ADAPTABILITY OF OHSAS 18001 AS A REGULATION IN THE SRI LANKAN CONSTRUCTION INDUSTRY: CONSULTANT'S PERSPECTIVE

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Dissertation submitted in partial fulfilment of the requirements for the degree of Master of Science in Construction Law & Dispute Resolution

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Sri Lanka

January 2018

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ABSTRACT

The management of health and safety is an issue that is relevant and crucial to all organizations across all industries in the globe. It is more significant and crucial for the construction industry. In Sri Lanka, the construction industry is one of the largest industries, accounting about 8.7% gross domestic product in 2013. It employs about 681,000 in 2012 of the national workforce and generates an annual turnover of up to Rs.423.4 billion. However, construction industry still remains one of the most dangerous industries due to its high work force, heavy use of high risk machineries sand lack of safety culture. This research is focused to study the potential of implementation of OHSAS 18001 as a regulation in local construction industry. Thus three objectives such as study the standard process of OHSAS 18001 requirements implementing at a site , Level of current practice of OHSAS 18001 requirements at consultants organisations and Analyse the possibility of implementing OHSAS 18001 as a regulation were set.

The survey method was employed in conducting this research. Data collection was mainly through questionnaire survey that consists with structured and semi structured questions. The findings of the research showed that 15.6 % of the companies are following OHSAS 18001 and another 12 .5% have obtained OHSAS 18001 certification. In addition, 59% of the companies are following OHS policies that are quite similar to OHSAS and 71.9 % of the respondents were of the view that OHSAS 18001 can be established as a regulation. These findings will inspire the stakeholders of the construction industry to implement OHSAS 180001 in their construction sites in order to optimize the operational performances and the legislature to introduce necessary legislations to make OHSAS 180001 a regulation for the benefit of the industry and the society at large.

KEYWORDS: Health and safety, consultants' organization, OHSAS 18001, construction industry

ACKNOWLEDGMENT

First and foremost, I wish to extend my sincere gratitude to each and every individual for offering their opinions, knowledge about the subject related areas as well as for the encouragement and guidance provided to make this a successful study.

I would like to say a big thank you to Dr Nayanathara De Silva my supervisor for her unstinted guidance, close monitoring along with supervision and encouragement to make this research a success and to all academic and non-academic staff of the Department of Building Economics for their support in abundance. A special thanks should go to Dr. Yasangika Sandanayake, Head of the Department of Building Economics, for her immense guidance provided from the day first of the academic year pushing us to reach the culmination of the academic programme with masterate.

Special mentioning should be made of Eng. V. M. Karunarathna, Visiting Lecturer, Department of Building Economics, University of Moratuwa and Eng. Samanthi Narangoda, Director, Institute of Sri Lanka Standards, for their assistance.

My sincere thanks goes out to the professionals in the industry including my batch mates who contributed immensely to complete the survey and shared their knowledge and experience amidst their busy schedules.

Last but not the least my heartfelt gratitude goes out to my beloved parents and my family especially to my little son and daughter for their patience and bearing additional responsibilities in my absence.

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LIST OF ABBREVIATIONS

APAU -Accident Prevention Advisory Unit-

BMC -Building Material Cooperation

BOI- Board of Investment

CIDA-Construction Industry Development Authority

CIDASL-Construction Industry Development Act Sri Lanka

GDP-Gross Domestic Product

ILO- International Labour Organization

ISO-International Organization for Standardization

MHC-Ministry of Housing and Construction

OHSAS-Occupational Health and Safety Assessment Series

OHS-Occupational Health and Safety

OHSMS -Occupational Health and Safety Management System

OHSMS -Occupational Health and Safety Management System

PDCA -Plan-Do-Check-Act

SD&CC -State Development & Construction Corporation

SEC- State Engineering Cooperation

SLIS-Sri Lanka Institute of Standards

SME-Safety Management Executive

SMS-Safety Management System

US-United States

CHAPTER ONE – INTRODUCTION

1.1 Background

The construction industry is one of the major employment providers in the world. It is an alarming situation having highest incident rate in respect of fatal accidents and serious injuries. Thus, the people engaged in the industry are exposed to a very hazardous environment.

According to Taylor (2015), construction is an inherently dangerous industry. International Labour Organization (ILO) stated on their website in 2014 that, every 15 seconds, 160 workers have work-related accidents. This means that worldwide more than 38,000 persons meet with accidents in one hour and almost 6.5 million people in one week. In 2012, there were 775 private sector construction fatalities in the United States and it was reported that this number is always higher than that of any other industries and it is further stated that in Canada work related fatalities is 6.1 in all industries but 20.9 in the construction industry. In global scenario of all industries, that construction industry in 2002 and discovered that the fatality rate in the construction industry is relatively high compared to other industries. Say for example as stated by Teo, Ling and Chong (2005), in Hong Kong, the fatality rate in the construction industry is 64.2, while it is 8.6 across all other industries. Similarly, the fatality rates are higher in the construction industry than in all other industries in Australia, Sweden and United Kingdom (Farooqui, Arif & Rafeeqi ,2008).

In the case of Sri Lanka, the extent of construction accidents is more severe, when compared to other industries (Rameezdeen, Pathirage & Weerasooriya, 2003). These statistics clearly indicate the unsafe nature of the construction industry.

As mentioned above, ‘accident’ refers only to those events that lead to injury or damage, the term ‘incident’ refers also to events that did not cause injury or damage, but had the potential to do so(OHSAS 18001, 2007). Similarly, Drupsteen (2014), referred the term ‘incident’, to any unexpected deviation from the normal operational process, that has led (accident) or could have led (near-miss) to damage or injury.

Although some events result in more severe consequences than others, their origins are similar (De Fretes, 1986). According to Van Vuuren (1998), incidents an accidents are “preceded by the same set of failure causes and only the presence or absence of defences and recovery mechanisms determines the actual outcome of normal situation, nearmiss or accident”.

Efforts have been made to address this problem, but the results are far from satisfactory as construction accidents continue to dominate. Despite the programmes implemented by government authorities at national level and the initiatives of private sector companies, the number of construction accidents remain alarmingly high (Teo, Ling & Chong, 2005).

On the contrary, Smallwood and Haupt (2007) pointed out even though those clients can successfully influence the construction health, safety and welfare (HS&W) in practice, client and contractors in most of the developing countries are not paying enough attention on above direct and indirect costs. Similarly, Kheni, Dainty and Gibb,2008, pointed out client’s and contractor’s prime objective is to get their finished product or the building at a lower cost. Therefore, the winning tender may be the one that pays the lowest wages, who does not allocate adequate safety measures to mitigate the occupational health and safety related risks. Similarly, previous researches on safety focused on matters such as ergonomics carried out by Oborne (1995), overall organizational safety climate by Pidgeon (1991), safety policy and behavioural issues by Langford (2000). Ruth (2004) found that site injuries often result from managerial issues, rather than engine defects. Thus, management practices are important in helping to reduce accidents in the workplace

Construction Safety Management is a method of controlling safety policies, procedures and practices on construction sites (Wilson & Koehn, 2000). It is a dynamic process involving small or large adjustments made to site operations to achieve the desired goals without encountering unexpected "shocks" to normal business (Cheng ,Fang & Xie,2004). Therefore, it shows that, safety should be

embedded as a management concept into every level of a company and every part of a cross-organisational project.

Occupational Health and Safety Standard, OHSAS 18001 plays a pivotal role in minimizing /controlling occupational accidents throughout the world. OHSAS 18001 specifies the requirements for a Safety Management System and OHSAS 18002 supports it by providing generic assistance for implementing management procedures.

According to Deming (1982) many Safety Management Systems, including OHSAS, are based on the same Plan-do-Check-Act (PDCA) model of continual quality improvement. It further stated that in the PDCA cycle, actions are planned, implemented and evaluated and the results from that evaluation may again lead to adaptations or new actions. Continual monitoring, checking risks, and acting upon that are core aspects of safety management. Incident registration is often an important part of this monitoring and checking process, since the incident reports give information on the risks that were not controlled.

However, the accidents rates are becoming high year after year and this shows that there is a gap in the processes of application of international standards to the local construction industry. Efforts have been made to address this problem, but the results are far from satisfactory as construction accidents continue to dominate as mentioned above. It is again evident that these efforts are insufficient to control the recurrence of unsafe acts at construction sites. Similarly reporting of accidents in Sri Lanka, remains low compared to actual number of accidents occurred.

Rafiq and Choudhry (2014) based on findings of a case study clearly stated that, safety performance across all categories: personal protective equipment; housekeeping; access to heights; plant and equipment, and scaffolding increased by improving safety behaviour. He further stated that results at one project improved from 86% to 92.9% within 6 weeks' time and large decreases in unsafe behaviours while significant increases in safe behaviours.

OHSAS 18001 is being implemented by several large and medium scale construction companies, but it has not yet been adopted as a mandatory regulation within the legal frame of Sri Lanka. Factory Ordinance and the Workman Compensation Act are providing the legal provisions for the construction industry and for the occupational health and safety which is not sufficient to improve the occupational Health and safety in the local construction industry.

1.2- Research Problem

Globalization, demographic changes and technological advancement have witnessed a significant change in work environments around the world. These changes have resulted in a heightened need for proper health and safety at the work place as it is important for moral, legal and financial reasons. Ultimately a healthy work place will lead to enhanced social welfare and in return a higher productivity.

Construction industry being a dangerous industry has recorded high number of accidents. As mentioned under the background, management of construction safety in the construction industry is important to enhance the safety without which loss of lives and OHSAS 18001 is recognized as an effective management tool in many countries as a standard among various safety policies. In the case of Sri Lanka, Sri Lanka Institute of Standards (SLIS) which recognizes and adopts as a management procedure as SLS OHSAS 18001, 2007. However this international management procedure has not yet been incorporated in the Sri Lankan legal framework. Therefore, this research intends to focus its attention on exploring the adaptability of OHSAS 18001 with a view to minimize both fatal and non-fatal accidents.

This research is therefore focused on adaptability of OHSAS 18001 as a regulation in the local construction industry on a consultant’s perspective.

1.3- Aim and Objectives

1.3.1 Aim

Study the possibility to implement OHSAS 18001 as a regulation in the local construction industry.

1.3.2. Objectives

1. Study the standard process of OHSAS 18001, implemented at sites
2. Identify the level of current practices of OHSAS 18001 requirements in consultant's organizations
3. Analyse the possibilities to implement OHSAS 18001 as a regulation, in local construction industry; Consultant's perspective.

1.4-Research Methodology

Research was initiated with a comprehensive literature review. Quantitative research approach was selected as the best method to achieve the research aim and objectives. Study was designed comprehensively to collect information and to understand the existing status in relation to the occupational health and safety in local construction industry. Sources of the study were OHSAS 18001, past researches, and the secondary data issued by relevant organizations being used, through questionnaire survey along with interviews with construction professionals who are actively involved in the local construction industry.

Sample selected for data collection was from consultant's organizations or from those who represent the consultants. Pilot study has been carried out with two professionals who have vastly contributed to the health and safety aspects in the construction industry to complete the questionnaire survey. Data was analysed reviewing the findings of the questionnaire.

1.5 –Limitations

The research has been limited to the construction professionals in the Sri Lankan construction industry which comprises Architects, Engineers, Quantity Surveyors and Safety Officers who are working in the Consultant's organizations.The contractors were not chosen for the research, however their views would have been

very valuable in order to allow more depth to the research as they are one of the main stakeholders in the construction consortium.

Sample size was limited to an average accepted level to complete the research within the stipulated time frame.

1.6 Chapter Breakdown

The research comprises five chapters having segmentations under each chapter for detailed information. Chapter one is providing information of the research background as an overview of the study. Literature of the research area has been carried out through a comprehensive literature survey, presented in the chapter two under literature review. Chapter three explains the research methodology while chapter four presents the data collection and findings. Conclusions and recommendations are presented in chapter five

CHAPTER TWO-LITERATURE REVIEW

2.1. Introduction

Research background is elaborated under introduction in chapter one. This literature review chapter presents the current knowledge about the research area under several sub headings to establish the research problem. At the beginning, nature of construction industry is discussed focusing mainly on its hazardous nature. Root causes behind the accidents and injuries caused by them as were found out through various studies done in the past, importance of the awareness of safety among employees for the maintenance of most appropriate level of occupational health and safety in construction sites, are further discussed.

2.2. Overview of Construction Industry in Sri Lanka

Construction industry plays a major role in national economy contributing immensely to the Gross Domestic Product (GDP). As reported by the Department of Census and Statistics during 2009, Sri Lanka's construction sector recorded a growth rate of 5.6% while its contribution to GDP stood at rupees 36,6248 million which is nearly 7.6% of the GDP and ranked 7th among thirteen major sectors contributing to the GDP of the island. In 2010, Sri Lanka's construction industry recorded a growth rate of 9.3% as compared to 5.6% in 2009. Its contribution to the GDP was about LKR 423.4 billion, at constant prices .Greater construction activity was also reflected 12% annual growth of the building material industry. It reveals that the industry has expanded by more than 20%. More data shows that a construction industry accounted for nearly 10% of Sri Lanka's GDP in 2014.

Table 1: Construction - Contribution to GDP

	LKR Billion				Growth (%)		
FY	2007	2008	2009	2010P	2008	2009	2010
At Current Prices	264.1	327.1	366.2	423.4	23.9	12.0	15.6
At Constant (2002) Prices	143.0	154.2	162.8	177.9	7.8	5.6	9.3

(Source: Department of Census and Statistics)

Among the entities involved in regulating the industry in Sri Lanka, the Ministry of Housing and Construction (MHC) being at the top level ensures that the sector operates maintaining the international standards. Under the umbrella of MHC, few other entities such as Construction Industry Development Authority (CIDA), State Development & Construction Corporation (SD&CC), State Engineering Cooperation (SEC) and Building Material Cooperation (BMC) function to oversee the industry. The employment in the construction sector in Sri Lanka in year 2012 has been reported as over 681,000 people as mentioned in the web site of Finco Engineering.

