………………………………Who are involved?

Health and Safety Committee ( ) Company directors ( ) Both ( )

1. How site workers are involved in Health and Safety issues?

Participatory ( ) Communicated to ( ) Both ( )

1. Is the process of Hazard recognition/identification done on site? Yes ( ) No ( ), if yes who are involved

Gang Heads ( ) Site Agent/Manager ( )Projects Manager ( ) All of them ( )

1. How strong is the involvement of Risk assessment?

Gang Heads ( ) Site Agent/Manager ( ) Projects Manager ( ) All of them ( )

1. Work method statement is prepared and approved, who are involved in preparation, Gang Heads ( ) Site Agent/Manager ( ) Projects Manager ( ) All of them ( )
2. Tool Box Meeting is one way of sensitizing and communication with workers on occupational health and Safety issues on site during morning hours. Do you practice this? Yes ( ) No ( )
3. For Tool Box Meeting, What is the frequent target for the meeting? ( ). And how often the meeting is conducted in a month;

 Every day ( ) Weekly ( ) Once a month ( )

1. During the Project bidding process, is Health and Safety plan included as prerequisite in bid submission; Always ( ) often ( ) Never ( )
2. Implementing the Health and Safety plan on site need funds, how do you rank the costs involved; Very high ( ) High ( ) Low ( ) affordable ( )
3. Does the Company provide PPE to workers on site? Yes ( ) No ( ). How do you rank the costs involved; Very high ( ) High( )Low ( affordable ( )
4. How do you report, near miss, injury incidents, accident.

Use record book ( ) Phoning head office ( ) Sending sms to head office ( )

1. How long does safety committee take to visit site;

weekly ( ) Monthly ( ) none ( )

**Part three; Risk Perception**

 **A;** How safe are you feeling when you are working with your task

 **(1=very safe, 2 =safe, 3=moderate safe 4 =not safe, 5= not safe at all)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **Type of hazard**  | **1** | **2** | **3** | **4** | **5** |
| **1** | Waking at height |  |  |  |  |  |
| **2** | Manual handling |  |  |  |  |  |
| **3** | Overcrowded site |  |  |  |  |  |
| **4** | Handling heavy load |  |  |  |  |  |
| **5** | Manual handling (carrying cement bags or bricks/blocks) |  |  |  |  |  |
| **6** | Noise (using block/brick cutting machine) |  |  |  |  |  |
| **7** | Dust (mortal/ cement) |  |  |  |  |  |
| **8** | Bending, twisting while laying blocks/ bricks |  |  |  |  |  |

 **B;** Rank as the most probable to least cause incidences on site

 **(1= very high, 2= High, 3=Medium, 4=Low, )**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S/N** | **Type of hazard**  | **1** | **2** | **3** | **4** |
| **1** | Falling from height (Causing Serious injury or fatal injury) |  |  |  |  |
| **2** | Falling object (blocks, debris) heating head, body etc |  |  |  |  |
| **3** | Manual handling (carrying cement bags or bricks/blocks) Neck, back or arm injury |  |  |  |  |
| **4** | Workers crushed or struck by moving vehicles, focal lift |  |  |  |  |
| **5** | Noise (using block/brick cutting machine) which cause hearing loss Handling heavy load |  |  |  |  |
| **6** | Inhaling dust from cement-cancer, respiratory systemmuscular skeleton disorder, back pain due to Bending, twisting while laying blocks/ bricks |  |  |  |  |

**Interview Guide for Contractors Safety Managers (Head office)**

1. Does your firm has a health and safety policy, how does it state
2. How does your firm manage health and safety risk in the sites.
3. Are you getting difficulties in designing Risk Control Stems or adopting Workplace Precautions standards to a risk point areas?
4. What are the challenges you are facing on managing health and safety management on site
5. What are your comments on improving health and safety risk management in workplace?
6. If any, what are they?

