SAFETY CLIMATE OF CONSTRUCTION INDUSTRY IN SRI LANKAN CONTEX

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ABSTRACT

It is generally accepted a proper safety climate enhances safety in work environment. However a proper and strong safety climate is not properly maintained by most of organizations. This research study attempts to address safety climate issues in construction industry and suggestions to prevent identified issues with reference to Sri Lankan context. Construction industry is one of the main industries having recorded high percentage of accidents and injuries due to inherent risky nature of the work site environment and also the lack of safety practices. This research study further elaborates safety climate issues in terms of health hazards, risks and causes of poor safety practices in construction sites. A mixed method, along with questionnaire survey and in depth interviews were used to collect data from construction site environments of selected sample. Data were collected from safety managers, who are responsible for safety issues. Data were also be collected from site practitioners such as site engineers, architectures and those who are involved in construction sites such as site workers, and suggestions to mitigate safety issues were provided based on that data.

When discussing the findings of this research it can be seen that the many construction companies tend to ignore the importance of site management, as well as many of the management which was interviewed for the research tend to be focused upon the main ideas behind the safety climate. These ideas are manly surface ideas and not deeper elements that are dealt with the safety climate issues.

1.0 INTRODUCTION

Safety climate is critical factor in industry like construction, because construction organizations have to carry their activities in hazardous working conditions and most of construction organizations plan and design their working practices very poorly.

Construction Industry

According to the statics of Department of Census and Statistics, construction industry is one, among other few industries which have shown a rapid growth in the previous years due to the development projects undertaken by Sri Lankan government. The construction industry has recorded a growth of 28% in 2014 compared to 2013. This was against a GDP growth of 7.4%. Creation of a separate ministry for construction, and the new parliamentary act proposed, is also expected to accelerate the development of the industry.

When compared with other industries the construction industry by nature poses a high risk environment calling the need for various safety practices to ensure safety at workplace for employees. As large numbers of workers are engaged, construction industry is one of industries which require high reliability, which when not provided will create a high cost.
Therefore understandings the safety climates as well as good safety climate measures are highly emphasized and critical in such type of industry.

Safety Climate of Construction industry

Hudson (2001) described safety as “Just make sure people don’t get hurt”. Perceptions of the employees regarding how the organization views safety is most important factor in designing safety policy and in creating a positive safety climate of the organization. Zohar (1980) uses the concept of safety climate to describe “A summary of moral perception that employees share about their work.”

Even though the words “safety climate” and “safety culture” are being used interchangeably, According to the Cooper (1999) and Zohar (2000) safety climate is one of dimension of the safety culture.

According to Flannery J.A, Carrick K & Nendick M.D, Safety climate encompasses the perceptions of employees about the safety management of organization while safety culture encompasses not only perceptions but behaviours and the physical system of the organization. Safety climate is the combination of three key dimensions which are systems, behaviours and perceptions.

Although the safety climate is seen as simple concept, when we analyse it with regard to the particular industry it is a concept which is hard to define and hard to measure. Safety climate is most important in construction industry as an accident prone industry. Because safety climate of the organization has high correlation with the employee's performance as well as maintaining safety control system is a significant cost for the organizations.

Lot of construction companies use accident rate as the measure of safety climate. But accident rate is not a good indicator of measuring the safety. Because accidents are rare events and low accident rate, even over a period of times, does not guarantee that risks have been effectively controlled. Even though company has recorded low probability of accidents, we cannot say that there is less probability of presence of major hazards. Even though accident rate is not a good measure of the safety climate, lot of organizations in construction industry still attempt to measure safety climate through work place surveys as well as using number of accidents occurred during a particular time period.

As well as, there is a most common belief that, majority of accidents occurs in construction site, not because of careless of employees but because of control failures and ultimately responsibility is passed to the management of the company. (Baxendale and Jones 2000).

ABC costing, budgeting, balance scorecard are some of common management control techniques used by the organizations to improve their performances while minimizing their costs. Safety control system is also a type of management control system but it is not common for all type of industries as well as still not much developed control system.

Therefore our research study intends to investigate and understand safety climate in construction industry in Sri Lanka while addressing key safety issues they are facing as well as discussing possible solutions to overcome those safety issues.