Table 2: Persons employed by the Construction Industry

Year	*2005*	*2006*	*2007*	*2008*	*2009*
No.of persons	417,000	527,000	542,000	590,000	562,000

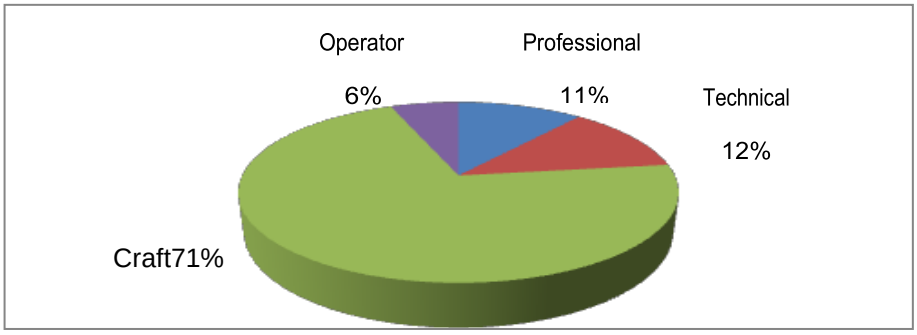

Figure 1: Construction Workers by Area of Expertise
(Source: Department of Census and Statistics, Government of Sri Lanka)

As illustrated in Fig.1, in year 2009, the direct employment in the construction industry was 562,000 persons. This included four categories of employees: professional, technical, crafts, and machine operators. Almost 97 percent of total Persons employed were males with 75 percent falling in the 25-45 age-group.

Even though the industry has many a challenging issues, scarcity of labour, tax implications on imported materials, brain-drain and health and safety concerns, the stake holders in the field are optimistic about the future the sector holds for the country.

2.3. Construction Accidents

Among other industries construction industry is in a dreadful situation with the highest incident rate in respect of fatal accidents and serious injuries; (Joys,1995 cited by Edward & Nicolas 2002) The National Safety Council reports that in 1996 alone, 1,000 construction workers lost their lives at work and another 350,000 had disabling injuries. Construction accounted for only 5% of the United States' workforce but claimed a disproportionate 20% of all occupational fatalities and 9% of all disabling occupational injuries. Tariq ,Delhamid, John Evertt, Abudayyeh et al; (2006), stated in their study that workers in construction and manufacturing sector facing the highest risk of occupational injuries and illness. This dangerous nature of the industry has become a research area in many countries worldwide.

A study carried out in Hong Kong by Tam and Fung (1998), revealed construction industry has a contribution of more than one third of accidents. According to Aksom and Hadikusumo (2008), Thai construction industry also suffers from about 100 deaths and 20,000 minor injuries per year. Similarly Lingard et al;(2009), stated that incidents of workplace fatalities in Australia building and construction industry is nearly three times higher than the national average for all industries. Furthermore it is mentioned that incidents of compensated claims for the industry is almost twice the national average for all industries.

Further the labour statistics US 2016 stated that the fatal injuries among construction and extraction occupations rose by 2 percent to 924 cases in 2015, the highest level since 2008. Several construction occupations recorded their highest fatality total in years, including construction labourers carpenters (2009); electricians (2009); and plumbers, pipefitters, and steamfitters (2003).In Singapore, the construction industry had implemented safety management system (SMS) and SMS auditing for about 10

years now, but the improvement in safety standard is not significant (Teo et al; 2005).

Therefore to overcome the accidents in the industry what has been proposed by a research study to ensure the occupational health and safety (OHS) procedures in the construction industry is to improve the health, safety, and wellbeing of workers. Due to the high accident rates in construction sites, internationally, strong occupational health and safety legislation has been devised to minimize accidents and promote construction workers' safety. It is accepted that construction workers have a higher risk of work-related illnesses and accidents than workers in any other industry and the public sector (Teo, Ling & Chong, 2005).

In United States, as reported by the Bureau of Labour Statistics ,4,836 fatal work injuries were recorded in 2015 as illustrated in Fig.2, a slight increase from the 4,821 fatal injuries reported in 2014,

Source: U.S. Bureau of Labor Statistics, 2016.

Figure 2: Number of fatal work injuries by employee status, 2003–2015
(Source: U.S. Bureau of Labor Statistics, 2016)

In the case of Sri Lanka as stated by Darshana W.D in his article published in the Daily Mirror on .31.10.2017,

> "The ramifications of construction accidents are growing with a trend toward more complex projects. With industry booms and its gross product constantly increasing the number of accidents, death toll has stubbornly high. Absolute mortality in the construction industry remains unexpectedly high and those accidents can use heavy loses of life and property which support the importance are therefore urgent and vital to improve safety management and to prevent accidents.
>
> From data available at labour department, nearly 2500 to 3000 fatal and non-fatal accidents are annually reported to industrial safety .Out of them 40 to 60 are fatal accidents and some 30% occur due to construction methodologies.
>
> Safety workers in the construction woefully neglected. Many construction workers and owners of construction sites are unaware of the needy to deploy health and safety officers to the site and even if they have such officers, they were not aware of safety protocols."

Further he stated that safety policy should be practical and must be enforced strictly.

Construction sector in Sri Lanka has grown tremendously in the recent past and has developed into an important base of the national economy. However, health and safety being an important aspect of construction, still remains unsatisfactory in Sri Lankan building construction industry, which takes the foremost share in constructions. Moreover, accidents result in heavy loss of time, cost and resources which are considered as the most valuable assets in the industry.

2.4. Causes of Accidents

The International Labour Organization (ILO) estimates that approximately 2.2 million people die every year from occupational accidents and diseases, while some 270 million suffer serious non-fatal injuries. According to the ILO official website, the total cost of such accidents and ill health have been estimated at four percent of the world's gross domestic product. In Sri Lanka about 4,000 accidents are being reported yearly. According to the information available at the Labour Department, every year, 2,500 - 3,000 accidents have been reported to the Industrial Safety Division of the Labour Department. Out of this number, 40% to 60% were fatal and around 30% were due to construction methods. There are many causes of an accident on a construction site. The top causes of construction worker deaths on the job were falls, followed by struck by objects, electrocution, and caught-in between. Many accidents may be attributed to some type of negligence and may involve unsafe site conditions, improper use of tools or equipment, and lack of protective safeguards.

As mentioned in the website of Perecman Firm PLLC, following are major causes of accidents at construction sites:

* **Falls -** An injury of this type may occur when a worker near an open-sided floor steps backwards or sideways without looking. Falling hazards also commonly occur on stairwells with no guardrails. Since high elevations often play a role in these falls, the results can be catastrophic to workers who sustain serious injuries. The main cause of death in construction occurs where inadequate or no fall protection is provided.

* **Struck by object -** A number of these deaths may have been prevented if the workers had undergone proper training and used equipment and machinery properly.

* **Electrocutions -** Electrocution is when a person, tool or piece of equipment comes into contact with power lines or exposed electrical sources. Sometimes, these types of accident occur because workers are simply unaware of all energized power sources, from overhead and underground power lines to damaged receptacles and connectors. As an example, a construction worker carrying a metal ladder may strike an overhead power line.

* **Slip and falls** - These are among the most common accidents on a construction site. These accidents may be linked to unsafe conditions including uncovered holes or trenches and exposed stakes.

* **Ladder/Scaffolding accidents -** This is one of the leading causes of injury and long-term disability. Most ladder/scaffolding accidents, including falls, happen because workers use the wrong type of ladder/scaffolding for their job or they set up the ladder/scaffolding improperly. In a general sense, most ladder/scaffolding accidents are caused by improper construction or negligent maintenance.

* **Musculoskeletal disorders -** A leading cause of injuries, disability claims and medical costs in construction are sprains and strains of the muscles. Construction work can also cause injuries to the joints, bones, and nerves. These injuries often stem from job demands that constantly wear and tear on the body.

* **Vehicle Accidents** - Dangerous construction site vehicles include forklifts, graders, backhoes and dump trucks. Another hazard on construction sites is falling from moving vehicles.

Many of these accidents can be prevented through effective occupational health practices and creating awareness and by inculcating a safety culture within the

workforce and establishing a properly maintained working environment that is safe and secure.

2.5. Safety Standards and Regulations in Sri Lanka and its Critical Gaps

For instance, the construction industry in Sri Lanka has developed significantly in recent years and construction has become the significant contributor to the national economy as it is having forward and backward linkages. Globally this industry has been identified as the most hazardous among all other industries, with the highest rate of accidents including deaths and disabling injuries. Despite this, the safety and health aspects of the construction industry remain at unsatisfactory level in Sri Lanka (Halwatura & Jayatunga, 2011)

When come to the legal background of occupational health and safety at present in Sri Lanka, OHS issues are mainly legislated under the Factories Ordinance No.45 of 1942, which has separated provisions for health, safety and the welfare of the employees. Workman Compensation Ordinance No.19 of 1934, Shop and Office Employee's Act No 15 of 1954, Municipal council's by-laws and regulations also covered occupational health and safety matters. Though the Ordinance has separate provisions for health and safety, it is quite obvious that the law has to be updated in response to the changes that have taken place over the last few decades in Sri Lanka.

Even though that the factory ordinance enacted to reporting mechanism for accidents and incidents monitoring mechanism for sites by factory engineer, the efficiency of practicing is not easy in monitoring all the accidents and incidents. Nevertheless the problem cannot be merely ignored however much it is difficult to tackle. Occupational Health and Safety (OHS) is all about human lives. It is important to create a safe and healthy working places for the people employed in the construction industry which in turn assures a healthy work place with leading to enhance the social welfare of the workers in the long run. It is also about productivity. To fulfil the gap in the occupational health and safety in Sri Lanka, the research focused on identifying the possibility of implementing OHSAS 18001 as a regulation to the local construction industry in the perspective of consultants.

In addition to the aforesaid Acts and by- laws, Construction Industry Development Act, No.33 of 2014 (CIDASL) came to operation in September 2014. Construction Industry Development Act of 2014 comprises of twelve sections. The purported purpose of CIDASL is to assure a sustainable progress in the development of the construction industry with proper policies and establishing an authorised institute to drive and regulate the industry. The CIDASL promulgate mainly on regulating, registering, formalizing and standardizing activities of the construction industry; however there is no provision provided for quality assurance and health and safety of the stakeholders. Therefore it has to be concerned on quality of construction and professional services in particular for public safety, environment protection, sustainability and accountability. (Rathnayake , 2014). He further stated in his article, that the above area to promoting would be necessary, to provide room for enhance health and safety.

2.6. Occupational Health and Safety Assessment Specification -OHSAS 18001

Globally, the construction industry has the third highest number of quality management system certifications among all other sectors. Most of the construction organizations are to implement safety and environment management systems for continuous improvement. Management system certifications on quality, safety, and the environment have been widely adopted by most organizations globally.

Poor safety performance is an immediate threat to most organizations which has a direct impact on organizational productivity and indirectly affects the moral of the employees. To overcome this situation, OHSAS is a robust tool in the hands of top management (Rajaprasad & Chalapathi, 2015)

Sustainable construction during various stages of construction is practical through six principles viz. monitoring quality, safe work environment, protection of the natural environment, utilizing recyclable resources, reducing resources and enhancing re-use.

Globalization of the economy has prompted many organizations to implement standards that are demonstrable at international level, exemplified by the thousands with certified quality and environmental management systems. Following this trend, many companies from different countries have started OHSAS 18001 implementation, with the goal of obtaining occupational health and safety management system certification. The number of OHSAS 18001 certified organizations are growing exponentially.

Main elements of the OHSAS 18001 (2007) are

- Occupational health and safety policy
- Planning, including risk and hazards assessment
- Implementation and operation;
- Checking and corrective action;
- Management review of the Safety Management System (SMS), to ensure its continuing suitability, adequacy and effectiveness;
- Continual improvement of the SMS.

Implementation of OHSAS18001 enables the realization of all of the said elements. At the same time the OHSAS certification is vital to any management which wishes to enact and implement OHS management system to eliminate or curtail risk to all stakeholders who are likely to be exposed to OHS risks. Any management should also continue to improve its compliance with OHS policy and to manifest compliance to others as well as to uphold and continually upgrade OHS management systems and diligence towards compliance with OHSAS certification.

Therefore implementation of OHSAS 18001 can stimulate a safety culture towards sustainable construction. OHSAS 18001 can also be integrated with other management systems, such as quality and the environment, which improves OHS performance besides reducing the cost of accidents. When the difficulties associated with obtaining OHSAS 18001 certification in the construction industry, are taken

into consideration, it is evident that OHSAS 18001 is already being practised by many top level clients and contractors within their organizations. Awareness makes the people engaged in the industry to change their minds to new innovations, improvements in the field of safety through this new system development. In addition, some of the companies have recently started practicing similar OHS management systems.

Having recognized the need to control and improve health and safety performance, worldwide organizations acted to formulate occupational health and safety management systems which resulted in confusing in choosing an adaptable system to suit the requirements. In these circumstances a group comprised of representatives from national standard bodies , academic bodies, accreditation bodies , certification bodies and occupational safety and health institutions with the United Kingdom's national standards body was established to create a single unified occupational health and safety management system (OHSMS) and the British Standard Institution provided the group with necessary secretariat.

A study carried out in Spain stated that OHSAS 18001 certified companies in Spain, are mainly private national SMEs from the three main economic sectors – industry, building construction and services which are already holding ISO 9001 quality and ISO 14001 environmental management system certification and also it stated that not result a better image in sale increase or productivity.

However there are many studies found through the literature contradictory statements to the above which states positive impact by implementing OHSAS which are mentioned below. A study by Pojasek (2012), considered the use of Plan, Do Check and Act -PDCA approach to implement OHSAS 18001 along with the other quality systems as being the most straightforward approach to adopt a management system structure.

International Journal of Business and Social Science stated in its article in 2015,that for the implementation of OHSAS 18001, firms need to develop their system manual

through objectives, programs and policies, hazard identification and risk assessment, legal requirements related to health and safety, adequate resources, communication and participation, emergency procedures, monitoring, auditing, documentation, record control and management review.

Moreover, Sampaio (2009) contend that ISO 9001, ISO 14001 and OHSAS 18001 standards are the most relevant standardized tools for organizational management and are also the most widely used in industry as the base for integrated management systems.