**Appendix B: Interview Guide Questions**

**(for Stakeholders; OSHA, CRB, AQRB, ERB AND CONSULTANTS)**

**Interview Guide for Institutional legal system**

1. What is your role in ensuring health and safety are managed in construction sites.
2. As per health and safety legislation, what are contractors’ duties on sites?
3. Do you have inspection plan? What is inspection frequent target? Do you meet target?
4. What are challenges you are facing
5. To what extent in your opinion our sites are safe
6. How do you rate Health and Safety management system in Tanzania, generally?
7. Rank the level of Importance to the following improvement measures to the Health and Safety management system in the compliance of OSH requirements. (1=Not importance, 2=Low Importance, 3=Medium Importance. And 4=High Importance)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Extend Penalties to the Clients. | 1 | 2 | 3 | 4 |
| Provision of H&S controller to the site employing more than 50workers |  |  |  |  |
| OSHA to provide incidents record book for all projects |  |  |  |  |
| Past good record on H&S to be pre-requisite for contract award |  |  |  |  |
| Increase by training H&S practitioners to Colleges, and Universities. |  |  |  |  |
| Beef up penalties for non-compliant stakeholders in the Industry. |  |  |  |  |
| OHS training in the CPD programs as mandatory |  |  |  |  |
| Pre-condition requirement for H&S personnel for contractors upgrading |  |  |  |  |
| H&S to be properly priced as bill item in bid stage of project. |  |  |  |  |
| Sustainable strategic design for H&S in the Projects. |  |  |  |  |

**Appendix C: Interview Guide Questions for Site Agents/ Safety officers on site.**

1. What is your education background
2. What is your experience in construction industry as site Agent or ..?
3. How did you learn to perform your construction activities?
4. Do you have any formal training of health and safety risk in construction sites?
5. Are you involved on Hazard identification and risk assessment, what methods/ tool used for risk assessment
6. Risk communication is important. What methods used for communication?
7. How do you involved in risk control, what methods used for risk control.
8. What are the challenges on implementation of health and safety risks control on site?

**Appendix D**

 Date……………

Company Name; ……………………..Class……….

Project………………………………………………………………………………

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | OSHA REQUIREMENT | DESCRIPTION | REF; NO | OBSERVATIONS |
|  | Scorer | scorer | Average score |
|  | H&S management arrangement |
|  |  |  |  | 1 | 2 | 3 |
| 1 | H&S policy |  |  |  |  |  |
| 2 | Organizing for H&S |  |  |  |  |  |
| 3 | Planning for H&S |  |  |  |  |  |
| 4 | Implementing plans |  |  |  |  |  |
| 5 | Performance |  |  |  |  |  |
| 6 | Review and Audit |  |  |  |  |  |
|  | WORKPLACE PRECAUTIONS |  |  |  |  |  |
| 1 | Health tests, Environment and welfare  |  |  |  |  |  |
| 2 | Health and safety personnel on site |  |  |  |  |  |
| 3 | Hazards and Risk assessment |  |  |  |  |  |
| 4 | Health and Safety committee site visit  |  |  |  |  |  |
| 5 | First Aid Kit And Aider on site |  |  |  |  |  |
| 6 | PPEs Provision and warning signs  |  |  |  |  |  |
| 7 | Hoarding and Netting at high levels |  |  |  |  |  |
| 8 | Workers Involvement to H&S issues on site |  |  |  |  |  |
| 9 | H&S documentation, Rules and Procedures |  |  |  |  |  |
| 10 | Accident and incident records and reporting |  |  |  |  |  |
| 11 | Budget location to H&S plans on site |  |  |  |  |  |
|  | ACTIVE MONITORING |  |  |  |  |  |
| 1 | Too box meeting |  |  |  |  |  |
| 2 | H&S inspections |  |  |  |  |  |
| 3 | Inductions &Trainings |  |  |  |  |  |
| 4 | Hazard identifications |  |  |  |  |  |
| 5 | Best Practice |  |  |  |  |  |