1.1 PROBLEM STATEMENT & RESEARCH QUESTION

The research problem addressed under this study is to understand the safety climate of selected organizations in construction industry in Sri Lanka. Further we intend to investigate the safety issues faced by this industry and possible solutions for those issues.

According to International Labor Organization, more than 2.3 million deaths occur annually due to employment related injuries or diseases. Among those, about 60,000 fatal accidents occur in construction industry per year as per Priyadarshani et al. Construction industry is a high accident prone industry and Ramzeedeen et al. has stated that the severity of accidents that occur in construction sites in Sri Lanka are much higher than that of other countries. Vitharana et al. has identified the lack of awareness of safety practices, unsafe work behaviors practices by employees and dislike to wear personal protective equipment are among major causes leading to a negative safety climate.

1.2 Research Questions

The following research questions have been developed to elaborate the problem statement of this study.

1. "Whether there are sufficient controls implemented in construction sites to promote a positive safety environment?"(RQ01)
2. "How will the management's perception towards safety help in creating a positive safety climate?"(RQ02)
3. "What are the current safety issues prevailing in construction industry?"(RQ03)
4. "What steps have been taken to rectify the prevailing safety issues?"(RQ04)
5. "What further steps can be taken to mitigate safety issues that can arise?"(RQ05)

1.3 RESEARCH OBJECTIVES

1.3.1 Overall Objective

The main objective of this research is to measure the safety climate in construction industry in Sri Lanka and to suggest recommendations to overcome the safety issues and improve the existing safety climate.

1.3.2 Specific Aims

The study will more specifically find about the following sub objectives.

- Identify the current safety climate ,prevailing safety issues and factors which has significant influence to the safety issues

Since Sri Lanka is a developing country, current safety climate in the construction industries is a considerable issue and it has been given less attention ever since. To overcome safety issues it is required to have better knowledge on current safety climate prevailing in construction industries. The relationship between workers and safety precautions is very poor although there are safety guidelines and measures in certain level. And there are many reasons not to follow available safety precautions and those reasons are to be identified in depth to mitigate prevailing safety issues and fill the gap between them.

- The level of application of safety standards and best practices

The extent to which the construction companies use or have implemented standards which are developed by organizations like ISO and ANSI to create a safe working environment will bw identified.

- Evaluate the solutions taken by the companies to overcome safety issues

Evaluations are necessary to be done on the solutions taken by the companies to overcome safety issues and to increase the safety performance identifying proper safety procedures.

- Giving an opinion on current safety issues and giving recommendations

The final objective of this research is to provide guidance and recommendations to the people who desire to increase safety climate, safety performance maintaining better health level and low vulnerable site environment.

1.4 SIGNIFICANCE OF THE STUDY

In order to understand the safety climate and safety issues faced by the selected organizations and to provide the recommendations to eliminate those issues the study will significantly contribute as follows.

- Importance of a safety climate

Safety climate can benefit for contractors and owners of industries by providing them with the knowledge of attitudes and perceptions that can help to consistently achieve better safety performance. Work sites can be dangerous places due to the number of people running around trying to get their job done and the amount of heavy-duty machinery being operated at any given time. That means there is an ever-present chance of serious injury not only for workers, but also site visitors and those living, travelling and working around sites.

Safety managers, engineers and supervisors need to visit sites regularly to do their jobs and for guiding the workers. There is a good chance they might not know much about the power tools and large machinery in use every day in the working sites. The same goes for people going about their daily routines near work sites. Working on large projects in busy urban environments may be especially dangerous. That is why those working in such areas must always be aware of their surroundings and important to have safety climate around the working environment.

- Socio-economic impact of unsound safety practices

Occupational accidents cause important social and economic problems by loss of life and physical injuries. Construction sector involves high risk due to its production processes and labour intensive characteristic and because of occupational accidents the sector brings up against financial loss in large scale. In developing countries, construction sector is one of the most important sectors that have a great contribution to economic development with its employment capacity and added-value to the economy. On the other hand, due to the lack of preventive measures, occupational accidents occur.