Another study by Lo et al. (2014) stated, 211 manufacturing firms of United States, found that the certification to OHSAS 18001 lead to significant increases in abnormal performance on safety, sales growth, labour productivity, and profitability which increase complexity and coupling.

Yorio (2014), recommended that organizations may use all the activities that go into an occupational health and safety traditional program. Such activities include safety training, behavioural safety observations, safety meetings, safety inspections and audits. They also suggested hazard and risk assessments and safety awareness campaigns.

According to Kadasah (2015) in India, Occupational Health and Safety (OHS) issues in the construction industry have always been a major concern to the management. The construction industry is labour intensive and the work force is vulnerable to workplace injuries. Protecting employees from injuries is the priority of the management. The Occupational Health and Safety Assessment Series (OHSAS) 18001:1999 is a comprehensive OHS management system specification, designed to enable organizations to control OHS risks and improve their performance.

The first step in establishing an OHS management system is the development of a formal policy, to ensure a clear direction is set and aids in formulating a series of steps for enhancing the business performance, which forms an integral part of an assurance towards invariable advancement. OHSAS 18001 specifications have been

framed in concordance with quality and environmental management systems, keeping a view to integrate the systems. However, OHSAS 18001 does not focus on OHS performance metrics or design of management systems. It is a challenge to the top management to implement the three systems separately and it would be effective by integrating the systems.

The reputation of the organization, work place safety, and employee moral are improved by implementing OHSAS18001. It has been shown that, after OHSAS 18001 implementation, the Malaysian automotive industry continued to perform more efficiently and effectively to become the best among its competitors in other countries. The OHSAS 18001 standard specifies the requirements for implementing an OHS management system that allows the organization to develop and implement a safety policy, establish objectives and processes for achieving the commitments of the policy, and take the actions necessary to improve system performance.

Accomplishment of the OHSAS 18001 relies upon the commitment of all levels in the organization. A study conducted in chemical plants in the state of Kerala, India to investigate the perception of employees on six safety variables revealed that perception levels varied in plants certified with OHSAS 18001 and ISO 9001 and those without certification. Perception of employees towards safety in the plants certified with OHSAS 18001 were higher and the study also emphasizes the importance of certification to improve safety performance.

Further the above study stated, in the current scenario, the framework of safety, quality, and environmental management systems has become a crucial prerequisite in industries to stay competitive. This is on the grounds that the future achievements of a company are reliant on its capacity to enhance its operations by restructuring safety management systems for continual improvement. The essence of OHSAS 18001 encompasses hierarchy, expectations, strategies, and the organizational structure to maintain OHS policy.

Safety policy is the prime mover in an organization as it sets a clear direction for better safety performance, and also creates awareness among employees towards safety. Policy framing is based on the scope of organizational activities and commitment of the top management to integrate health and safety with other business activities. Safety culture refers to individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment style and proficiency of an organization's health and safety management. Safety culture at an organization level reduces injury rates, which ultimately minimize cost of accidents. Safety performance will improve through safety culture, resulting into better productivity. Knowledge, skills, and positive attitude towards safety are possible through training. Knowledge refers to safety information, attitude refers to feelings associated with safety and behaviour represents organizational, management, or employee performance. All employees need to be imparted safety training in order to improve their safety awareness. Safety training is a continuous process involving all cadres of employees as it directly influences the behaviour of employees. It is evident that management plays an important role in an efficient and effective safety program. Management must fully and actively translate ideas into safety actions, including issuing a written comprehensive safety policy, allocating sufficient resources, promptly reacting to safety suggestions and complaints, attending regular safety meetings and training, and regularly visiting the workplace . The above study further stated based on an extensive literature survey combined with discussion with safety consultants and safety professionals in the field of safety, nine factors have been identified which influencing OHSAS 18001 in Indian construction organizations. As such, safety culture, continual improvement, morale of employees, and safety training has been identified as dependent variables. Safety performance, sustainable construction, and conducive working environment have been identified as linkage variables. Management commitment and safety policy have been identified as the driver variables.

Furthermore, the Building and Other Construction Workers Regulation of Employment Conditions service Act 1996 was enacted by the Indian Government to

safeguard safety, health and welfare of employees in the construction industry. Except for a few state governments, others have failed to implement the act fully and enforcement from government is lacking. This practice is continuing to date and clients/contractors have explored an alternate system to improve safety performance, reduce cost of accidents, and maintain company reputations. Many construction organizations in India feel that OHSAS 18001 is a management system that guides the organizations in the right direction to improve safety performance.

Implementation of OHSAS 18001 as per the view of India, implementation of safety norms in the construction industry is dynamic; mainly due to progress of the work, lack of skilled personnel, and working conditions. Earlier studies mainly concentrated on post-implementation benefits and improvement of safety performance in organizations certified under OHSAS 18001.

2.7 Benefits of Implementing OHSAS 18001

The main advantages of obtaining OHSAS 18001 are:

- Enhanced reputation as a health and safety conscious organisation.
- Reduced potential risk of litigation, through the reduction in the number of accidents in the work place.
- Improved productivity of the workforce by reducing potential of absenteeism and sickness is reduced.
- The conduct of rigorous assessments assures the customers that the products / services are delivered within legal requirements.
- Peace in the minds of employees that their company promotes health and safety in the workplace, and also the involvement of all staff to ensure a healthy and safe work place.

Similarly, the web site https://www.qmsuk.com in one of its articles posted on 28th September 2017, elaborated few more advantages of obtaining OHSAS 18001 which are listed below:

- Improved employee training, development and communication
- More efficient delivery of products and services
- Compliance with legislation and regulations
- Reduced costs
- Reduced errors
- Greater ability to deliver projects on time
- Increased margins
- Repeat business through delivery of higher quality work
- Evidence of your commitment to international standards of excellence

CHAPTER THREE- RESERCH METHODOLOGY

3.1. Introduction

This chapter discusses the research methodology of the thesis in detail where the research method, method of data collection, developing a questionnaire, selection of the sample, research process, type of data analysis, and the limitations of the research are outlined.

3.2. Research Method- Survey Method

Considering the research objectives, the survey method was used. A questionnaire was used as the tool for data collection. In order to obtain quantitative data through the survey method, a semi-structured questionnaire was designed and developed including direct informative questions and liked scale.

As mentioned in the mapped diagram below, the research was designed in such manner so as to achieve its aim and objectives through the steps indicated in the map. The research initially focused on studying the construction health and safety in local construction industry in a border perspective and gradually narrowed down the scope to identify the limitations to implement OHSAS 18001 as a regulation under occupational health and safety.

3.2.1Structure of the Research process

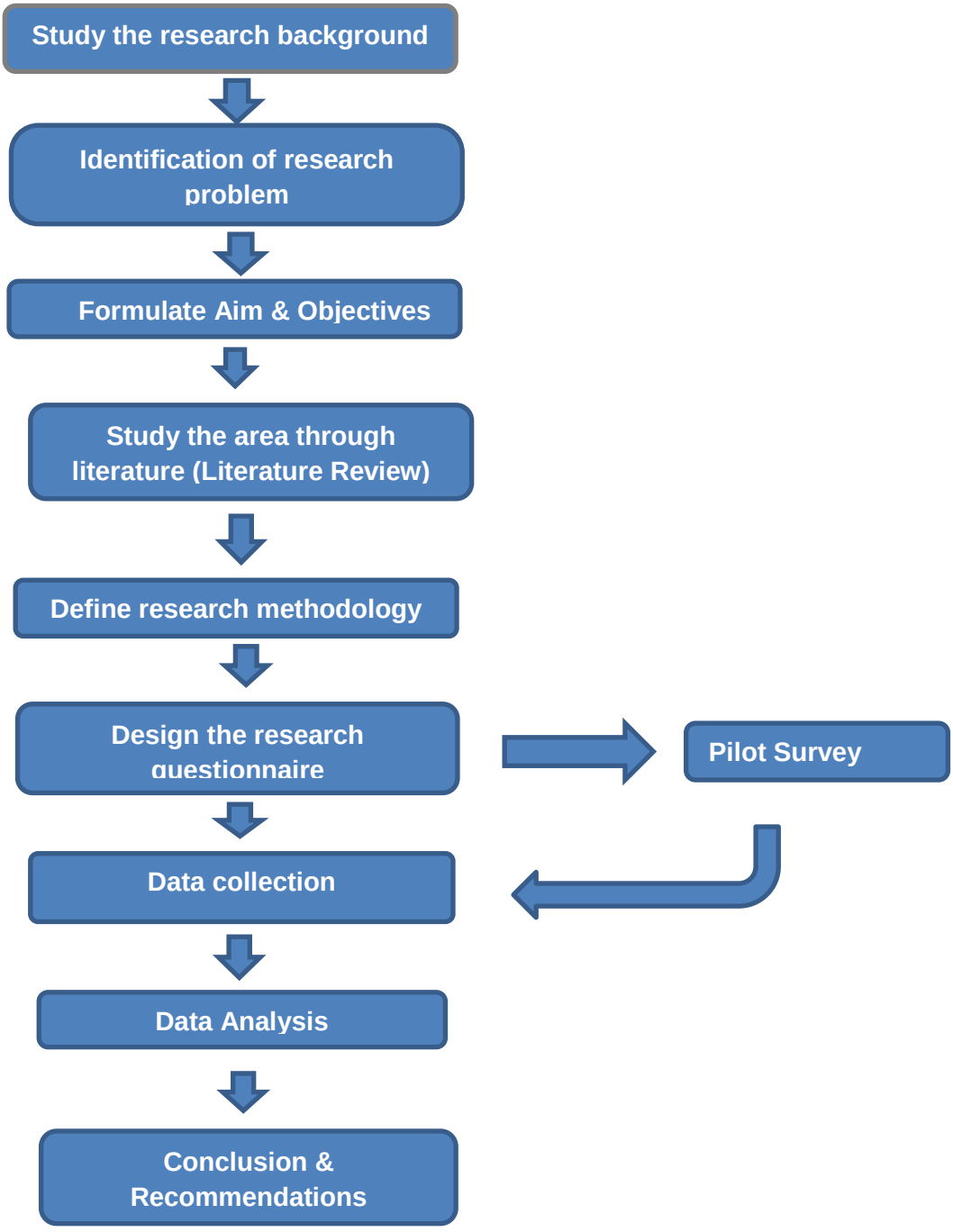

Figure 3: Structure of the Research Process

As graphically presented in Figure 3, structure of the research process, a comprehensive literature survey was carried out in the research area, with a view to gathering a far-reaching understanding of the study area. The scope of the research was gradually narrowed down to study the gaps in the present context in order to identify and analyse the research problem. Once the research problem was identified, research aim was formulated with intermediate objectives in the process of achieving the research aim. After formulating research aim and objectives, a comprehensive study was carried out through the literature. Research methodology was designed elaborating the whole process which included a pilot survey to test the relevance and reliability of the research aim and objectives. Data collection and data analysis were attended to subsequently.

A questionnaire was designed, distributed among industry professionals randomly selected and the data received from them were critically analysed. The said analysis was the basis of the conclusion arrived which prompted the recommendations made to be presented as the outcome of the research.

3.3. Method of Data Collection

A study carried out by Spyros (2014) mentioned that certain questions were prepared for the researcher to guide the interview towards the satisfaction of research objectives, however kept a space for encounter an additional question when ever needed. According to fisher (2005) and Wilson (2003) the main advantage of personal interviews is that they involve personal and direct contact between interviewers and interviewees, as well as eliminate non-response rates, but interviewers need to have developed the necessary skills to successfully conduct an interview

Therefore, the study aims collect 80% of data through the questionnaire by direct questions and 20% of data through the same questionnaire by open ended questions which were designed for respondent's views. Further in this research, personal interviews conducted for facilitating the completion of the questionnaire to avoid non response rate. A pilot survey was carried out with two industry experts to test and

validate the questionnaire. One of the persons involved in the survey was an executive at senior management level in the regulating body related to the OHSAS 18001 and the other person is having more than 50 years' experience in the industry and a leading practitioner. The study aimed at making the findings deviated from personal judgement and interpretation as much as possible. Therefore some of the questions formulated provided room for stating their views and own perspectives with a view to eliciting the view of the participants in the survey. Furthermore, unstructured interviews offered flexibility in terms of the flow of the interview, thereby leaving room for the generation of conclusions that were not initially meant to be derived but at the end of analysing the findings of the research.

3.3.1 Brief of the questionnaire

Main objective of the questionnaire was to identify the level of current practices of the OHSAS 18001 requirements in consultant's organizations. In the event of developing the questionnaire, attention was paid to develop the questionnaire to consist the following four major sections.

Section A: General Information

Section B: Organizational Occupational Health & Safety Management Practice

Section C: Accidents & Health Hazards

Section D: Awareness on OHSAS 18001 & Expert's Views

Section A contains general information about the respondent as general phenomena but it is useful to have an overview to validate the findings justifying the relevance based on his/her profession, academic level of qualification and the experience in occupational health and safety.

In the section B: Organizational occupational health and safety management practice, what is tried here at is to identify whether the organization is following a health and occupational safety procedure, and at the same time few more questions were included with a view to ascertaining to whether the company follows or fulfils the

basic requirements of the OHSAS 18001 without the knowledge that what they are flowing similar or parallel to OHSAS 18001.

Section C focused mainly on the history of accidents and health hazards pertaining to the organization along with cost implications. An attempt was made to provide substantiation to the research aim by obtaining data on post-accident review, report and evaluation procedures.

Section D: Awareness on OHSAS 18001 and expert's views. This section mainly focused on obtaining data about OHSAS 18001 with special emphasis on identifying limitations to obtain certification. It also expected to rank the given factors which are identified as constraints or limitations from the literature. Questions 37, 38, 39 and 40 have given more weightage to relate the findings to the research aim while the rest of the questions are for supporting both objectives and aim.

3.4. Sample Selection

Method of purposive sampling was used to develop the sample of the research. Respondents were selected on the basis of knowledge, relationship and the expertise of the research area and the experience in the sector. In the recent past secondary data on fatal and nonfatal accidents were collected to validate the research aim. Thereafter it was extended to a questionnaire survey among the professionals in the construction industry, representing the consultants to identify the causes of accidents and the means to mitigate the potential risks. Sample was narrowed down to the capacity of the consultants who are involved in the construction projects of which the cost exceeding the cost of Sri Lankan Rupees 0.5 billion.

When selecting the sample, a combination of participants with different background in the construction industry was randomly selected to minimise the probability of biasness. Safety officers, architects, engineers and quantity surveyor representing the consultants were selected mainly from the construction consortia. The selection of the consultants who work for the investments above 0.5 billion was basically with the intention of obtaining more reliable responses.

Size of the sample limited to a number of 40 respondents to obtain their views and information for the questionnaire. Board of Investment (BOI) registered clients list, Telephone directory and known on-going projects in Colombo through contacts were explored to select this forty number of experts from consultant's organizations as there is no regulating body in the national level to streamline the consultants. Twenty consultants were selected who work for the BOI registered clients, 15 consultants were selected from telephone directory and five of the consultants were selected via personal contacts from on-going projects in Colombo area.

3.5. Data Collection Process

Initially the questionnaire was sent to all 40 selected consultants via email and then contacted over the telephone to brief the research and to constantly remind the expectation of their valuable ideas and commitment to fulfil the research within the specified time frame. Out of the forty respondents five replied within two days from dispatching the questionnaire. Reminders were sent to the rest of the respondents after two weeks, requesting for an appointment to have in person meeting to complete the questionnaire. Out of those remaining 35consultants, 27 booked their time for an in person meeting to fill the questionnaire. When summarised, it could be stated that two thirds of the sample had direct interviews to complete the questionnaire and another one third of sample had telephone interviews and duly filled questionnaires were returned via email.

CHAPTER FOUR- DATA ANALYSIS

4.1. Introduction

The chapter discusses the comprehensive process of data analysis including elaborative description of profile of the respondents, questionnaire and level of safety management practices. Findings are tabulated in the form of pie charts and other forms of chars to supplement where necessary.

4.2. Respondent Profile

Respondents selected for the purpose are currently involved in construction projects. The first part of the questionnaire has specifically been designed to provide some overview of their qualifications and experience to substantiate the relevance of the collected data. In the section A of the questionnaire, questions from 1-6 aimed at obtaining the general information of the respondents such as field of study ,experience in similar capacity, academic & professional qualifications, business background, total number of employees, especially at establishing whether OHS management systems are being followed by them. Pie charts, bar charts were used as the statistical tools to present the data.

4.2.1. Questionnaire Design

In the data analysis, questionnaire was developed as data collection tool of the research. The first section of the questionnaire deals with particulars of the respondents regarding his/her professional background which helps to validate the relevance of the data. Section B starts from question 7 and continues up to question 29. Section D comprises questions from 35 to 40 and the question 40 in particular is focused to obtain directly the data to test the research aim and objectives.

Throughout section B to D of the questionnaire, the questions are designed to cover the following areas as requirements of the OHSAS 18001, to achieve the research aim and objectives. Few informative questions are also included to obtain detailed information on the main questions. As an example, a binary question “Do you

conduct safety meetings? “is followed by an informative question “If Yes, how frequently?”

1. Having an internal health and safety policy

2. Conducting safety meetings

3. Top management participation for the health & safety meetings

4. Having competent person responsible for health and safety related matters

5. Mandatory requirement for study H&S policy by new joiners

6. Conducting trainings /mock drills

7. Having functional safety committee

8. Conducting safety inspections/safety audits

9. Receiving feedback from safety audits with corrective actions

10. Having disciplinary procedure for who violated health & safety policy

11. Compliance with factory ordinance and workman compensation Act

Further the following parameters have been found through the literature and have been tested through the Likert scale as limitation for implementing OHSAS 18001 as a regulation in Sri Lankan construction industry. These parameters were also subjected to testing by consultants in order to identify the outcome related to Sri Lankan construction industry.

12. a. Top management commitment
    b. Cost
    c. Awareness
    c. Training & Development
    e. Cultural/Attitudinal barriers

f. Academic qualification related to health and safety in Sri Lanka

g. Lack of experience knowledge in the sector

4.3 Level of Safety Management Practices

Studies in this field have revealed that a lack of attention to occupational health and safety (OHS) issues results in irreversible costs, including costs associated with workplace accidents, reworking, delays, and loss of reputation of the organization and the contractor (Wang, Liu, & Chou, 2006, as cited in Mahmoudi et al., 2014). As pointed out by Ngacho and Das (2014), and Alzahrani and Emsley (2013), in recent years, OHS issues have become an important factor in project evaluation along with the contemporary project triangle comprises of cost quality and time.

The results of another study indicated that the loss for companies from the work-related accident was 5-10% of the profit for all industries, and 8.5% of the tender price for the construction industry (Yoon et al., 2013). According to Davies and Teasdale (1993), the ratio of the direct cost to the indirect cost of work-related accidents is 1:11.

What Yoon et al., (2013) has further mentioned that indirect costs are product and material damage, loss of production time, legal costs, overtime and temporary labour, investigation time, supervisor's time, fines, loss of expertise and experience, loss of morale, and bad publicity.

"The occupational health and safety management system (OHSMS) was first prepared by the Health and Safety Executive -HSE's Accident Prevention Advisory Unit-APAU in the UK in 1991 as a practical guide for directors, managers, health and safety professionals, and employee representatives who wanted to improve health and safety in their organisations" (HSE, 1991). As per the explanation of the Occupational Health and Safety Advisory Services Project Group (2007), the OHSMS was placed to enable an organisation to control its OHS risks and to improve its OHS performance.

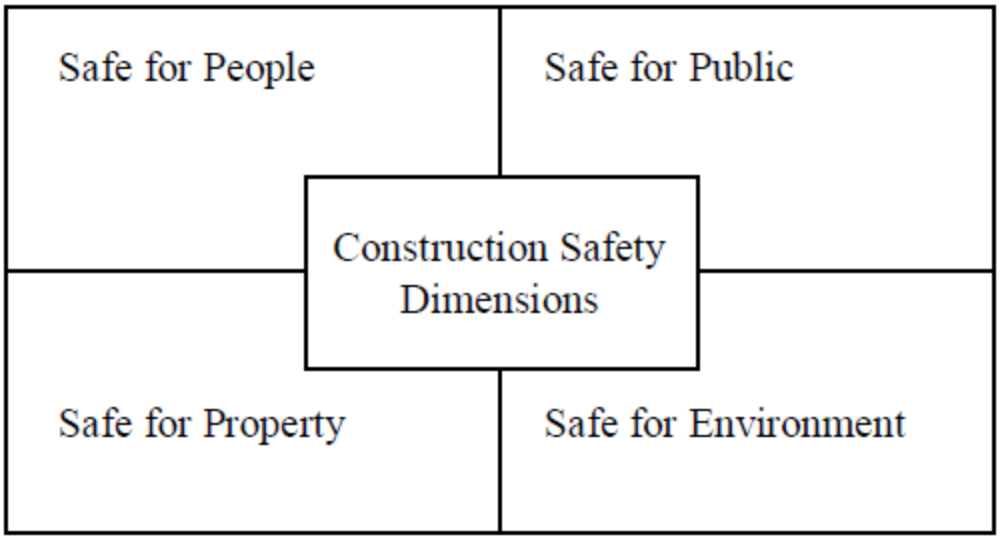

Figure 4**:** Dimension Construction Safety (Source: Suraji and Widayatin2010, as cited in Yustisia 2014)

Donald and Young (1996) stated that, "Safety and Health is an issue that can be managed and that profiling safety attitude can provide a useful tool for the development of management strategies."

Also, according to Davies and Thomasin (1990), as cited in Rameezdeen, Pathirage, &Weerasooriya, (2003) have highlighted some important reasons for this poor safety performance in the industry as, lack of controlled working environment, and complexity and diversity of the size of organisation within the industry.

Furthermore, Ling, Ong, and Teo (2005) show that training is an important method to enable workers to work safely because they are equipped with the knowledge of safe working. Also, according to Cameron (2004), effective planning for safety and health is essential to a project to be delivered on time, without cost overrun and without experiencing accidents or damaging the health of the site personnel.

As per the Smallwood (2007), improving the knowledge on recognising signs and signals that express vital information related to site safety, careful selection of safe or low-risk building materials, and employee representation plays a crucial role in improving safety and health in construction organizations.

4.4. Analysis of Data

Findings of the research under categories of questions posted in the questionnaire are analyses and tabulated in the respective bar /pie charts as follows

4.4.1. Availability of Internal Health and Safety Policy

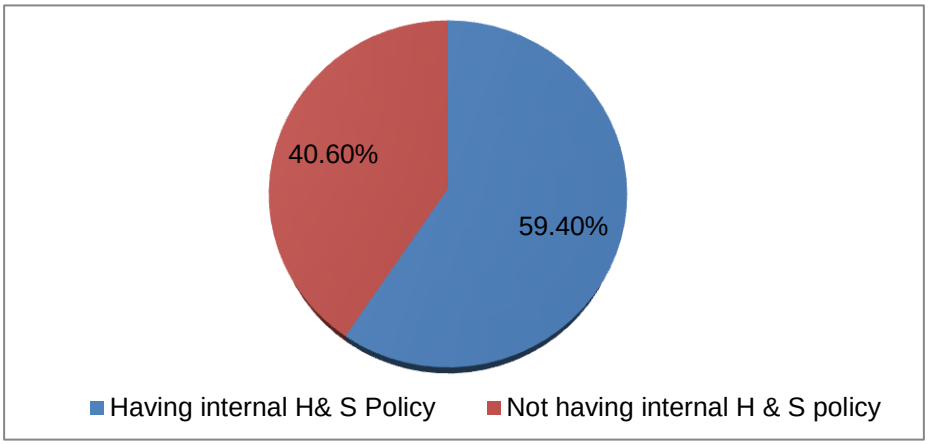

Figure 5:Having an internal Health and Safety policy

Researchers found out of the consultants 59.4% have an internal health and safety policy put in practice whereas 40.6 % of the consultants' organizations do not have a safety policy. It was revealed that most of the companies have their internal safety policies however they are not getting reviewed and updated on a timely manner.

4.4.2. Conducting safety meetings

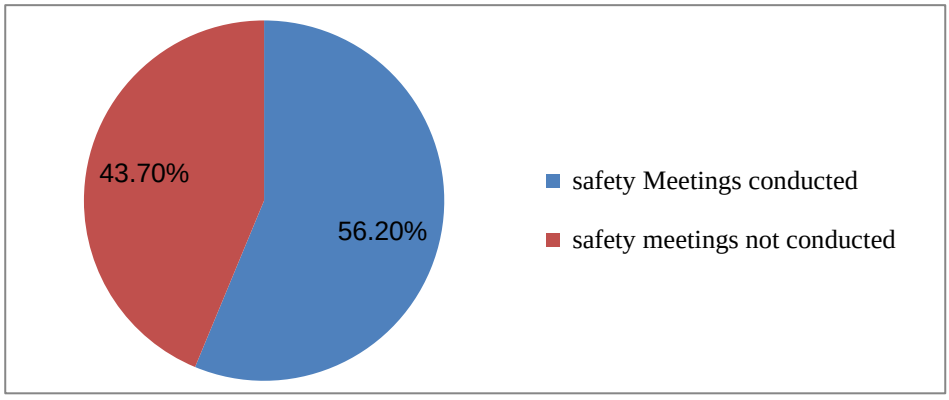

Figure 6: Conducting safety meetings

As stipulated in the above Fig.6, 56.2% are conducting safety meetings in different scales in their construction site offices and the remaining 43.7% of the consultants are not conducting meetings related to health and safety. However, 87.5 % of the sites have made it a mandatory requirement to use personal protective equipment (PPE) such as helmets, safety shoes, and goggles but no disciplinary actions is taken for violating the above requirements.

4.4.3. Participation in the safety meetings.

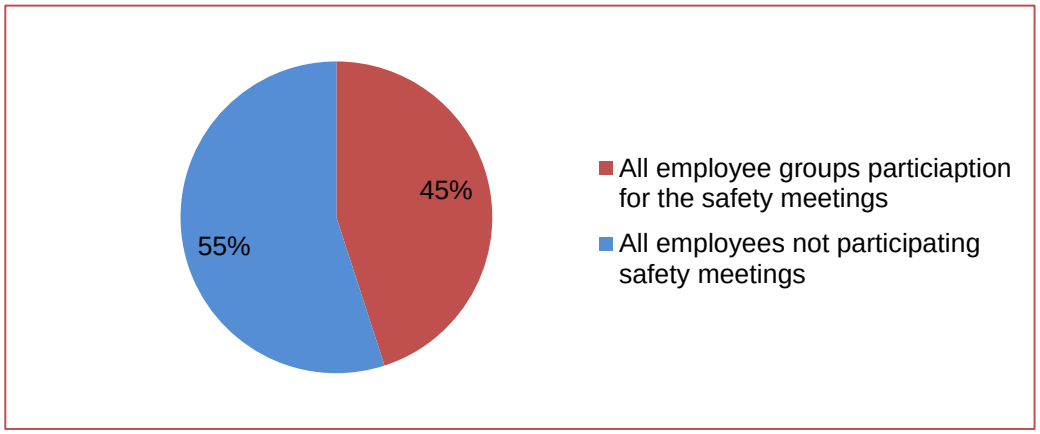

Figure 7: All employee groups' participation to the safety meetings

Most of the consultant's organizations which are conducting safety meetings allow all employee groups to participate in the safety meetings. As stipulated in the Fig. 6, 56% consultant organizations conduct safety meeting and employee participation in such meetings also stands at approximate percentage of 55%.