- Growth of industry as well as the accident rate

When it comes to Sri Lanka, GDP clearly shows that the construction sector is growing at an increasing rate while the number of fatal accidents is also increasing at a higher rate than that. In Sri Lanka, as in other countries, the extent of construction accidents is more severe when compared to other industries. The nature of the work at construction sites in Sri Lanka is labour intensive and heavily depended on the workforce of skilled and unskilled with different educational backgrounds and hence has high potential for personal injuries.

- Worldwide best practices not being implemented in Sri Lanka

The best practices implemented in construction sites worldwide to enhance a safety climate are not introduced to construction sites. Only the basic safety measures such as providing a helmet are being practiced as at now. This is a main cause of a negative safety climate and a significant factor because if those practices are properly introduced a positive safety climate can be enhanced.

- Only a few studies are done to identify safety climate in construction sites in a Sri Lankan context

Mainly due to unavailability of proper safety measures in construction sites there are only a few studies done to identify safety climate in construction sites in Sri Lanka.
There are no excuses for poor safety practices on a job site. While efficiency and production are definitely key considerations, the overall health of all those directly and indirectly involved with a construction is a priority.

1.5 RESEARCH DESIGN AND METHODS

1.5.1 Overview

A mixed research method was chosen to examine the safety climate and safety issues in construction sector. A questionnaire survey and in depth interviews will be used to collect data from construction site environment. Data will be collected from management personnel, mainly safety managers who are responsible for safety climate, site practitioners such as site engineers and architectures and site workers. Data analysis of questionnaires will be done using Statistical package for the social sciences. The questionnaire consists,

1. General information of the respondents/company's
2. Personal information of respondent
3. Questions under ten subtopics to measure the safety climate of the organization
4. Employee's perception on current role that safety (concept, measures, and practices) plays within your work environment.

1.5.2 Population and Study Sample

A population is construction companies in Sri Lanka. Because of the limitation of time and money we will conduct our research on sample basis. So sample would be selected based on purposive sampling method i.e. a convenient sample of construction companies was selected considering the ease of access.

1.5.3 Sample Size and Selection of Sample

The sample was selected based on the National registration and grading scheme for constructors, conducted by Construction Industry Development Authority. We will be selecting construction companies based on the following criteria,

1. Companies specified in building construction
2. Financial Limit above 300 Mn

1.5.4 Sources of Data

Primary data will be collected through a standard questionnaire which was adopted from the study "Safety Climate in Construction Site Environments" conducted by Sherif Mohamed in Queensland, Australia. The questionnaire will be distributed among the site workers, safety managers and engineers. The questionnaire will be translated to Sinhala. In depth interviews will be conducted with safety managers or relevant persons who are responsible for maintaining safety and technical officers of the selected companies.

1.5.5 Collection of Data

A construction site with on-going operations of the companies to be selected will be approached through an introductory letter explaining the purpose of the study, and seeking permission to conduct site visits. The sample will be included management personnel, who are responsible for safety climate, i.e.-safety managers, site practitioners such as site engineers and architectures and site workers. It was decided not to interview more than five employees working for the same organization.

1.5.6 Data Management

Ojanen et al. (1998) argue that the only way to measure the safety climate is by surveys. A questionnaire survey and interview will be used in order to facilitate the collection of information from construction site. A questionnaire will be constructed five point likert type response format (from 1 = "strongly disagree" to 5 = "strongly agree") and distributed among site workers to collect data. Face-to-face, in-depth interviews will be conducted with top management and middle level management.

1.5.7 Data Analysis Strategies

A data analysing software will be used to analyses data and to make conclusions.

Since we are only measuring the safety climate through data collected from questionnaires we will only be using descriptive statistical analysis of SPSS package.

Conversation analysis method will be used to analyse data collected from interviews.

Quality Assessment

To achieve acceptable level of measurement reliability and validity, a draft questionnaire will be constructed and presented to a university lecturer and and a construction safety manager.

1.5.8 Ethics and Human Subjects Issues

Names or any other personal details of the personnel will not be revealed to any outsider and any confidential details will not be obtained in any circumstances.