4.4.4. Conducting regular" tool box" safety meetings

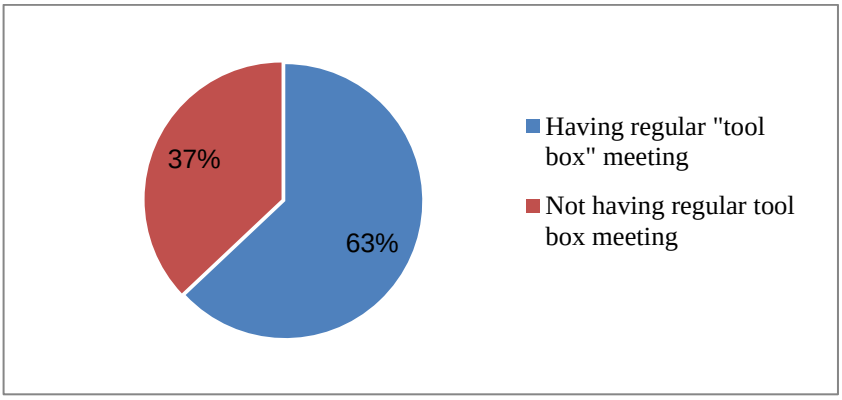

Figure 8: Conducting regular" tool box" safety meetings

As stipulated in Fig.8, the percentage having safety meetings are tested to check whether they have a regular tool box meeting. Therefore, the consultants' organizations which conduct tool box meetings are counted in the percentage of 63%.

4.4.4a; Frequency of having regular "tool box" meetings

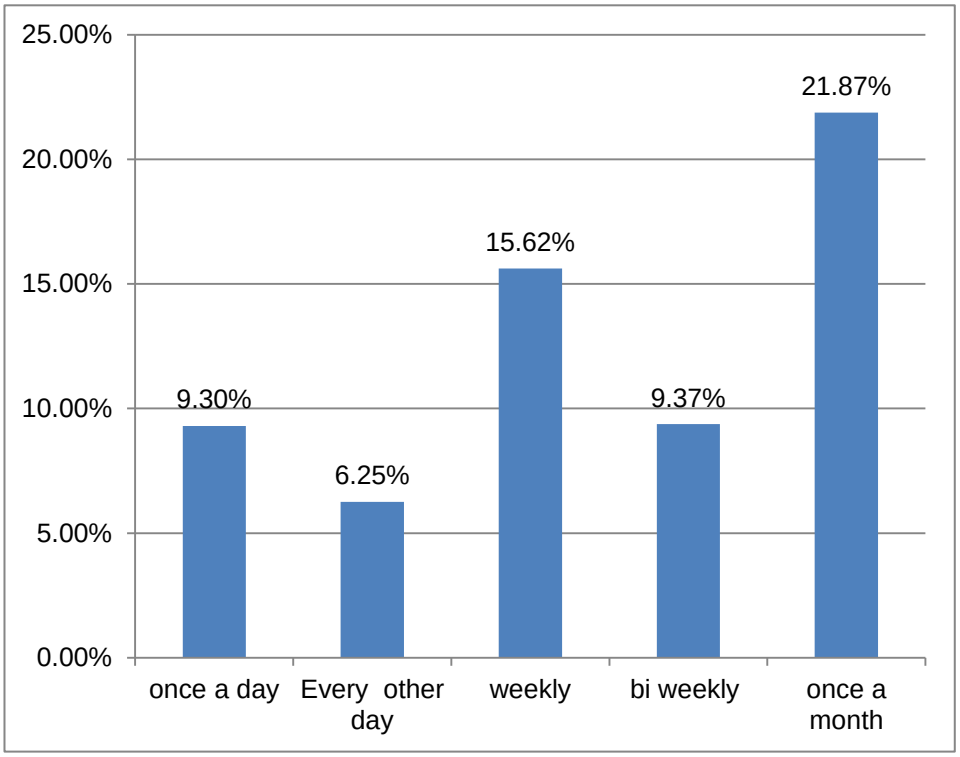

Figure 9: Frequency of having "tool box" meetings

The Fig.9 above indicates the frequency of conducting tool box meetings by the organizations which comprised the 63% of organizations having tool box meetings. Findings as indicated in the above Fig.9, shows that most of the consultant's organizations conducting tool box meetings on a monthly basis account for 21.87%. Organizations having weekly amounts to 15.62% and the organizations having daily tool box meeting have reached 9.3%. Similarly the percentage of organizations that have bi-weekly tool box meetings is 9.37%, which is almost identical with the daily meeting percentage It is only two respondents who had indicated that they conduct tool box meetings every other day at a percentage of 6.25%.

4.4.5. Occupational, Health and Safety (OHS) policy

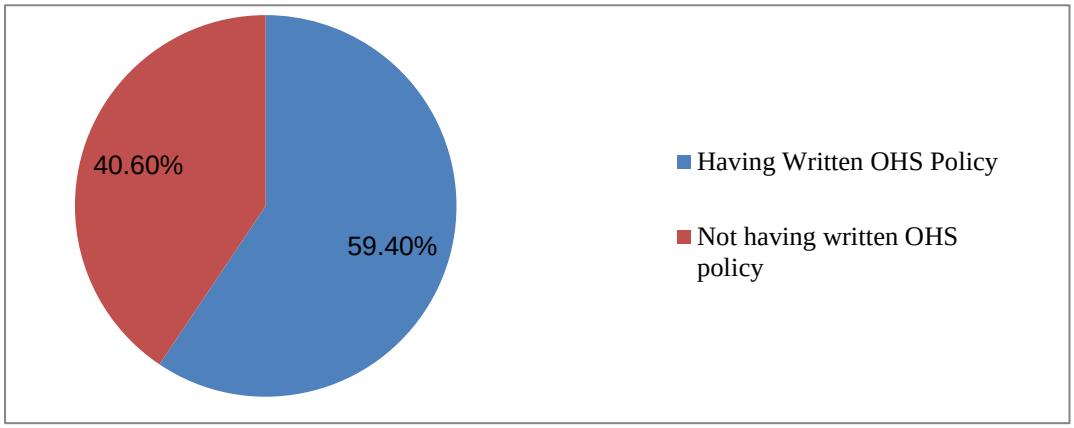

Figure 10: Having written Occupational, Health and Safety (OHS) policy

Nineteen respondents have stated that they have put in place a written Occupational, Health and Safety policy in their organizations. The percentage of organizations having a written OHS policy amounts to 59.4 % and at the same time 40.6%, of organizations did not have a written OHS policy. Which is a fact indicated in the above Fig.10. This is a clear indication that the percentage of companies having an internal safety policy as depicted in Fig.5 is almost similar to that of the organizations having a written OHS policy.

Moreover, the 19 respondents who admitted to have a written OHS policy also stated that such written policy is readily available for reference in the company along with other company manuals.

4.4.6. Availability of a competent person to implement and maintain internal OHS policy

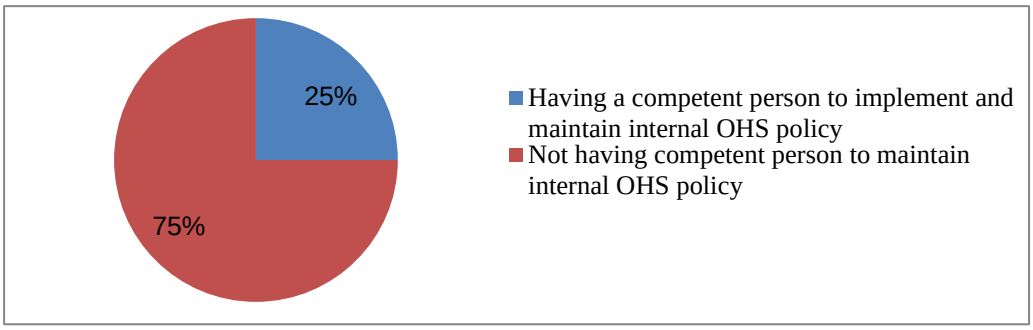

Figure 11: Availability of competent person to implement and maintain internal OHS policy

A competent person was not available at most of the organizations to maintain OHS policy and such organizations amounted to a percentage of 75% and only 25% of organizations had a competent person to maintain their OHS policy. The term"competent person"was interpreted at the in-person interview and at email communications as well as a person having a Diploma or above in a field related to Health and Occupational Safety from an accredited institute as the minimum academic qualification with three years' work experience.

4.4.7. Mandatory requirement to read and understand the company policies (IT, OHS, HR) at new recruitments?

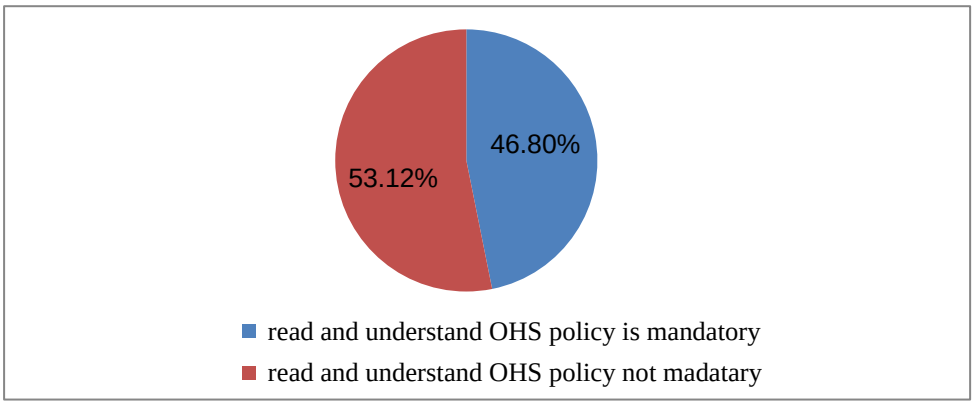

Figure 12: Mandatory requirement to read and understand the company policies (IT, OHS, HR) at new recruitments

As indicated in Fig.10, out of 59.40% of organizations having a written OHS policy, 15 respondents amounting to 46.8% stated that they have made it a mandatory requirement to read and understand OHS policy in parallel with other company policies & procedure for the new recruiters. As such the percentage of companies where read and understand OHS policy is a mandatory requirement of the company. Further, it was observed that the compliance to the mandatory requirement is kept in file of records in their systems.

4.4.8. Conduct training sessions on OHS management systems & OHS risks?

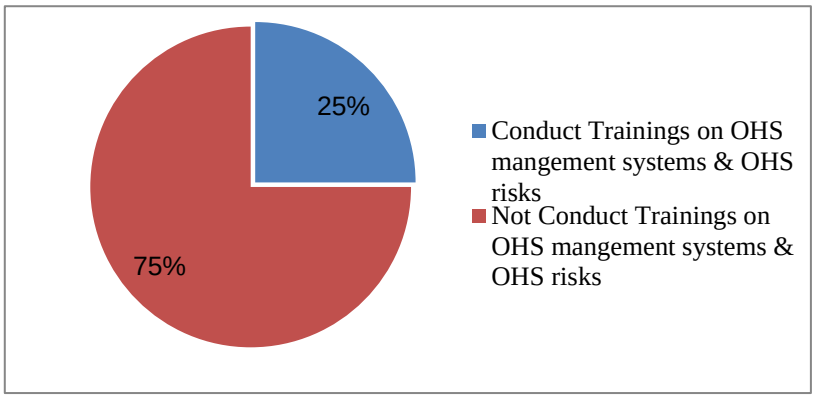

Figure 13: Conduct training sessions on OHS management systems & OHS risks

25% of companies stated that they are conducting trainings on OHS management systems and OHS risks while the remaining 75% of majority of companies are not conducting the same. However representatives of the aforesaid 25% of companies informed that trainings are not organized on a regular basis but at least once a year or quarterly to the maximum.

4.4.9. Conducting Mock –Drills

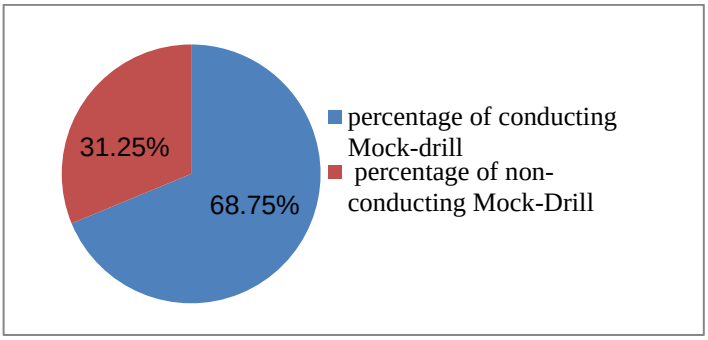

Figure 14: Conducting mock –drills

Out of 32 organizations interviewed 22 admitted that they are conducting mock drill within their organizations which is 68.75% as a percentage. The remaining 32.25 % revealed that they did not conduct mock drills under the company's health and safety procedure.

4.4.10. Delegation of Responsibility of health and safety to job positions

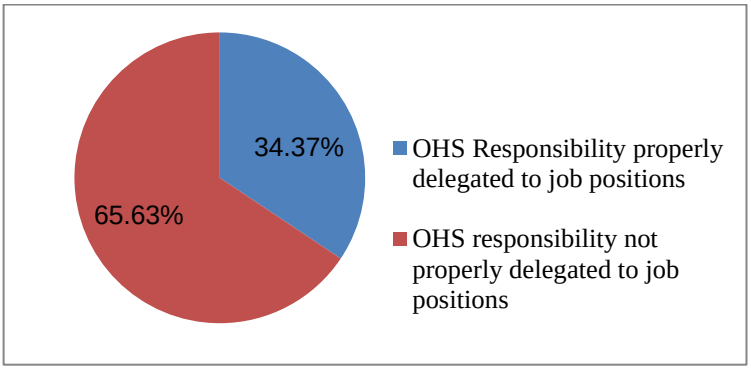

Figure 15: Delegation of responsibility to job positions

Majority of the responses were that OHS responsibility is not delegated to job positions which reflected the percentage of 65.63% and only 34.37% had delegated the responsibility properly to job positions.

4.4.11. Functional safety committee

The questionnaire survey findings proved that even though most of the companies had nominated safety committees they were mostly defunct and also most of the nominated members are no longer in the service of the organization. Alarming though, only 31.25% of the companies interviewed` had functional safety committees.

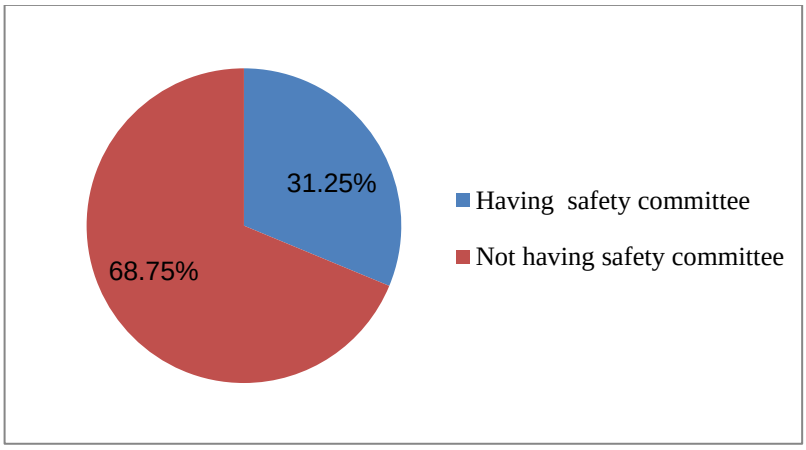

Figure 16: Having functional safety committee

4.4.12. Top management participation in the health & safety committee

Respondents expressed that this is an area where they cannot influence as they are working under the management and the findings indicated in the below Fig.17 and show that 93.7% are not participating in the safety meetings.

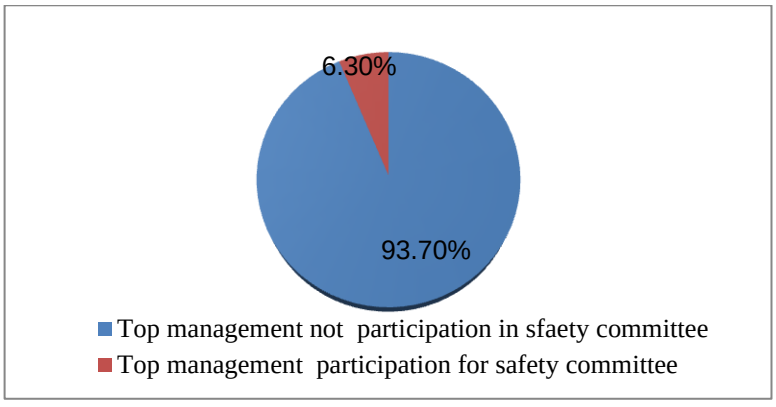

Figure 17: Top management participation for the health & safety committee

4.4.13. Top management review the organization's OHS management system at planned intervals, to ensure its continuing suitability, adequacy & effectiveness

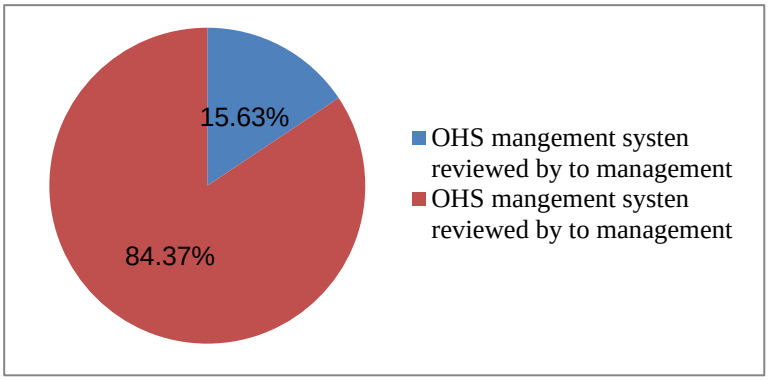

Figure 18: Top management review the organization's OHS management system at planned intervals, to ensure its continuing suitability, adequacy & effectiveness

As per the findings, a staggering 15.63% of respondents admitted that their top management review the OHS management system and 84.37% of respondents answered in the negative.

4.4.14. Conducting safety inspections/safety audits

Most of the companies which are following Health and safety procedures conduct safety audits in their organizations to evaluate the level of safety within the organization and to identify the gaps in the health and safety for improvements. 31.25% of the consultant's organizations are conducting safety audits annually and 68.75% of the consultant's organizations are not conducting the safety audits.

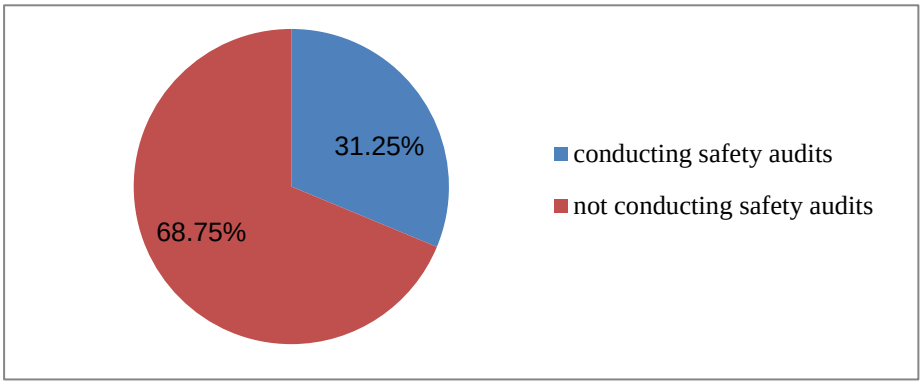

Figure 19: Conducting safety inspections/safety audits

4.4.14. a. Frequency of having safety audits

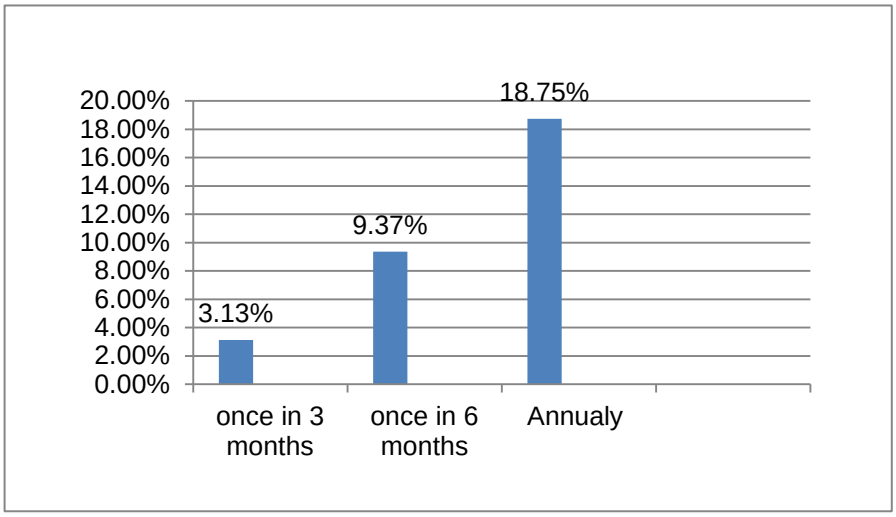

Figure 20: Frequency of having safety audits

The above Fig.20 indicates the percentage of companies which conduct safety audits in regular time intervals of once in three months, once in six months and annually.

4.4.15. Receiving feedback after safety audits with corrective actions

Feedback received from the respondents for this question is considerably low which stood at 6.25% and only two respondents had answered "Yes "demonstrating that corrective actions had been taken only by those two among 32 respondents interviewed. This is also a clear indication that practice of the safety measures are far below the accepted level.

4.4.16. Having Manual or system generated follow-up procedure for safety audits and its corrective actions.

Based on the data collected for this question, it was obvious that only 5 organizations; 15.63% as a percentage do have follow up procedure for safety audits whereas the remaining 84.37% of the organizations are not taking follow up actions on its audit manually or system generated way.

4.4.17. Availability of systems for conducting risk assessment and its frequency of assessing risks

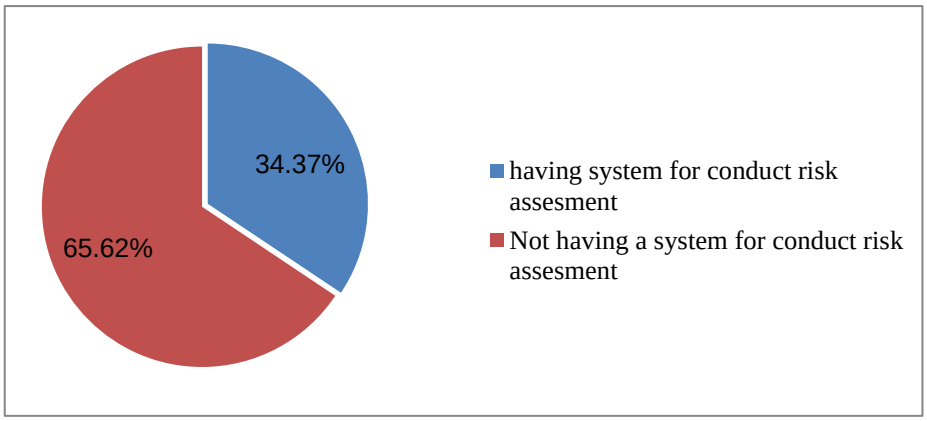

Figure 21: Availability of system for conducting risk assessment and its frequency of assessing risks

As per the findings, the consultant's organizations which conduct risk assessments have reached 34.37% while the remaining 65.62% organizations do not carry out such assessments. However these companies that carry out risk assessments pointed out that the risk assessment is not focusing only on occupational health and safety risks but also on business risks

4.4.18. Maintaining register for hazardous substances for routine and non-routine activities

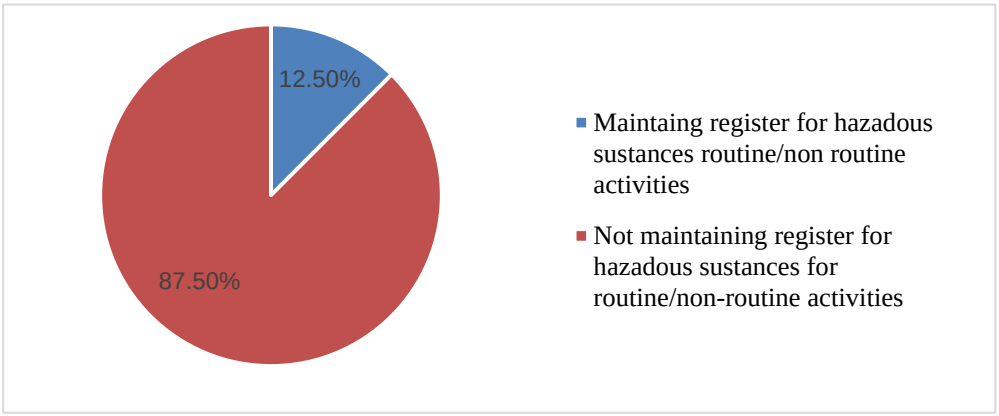

Figure 22: Maintaining register for hazardous substances for routine and non-routine activities

As shown in the Fig.22, very low value which is 12.5% as a percentage for maintain a register for hazardous substances both routing and non-routine activities.

4.4.19. Disciplinary procedure for those who violate health & safety policy

None of the consultant's organizations interviewed had a disciplinary procedure put in place for violations of health and safety policy. However, 46.87% companies stated that they keep reminding of the safety measures and personal protection equipment (PPE) at their safety meetings at sites.

4.4.20. Experience in fatal and non-fatal accidents in the organization (over the last 10 years)

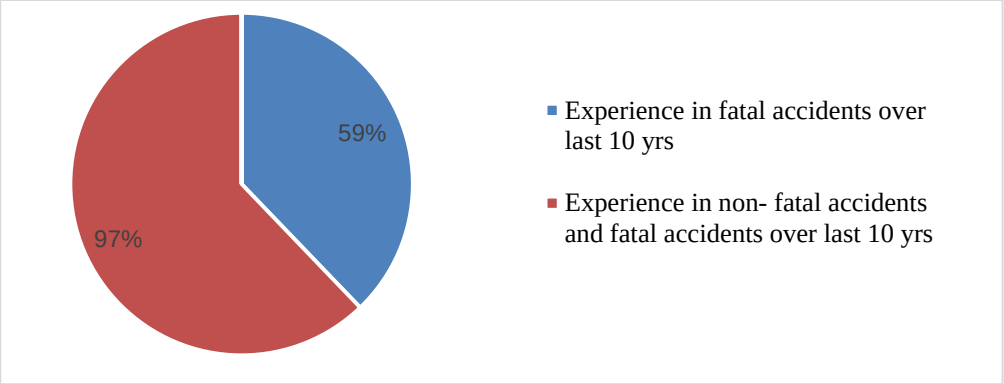

Figure 23: Experience in fatal and non-fatal accidents in the organization (over the last 10 years)

31 responses, 97% as a percentage, revealed that they had experience in both fatal and non-fatal accidents in the last 10 years' period and 12 responses shows 37.5% as a percentage, revealed that only recorded that they had non-fatal accidents only during the period.

4.4.21. Compliance with Factory Ordinance and Workman Compensation Act

93.75% of organizations are adhering to the factory ordinance and the workman compensation Act. 90.6% of the respondents stated in their views and perceptions, that the above compliance to the Factory Ordinance and Workman Compensation Act is mainly due to their legal binding.

The findings have proven the adherence is considerably at a high degree.