1.6 LIMITATIONS OF THE STUDY

The main limitation identified at this point of the study is the inability of generalizing the findings of the study to the overall construction industry as the study will be conducted on Sri Lankan construction companies and it will be generalized only to Sri Lankan construction industry.

This study addresses only the safety climate of building construction companies and financial limit above 300mn. Due to this study was limited to above criteria, this could be considered as a limitation of this study.

On the other hand, this study was attempted to evaluate safety climate based on the limited number of measurements it is also a limitation of this study.

2.0 THEORETICAL REVIEW

2.1 Construction Industry

The construction industry is a major player in the economy, generating both, employment and wealth (Sweis, 2008). According to Tookey (2005) the construction industry has been subject to deliver construction projects on time, within cost and quality targets. Mahamid (2011) stated that complete the project on time and within budget while meeting established quality requirements and other specifications is the universal objective of a construction project. Furthermore Mahamid (2011), stated that the history of the construction industry worldwide is full of projects those were completed with the significant time and cost overrun.

Construction projects can be determined as building projects and infrastructure projects. Infrastructure projects are power plants, roadways, bridges, dams, seaports, airports, and telecommunications networks etc (Andrew, 2009). Among them for developing economies, road construction constitutes a major component of the construction industry (Chabota, Mundia & Kanyuka, 2009). The increasing the complexity of infrastructure projects which they are constructed place greater demands on construction managers to deliver project on time, within estimated budget and to high quality (Adnan ,Al-Najjan & Kauraswamy , 2009). Hence, an accurate estimation for infrastructure project is critical for project success similarly, the determination of time completion is critical in mega construction projects (Chagas, 2014). In building construction the modes of modeling and predicting construction duration of building projects have been subject for various researchers for the last four decades. But as a new initiative approach (Stoy, 2012). Hegazy and Ayed (1998) developed a model to estimate the road construction cost by considering project physical features. Many studies done in past has been able to identify the factors causing the delays of road construction projects, but there is the lack of criteria and systemic approaches in deciding the duration of projects for rehabilitation projects. Therefore there is a huge requirement to develop a criterion which would determine the project duration of road rehabilitation projects in Sri Lanka at the project pre tendering stage

Construction is a very complicated industry and has been the subject for many scholarly work (White 1997). According to the “National Standard For Construction Work (2005) Canberra April 2005” construction carries out works that related to construction, alteration, conversion,

fitting out, commissioning, renovation, repair, maintenance, de-commissioning, demolition or dismantling of any structure etc… In White (1997), mention that construction industry includ the wide variety of organizations which are doing construction activities such as building, civil engineering, mechanical and electrical services. Further he explained these construction organizations have one or more product divisions within the organization and those divisions are more concern about manufacturing or quarrying. Regarding to the, UK construction industry, Roy et al., (2010), explained that the construction industry is a profitable industry to the economy. Because in UK, construction industry contributes 6 per cent to the gross domestic product. Also, Rhodes (2005) , provide information about the economic contribution in the construction industry in the UK. In 2014 construction industry contributed £103 billion as an economic output and created 2.1 million jobs in the nation.

According to Acar et al., (2007), cited that only few published studies have in the project-based industries such as construction (Ankrah and Langford, 2005; Low and Shi, 2001; Zhang, and Liu, 2006) and Low and Shi, (2001) suggested that organizational culture, positively affect on increasing the organizational performance and internationalization in the construction market. Although Gould and Joyce(2000) mention that international construction firms are facing the lot of problems due to the conflicts, confrontations, misunderstandings, other cultural barriers etc. Accordingly Dawood & Sikka, (2009), suggest that ICT is supporting to the construction teams to work collaboratively and ICT increase the effectiveness of architecture, engineering and construction (AEC) industry.

Safety

Scholars such as Piggin & Young (2001), are more considered about the machine safety system as a safety in the organization. Also, the followings generic advantages in technology and machinery safety in Fieldbus technology were noted in the paper such as : Less wiring, reduced complexity faster installation, distributed intelligence and self-diagnostics potentially affording greater functionality, better diagnostics and lower costs etc…

According to the David (2000), he explained that in UK, regulation of occupational health and safety was changed after introducing the Management of Health and Safety at Work Regulations in 1992. This regulation change positively affected the employers because it helped to adopt a proactive approach to managing safety by using the principles of risk assessment. Also in health and safety fields Cooper(1998) mentioned that safety helps to

prevent accidents and to control the risky activities in the organization. Then the problem is how we measure this safety or riskand to answer this question, the authors proved that, safety performance depends on many organizational variables and other safety interventions may be taking place simultaneously.