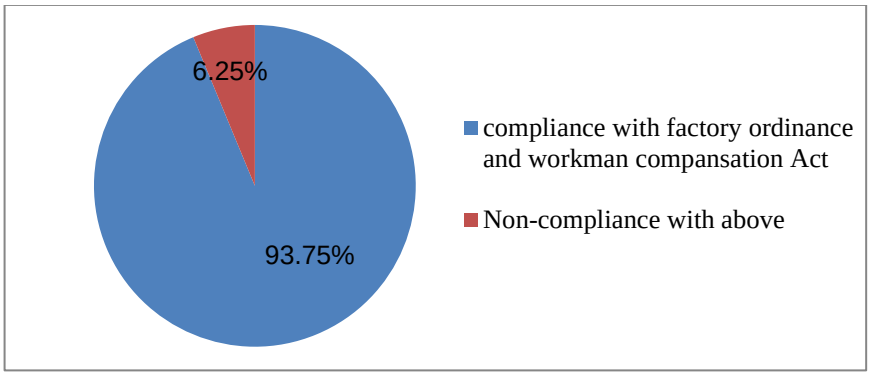

Figure 24: Compliance with factory ordinance and workman compensation act

4.4.22. Availability of Emergency Plan in the Organization

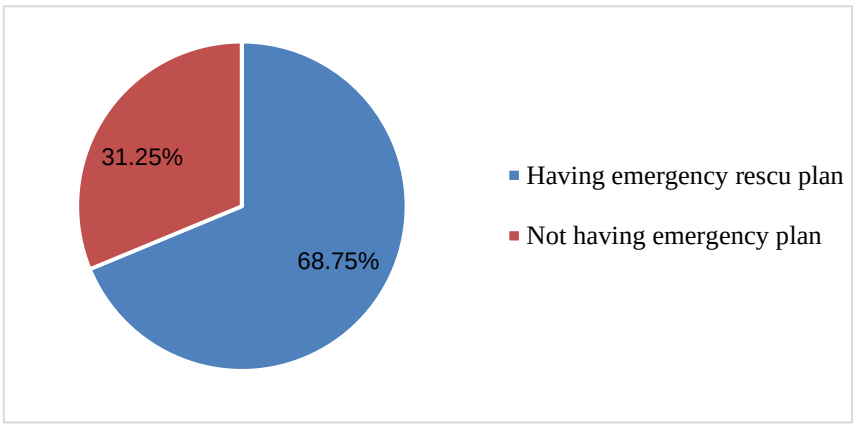

Figure 25: Having emergency plan in the organization

According to the findings, 68.75% organizations are having emergency rescue plan and only 31.25% of companies did not have such an emergency rescue plan. In answering this question the above companies which do have an emergency plan stated that they have declared an assembly point and protocol to follow in an

emergency. They also informed that their organizations put up notices indicating the emergency evacuation plan with relevant contacts like police, fire brigade etc.

4.4.23. Maintaining a Register for Reporting Accidents

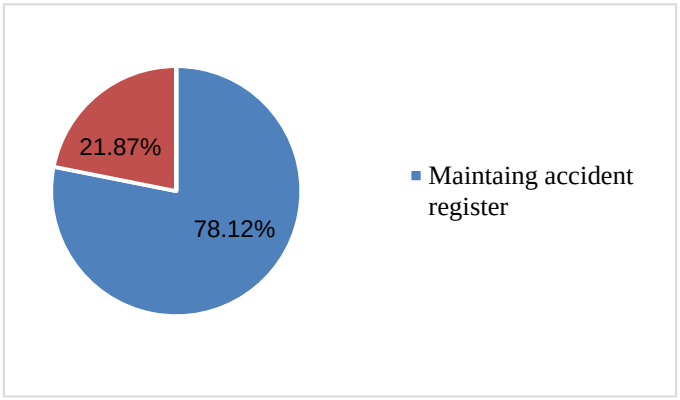

Figure 26: Maintaining a register for reporting accidents

As the above Fig.26 shows 78.12% of companies maintain a register for recording accidents. The contractor implementing the construction work is normally maintaining the register. It is a legal requirement to maintain an accident register which is closely monitored by the consultant or client. The number of organizations that do not maintain an accident register is 21.87%.

4.4.24. Investigations carried out after an accident

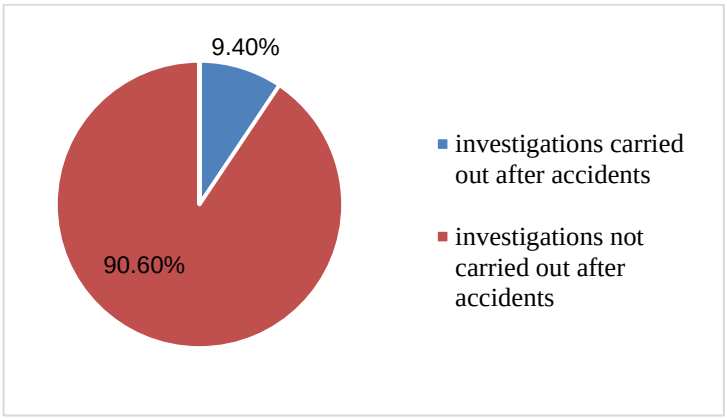

Figure 27: Investigations carried out for accidents

Only 9.4% of organizations carried out post accidental investigations regarding the root course, probability of future occurrence, precautions to be taken and cost implications.

90.6% of the rest or the rest of companies are not focusing on doing post accidental investigations. All of the above 9.4% of companies which are carrying out post investigations regarding accidents also investigate to identify the root courses and to take corrective measures with a view to avoiding recurrence of such accidents.

4.4.25: Have an idea about annual direct and indirect cost incurred due to accidents

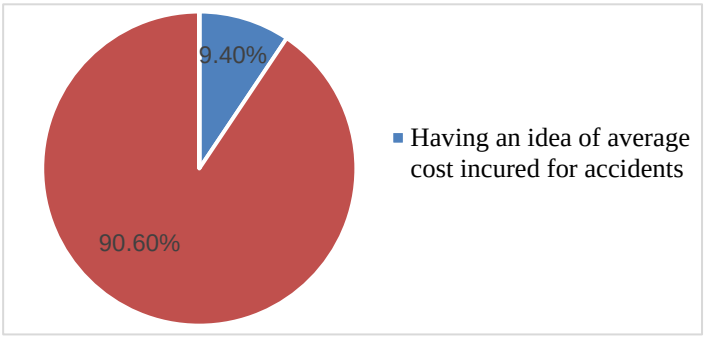

Figure 28: Have an idea about annual direct and indirect cost incurred due to accidents

Findings indicated that the similar percentage of organizations as that of Fig.27, carry our investigations into accidents which is a fact established at the interview and all companies doing post-accident investigations are also evaluating the cost incurred directly due to the accident and also the related expense.

4.4.26. Organizations following OHSAS 18001

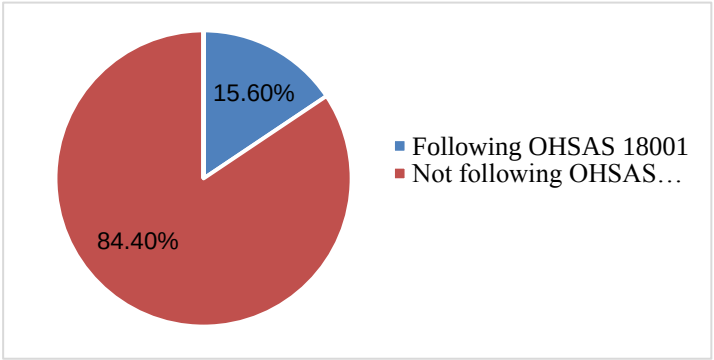

Figure 29: Organizations following OHSAS 18001

Five respondents stated that their companies do follow OHSAS 18001 as occupational health and safety procedure. However, they have informed that they are implementing the procedure through their contracting party transferring the liability to the implementing party of the construction site. They have also indicated that this OHSAS 18001 certification is included in their selection criteria in the tender documents to screen the implementing parties for large scale projects.

4.4.27. Obtain certification for OHSAS 18001 from an institution or regulating body

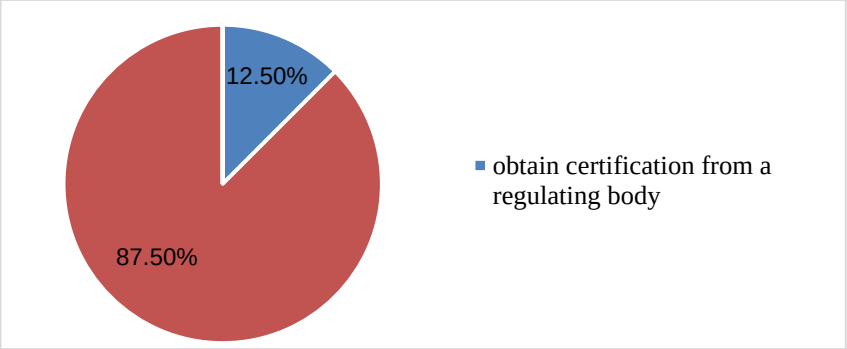

Figure 30: Obtain certification for OHSAS 18001 from an institution or regulating body

Table 3: Organizations having OHSAS 18001

Number of organizations obtained OHSAS 18001	Number of organizations not obtained OHSAS 18001
4	28

As per the findings, only 12.5% of the consultant's organizations have obtained certification for OHSAS 18001 from a regulating body while the other 87.5% of organizations do not have any certification for OHSAS 18001. One organization has indicated in response to the questionnaire, that even though they are following the OHSAS 18001, they do not apply for certification as it would be a major cost involvement for the company.

4.4.28. Perspective on Certification of OHSAS 18001

This question was specifically designed to provide space for expert's views and perception on certification of OHSAS 18001. 30 respondents reflecting 93.7% as a percentage stated that practising OHSAS 18001 is very important to maintain high standards of occupational health and safety in the construction industry. However, they went on to mention about the negative attitude of the governing bodies towards changing national policies and procedures with political changes unless such changes are legally binding. This has reflected a high degree of positive perspective of consultant organizations demonstrating their understanding of the importance of implementing OHSAS18001.

4.4.29. Main constraints to obtain certification of OHSAS 18001

Cost, top management commitment, and awareness have been identified as the three main constrains based on the data collected. These three constraints are considered for detailed analysis out of other additional factors which are discussed in the next point through question 39 in the questionnaire.

Therefore out of the three parameters, cost has become the main parameter with 46.88% while the awareness has become the third place with 18.87%. Top management remained the second with 34.40% as tabulated in the below graph.

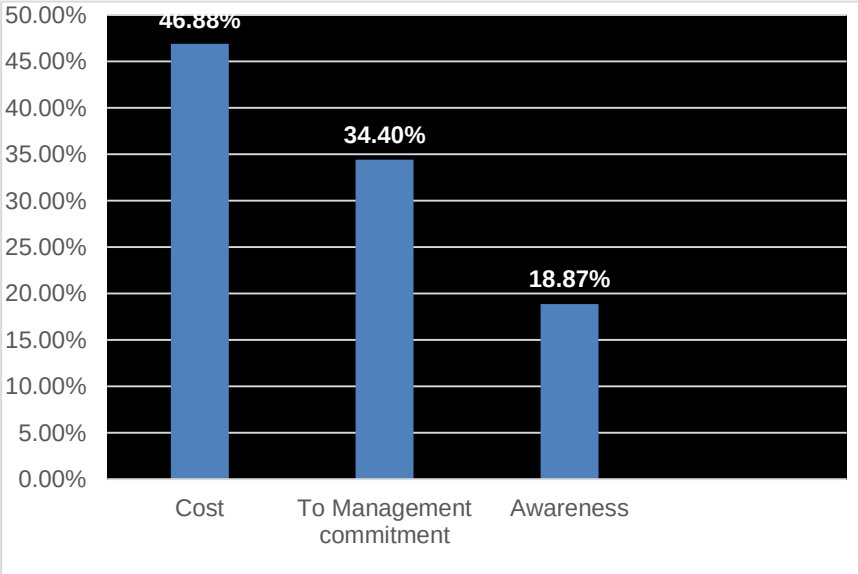

Figure 31: Constraints to obtain certification of OHSAS 18001

4.4.30. Constrains found through the literature for implementing OHSAS 18001 and tested through the survey

a. Top management commitment

b. Cost

c. Awareness

d. Training & Development

e. Cultural/Attitudinal barriers

f. Academic qualification related to health and safety in Sri Lanka

g. Expertise knowledge in the section

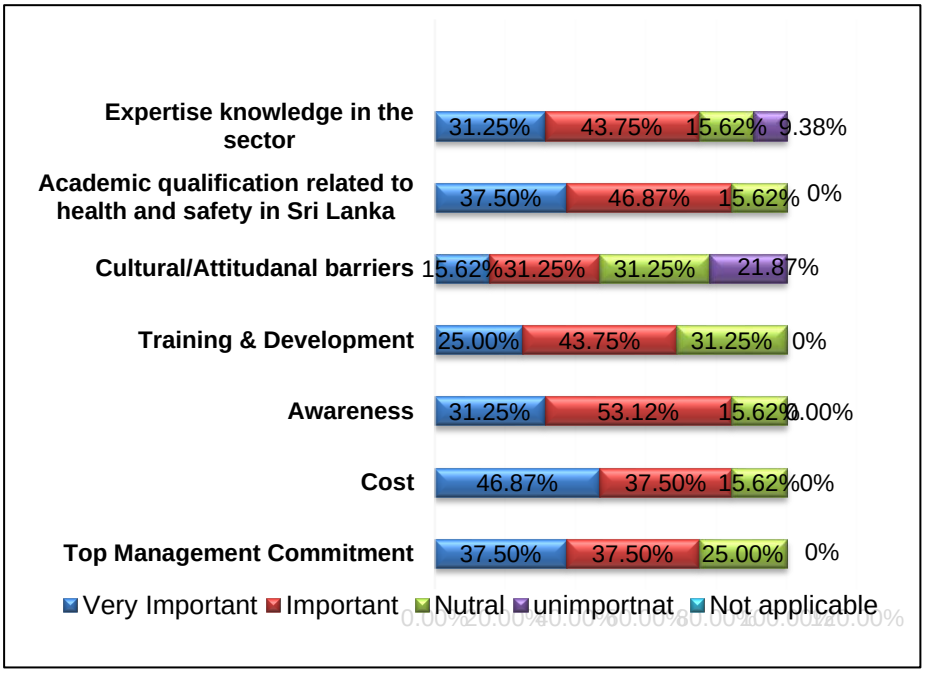

Figure 32: Parameters considered as constraints to obtain certification of OHSAS 18001

As per the findings from the above parameters found through literature, the cost has been identified as the most important parameter by 46.87% of organizations. And 37.5%.of the organizations have identified the top management commitment and academic qualification related to health and safety as the most important parameter. 31.25% organizations have identified expert knowledge awareness in the sector as the most important while another 25% of organizations identified, training &

development as the most important. Findings are tabulated in the table below with their importance as per the findings

Table 4: Percentage of respondents who identified each constraint as important

Parameter	**Percentage marked as very important**
Cost	46.87%
Top Management commitment	37.5%
Academic qualification related to health and safety in Sri Lanka	37.5%
Expertise knowledge in the sector	31.25%
Awareness	31.25%
Training and development	25%
Cultural/Attitudinal barriers	15.62%

4.4.31. Expert's comments on OHSAS 18001 being converted into a regulation in national construction industry with regard to the occupational health and safety aspects

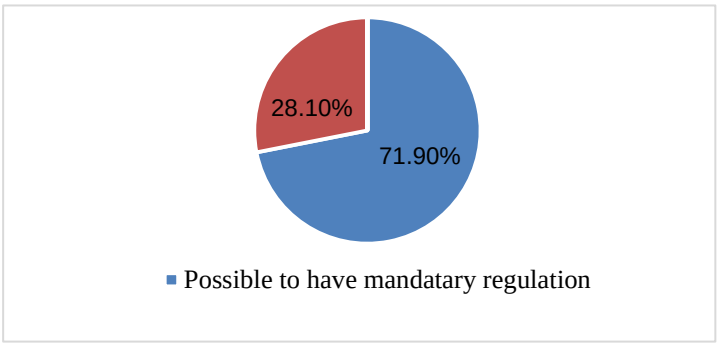

Figure 33: Respondents' view on the possibility to implement OHSAS 1800 as a regulation

In reviewing the responses received in respect of the above, 71.9% of respondents have given a positive feedback on obtaining OHSAS 18001 and implementing it as a regulation in the Sri Lankan construction industry. However 28.1% respondents have given a negative feedback on the same.

5. CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter discusses the conclusions and recommendations made throughout the entire process of the research. It also concludes the findings and analyses the data under respective objectives and discusses the constraints relating to the implementation of OHSAS 18001as a regulation in the local construction industry; consultant's perspective in the order of importance and finally it makes several recommendations based on the findings of the research for the advancement of the construction industry. Therefore, identifying main constraints with a view to addressing them in a more professional approach will be helpful to create a universally accepted safety culture in the local construction industry.

5.2. Conclusions

Globalization of economy has prompted many organizations to implement standards that are demonstrable at international level with certified quality and environmental management systems. Following this trend, many organizations from different countries in the world have started OHSAS 18001 implementation with the goal of securing occupational health and safety management system. As with many other areas of research in the built environment, occupational safety and health (OSH) practice and performance differs considerably around the world, with some regions being generally accepted and some other regions are still emerging. The research findings which demonstrates that only 12.5% of consultant's organizations have had the OHSAS 18001 certification, testifies that Sri Lanka comes under the still emerging region.

The management of OSH requires sustained and co-ordinated effort. However, construction is a transient, global industry and therefore construction companies are often decentralised which means that a common culture or beliefs and attitudes are not easily developed among project stakeholders. Safety culture is the way in which safety is managed in the workplace, and often reflects the attitudes, beliefs, perceptions and values that employees share in relation to safety.

The research attempts to study the adaptability of OHSAS 18001 as a regulation in the local construction industry with particular reference to the consultants, following activities were the core of this study;

1. Study the standard process of OHSAS 18001, implementing at a site

2. Identify the level of the current practice of OHSAS 18001 requirements in consultant's organizations

3. Analyse the possibilities to implement OHSAS 18001 as a regulation, in local construction industry; Consultant's perspective.

In relation to the second objective of the research, level of current practices of OHSAS 18001, the research findings conclude that reporting of accidents at the consultant's organizations in local construction industry however this does not mean that the rate of accidents is minimal but the reporting mechanism is not properly in place. At the event of an accident, companies take ad-hoc measures and do not consider adopting long term precautionary procedures. This leads to incurring indirect cost in the long run to which the top management pays less or no attention. The history of most accidents could be known from the recalls of the old members in the organization and not from and not from records, which is a fact established in the survey.

The survey also demonstrated that above 55% of the organizations have a safety policy whether written or unwritten and those policies are mainly implemented through the contractors by way of transferring the responsibility to the implementing partners through construction contracts, which have a legal binding. Almost all consultants' organizations which are having safety procedures in operation have neither disciplinary procedures nor penalty charges imposed on those who violate regulations. The reason behind is that a conducive safety culture has not yet been developed up to the accepted standards commensurate with the global standards such as OHSAS 18001.

As a competitive bidding requirement, employers require the implementing partners or the construction contractors to adhere to safety policies. And this is evaluated in

the tender evaluations process and is monitored in the execution stage. This has become a new trend in construction contracts providing for enhancing occupational safety which is to be implemented through contacting partners. However as this is not yet a compulsory requirement, the attention paid there to is proportionately low while the other milestones such as time, cost and quality are still in the forefront when the attention of the stakeholders are concerned. And therefore the level of implementing safety standards still remains at lower percentage. Institute of Sri Lanka Standards (ISLS), the government body regulating standards in the national level, has already recognized OHSAS 18001 as a management procedure, SLS, OHSAS 18001, 2007, which is a very positive achievement towards adopting OHSAS 18001 as a regulation in the local construction industry. According to the data received, 15.6% of consultant's organizations are following OHSAS 18001 as their OHS policy.

In fulfilling the third objective; analyse the possibilities to implement OHSAS 18001 as a regulation, the thesis focused on identifying constraints relating to the implementation of OHSAS 18001,in local construction industry. Furthermore, based on the responses of the industry experts, certain other factors were also identified as additional barriers such as political influence in implementing national policies which has become critical in Sri Lankan context, where almost every political party focuses mainly on its individual agenda at the expense of the national goal .Lack of commitment of the stakeholders as well as the lapses in delegating authority and responsibility have negative impact on the establishment of a safety regulation such as OHSAS 18001.

The survey highlighted that 71.9% of the consultant's organizations have stated that it is possible to make OHSAS 18001 as a regulation in the construction industry by way of addressing the parameters identified below as main constraints;

- Cost
- Top Management Commitment
- Academic qualification related to health and safety in Sri Lanka

- Expert knowledge in the sector
- Training & Development
- Awareness
- Cultural/Attitudinal barriers

The above findings of the questionnaire survey is a resounding testimony that adaptability of OHSAS 18001 as a regulation in the local construction industry; the aim of the thesis is a probability.

5.3. Recommendations

Considering the findings of data collection of this research, several recommendations are made with a view to implementing OHSAS 18001 as a mandatory regulation in the local construction industry. Thus, introducing legal provisions to invoke a binding on organizations to implement OHSAS 18001 is recommended.

In the process of introducing such provisions, some critical suggestions such as single submission for preliminary approval of OHSAS 18001 through a control body as in charge of the certification is appointed through a proper transparent mechanism, appointing a third party reviewer to ensure effective results and authorising a private authority for continuous monitoring along with introducing a safety culture are also recommended in order to mitigate corruptions and malpractices.

Therefore, the recommendations made are beneficial to accomplish the research objectives and there by the research aim and recommendations also proposed a proper control process to implement OHSAS 18001 with measures to mitigate corruptions and malpractices in the local construction industry.

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APPENDIX

RESEARCH QUESTIONNAIRE

M.Sc in Construction Law and Dispute Resolution

University of Moratuwa

Research Title: Study the Possibility of implementing OHSAS 18001 as a mandatory regulation for Local Construction Industry: Client's Perspective.

Study Background: Accidents are alarming high in Sri Lankan construction industry. There are many lapses in occupational health and safety; especially referring to the construction industry. Having admitted to the client's perspective on occupational Health and safety in construction, large numbers of shortcomings are reporting in time to time. As an internationally recognized standard, OHSAS 18001 is still a general standard in locally as the best practice. The study aim to see the possibility of inserting OHSAS 18001 as a mandatory regulation to the Sri Lankan legal frame work

Interview Guideline: Section A: General Information

Section B: Organizational Occupational Health & Safety Management Practice.

Section C: Accidents & Health Hazards

Section D: Awareness on OHSAS 18001 & Expert's Views

Confidentiality: Confidentiality of data / information provided in this document is fully assured.

Thanks Giving: Thank you in advance for your valuable time, guidance and support to my mission success.

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QUESTIONNAIRE

Abbreviations

OHS – Occupational Health and safety

HR – Human Resource

IT – Information Technology

Note: Please put "√" in appropriate cage where necessary.

SECTION A: GENERAL INFORMATION

1. Designation of the interviewee.

i. Project Manager ☐

ii. Safety officer / Manager ☐

iii. System Implementation Officer ☐

iv. Other specify ☐

2. Experience in similar capacity.

i. Below 05 Years ☐

ii. 05 – 10 Years ☐

iii. 10 – 15 Years ☐

iv. Above 15 Years ☐

3. Highest educational level achieved.

i. National Certificate ☐

ii. National Diploma ☐

iii. Higher National Diploma ☐

iv. Bachelors ☐

v. Masters ☐

vi. PHD ☐

- **Organizational information**

4. Nature of the business.

i. Building Construction ☐ iv. Water Supply & Sewerage ☐

ii. Highway Construction ☐ v. Irrigation & Drain Canals ☐

iii. Bridge Construction ☐ vi. Others Specify

……

5. Describe the scope of work under the above sector (*refer Q.01*) of your organization?

……

……..……..……

……

……

6. Total number of persons employed at site.

i. Below 50 ☐ iv. 201 – 300 ☐

ii. 51 – 100 ☐ v. Above 300 ☐

iii. 101 – 200 ☐

SECTION B: ORGANIZATIONALOCCUPATIONAL HEALTH & SAFETY MANAGEMENT PRACTISE

7. Does your organization following an internal management system for occupational health and safety?

☐ ☐

Yes No

Please state the reason

……

……

……

8. Do you conduct the safety meetings?

Yes ☐ No ☐

If yes, How frequently?

i. Once a day ☐ iv. Once in two weeks ☐

ii. Every other day ☐ v. Once a month ☐

iii. Once a week ☐

Purpose of the meeting.

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……

9. Do all the employee groups in your organization participate to it?

(*Including top management*)

Yes No

What is the most common employee group participate? List them.

……

……

……

10. Does the company hold regular "toolbox" safety meetings?

Yes No

If yes, How frequently?

i. Once a day ☐ iv. Once in two weeks ☐

ii. Every other day ☐ v. Once a month ☐

iii. Once a week ☐

Please put "√" in appropriate cage and comment where necessary.

No.	Management Practice	Yes	No	Reason / Remarks
11.	Does the company have a written occupational health and safety policy, addressing specific activities?			
	Is the manual readily available to your relevant employees?			
12.	Does the company have a competent person to implement & maintain such internal OHS policies?			
13.	Is there mandatory requirement to read and understand the company policies (IT, OHS, HR) at new recruitments?			
14.	Do you conduct training sessions on OHS management systems & OHS risks?			
15.	Do you conduct any mock drill for emergency situations?			

	If yes, How often?			
16.	Does the responsibility of health and safety is properly delegated to job positions?			
17.	Does the Company have a safety committee/ safety representatives?			
18.	Does there any participation from top management for safety committee?			
19.	Does the top management review the organization's OHS management system at planned intervals, to ensure its continuing suitability, adequacy & effectiveness?			
20.	Does the company conducts, project or worksite safety inspections / audits?			
	How often?			
	If yes (Q.20), What is guideline that follows for the audit?			
21.	Does your business compliance with Factories Ordinance & Workmen's Compensation Ordinance including their latest amendments?			
22.	Do you receive the feedbacks / outcome after the audits including corrective actions, etc…?			
23.	Is there any manual or system generated follow up procedure?			
24.	Does the company have a system for conducting risk assessments?			
	How Often?			
25.	Does the company maintaining register for hazardous substances& hazardous situations			

	of its routine activities?			
26.	Does the company maintaining register for hazardous substances& hazardous situations of its non-routine activities?			
27.	Does the company have a disciplinary policy for who violates the health and safety regulations?			
28.	Experience in fatal accidents (*death, permanent disablement*) in your organization?			
29.	Is there any emergency rescue plan?			
	If yes please describe.			

SECTION C: ACCIDENTS & HEALTH HAZARDS

30. Indicate fatal accident rate per year in your organization (over last 10 years)?

Please put "√" in appropriate cage and comment where necessary.

Accident Category	Rate (Please Indicate)
	Below 05|06 – 10 | 11 – 15 |16 – 20 | Above 20
Fatal	☐ ☐ ☐ ☐ ☐
Major (Permanent or Partial Disable)	☐ ☐ ☐ ☐ ☐
Temporary Disable (more than three days)	☐ ☐ ☐ ☐ ☐
Minor (below three days)	☐ ☐ ☐ ☐ ☐

No.	Management Practice	Yes	No	Reason / Remarks
31.	As refered by factories ordinance, do you practicing any register for reporting of accidents, near misses, etc… and identifiable ill health condition arising out of the work?			
32.	Is there any post investigation with regard to the accident?			
	If yes, Does it go up to the finding of root course of the accident?			
	Indicate them.			
33.	Have you taken any preventive / corrective action to avoid such occurrences in future?			

34. On average, do you have any idea on annual direct and indirect cost related to the accidents?

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SECTION D: AWARENESS ON OHSAS 18001& EXPERT'S VIEWS

35. Are you following OHSAS 18001, as the occupational health and safety standard?

Yes ☐ No ☐

36. Is your company obtained a certification under an institution or body who controls OHSAS 18001 standard?

Yes ☐ No ☐

37. Your perspective on certification of OHSAS 18001?

……

38. What are the constraints related to obtaining OHSAS 18001 certification?

……

……..……

39. Please indicate the factors below, on their level of importance for a successive OHS management system

Factors	Importance (Please Indicate)				
	Very Important	Important	Neutral	Unimportant	Not Applicable
Top management commitment	☐	☐	☐	☐	☐
Cost	☐	☐	☐	☐	☐
Awareness	☐	☐	☐	☐	☐
Training & Development	☐	☐	☐	☐	☐
Cultural / Attitude barriers	☐	☐	☐	☐	☐
Academic qualification related to health and safety in Sri Lanka	☐	☐	☐	☐	☐
Expertise knowledge in the sector	☐	☐	☐	☐	☐
Any other	.....				

40. Please provide your comments on, that OHSAS 18001 should be converted to mandatory regulation in national construction industry referring to the occupational health and safety aspects?

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