Mostly scholars consider the safety in the health care industry. Regarding to , International Journal of Health Care Quality Assurance, Stern et al., (2007), defined Organization safety as a freedom from accidental injury in the industry in US (Perrow, 1984; Roberts, 1990) and this safety related to the employees within the hospital and other organizational stakeholders. Also, this scholar conducted a case study on health care system in US and found around 44,000 to 98,000 patients dead as a result of treatment errors and annual errors, which costs between $17 and $29 billion (Committee on Quality of Health Care in America and Institute of Medicine, 2000). Intrestingly these errors were mainly happening due to the inadequate safety rules and procedures. These safety issues are not only effecting to one specific industry, but these safety concepts also deal with the other high reliability industries and customers.

According to the international Journal of Health Care Quality Assurance, et al,. (2007) defined Safety culture as “an integrated pattern of individual and organizational behavior based upon shared beliefs and values that continuously seek to minimize patient harm that may occur from the process of care delivery.” This scholar specially mentioned followings four critical components in a safety culture. Simply these are Justice or fairness, Flexibility, Learning and Systematic reporting (Reason, 1997).

When considering about the safety issues Mitchell et al., (2008), mention these key safety issues that is to be considered crucial in the construction industry,

- when safety has improved to the level this accelerate the diminishing marginal returns on new inputs and increase the marginal cost.
- Currently, safety works within the traditional based but technology and social conditions are rapidly changing.
- Decision making becomes reliant on regulatory authorities exercising judgments.

- The natures of risks are different to each other.It may be possible to describe and validate an individual utility function and group or society would likely be too complex to be reliable.
- The range of choices available to an individual faced with an issue of safety is Limited.

Then to prevent above different safety issues, Höpfl (1994), suggested that corporate culture support to reduce the safety issues.

2.2 Categories of safety

Safety is an important feature in the construction industry and the categories of safety cannot be stated in a way that matches with everything. Thus according to Mitchell et al., (2008), the following are the main categories that can be identified in the industry prone situations.

1. **Safety Hazards** can be defined as most common issues happen in the work places at one time or another. As a result of these issues it can create unsafe working conditions in the workplace and can cause injury, illness and death. Safety hazards can happen due to these reasons. For example spills on floors, working from heights, unguarded machinery and moving machinery parts, electrical hazards, confined spaces, machinery-related hazards etc..

2. **Biological Hazards** affect on when working with animals, people, or infectious plant materials. These include Blood and other body fluids, fungi /mold, bacteria and viruses, plants, insect bites etc…

3. **Physical Hazards** are issues that happened due to the environmental factors. For example radiation, high exposure to sunlight/ultraviolet rays, temperature extremes – hot and cold, constant loud noise etc..

4. **Ergonomic Hazards** are occurring due to the type of work, body positions and working conditions which put strain on your body. For example improperly adjusted workstations and chairs, frequent lifting, poor posture, awkward movement, repeating the same movements over and over etc…

5. **Chemical Hazards** are problem that's arising as a result of environment which are more sensitive to chemicals like liquids like cleaning products, paints, acids, solvents, vapors and fumes, gases, flammable materials

6. **Work Organization Hazards are** occurring due to the stress (short-term effects) and strain (long-term effects) because of workload demands, workplace violence ,intensity and/or pace, respect (or lack of), flexibility.

Thus the above main categories contribute to the identity of understanding the safety categories exsisting in the field.

Safety categories that consist in construction industry

Roy (2013), mentioned that construction works have high risk nature and recruit a high proportion of safety advisors to the construction industry sector to reduce this high risk (Jones, 2005b). When considering the circle chart of six hazards, these include , Safety hazards (issues have in work places), Physical hazards (issues due to, Temperature extremes and sunlight), Ergonomic Hazards (due to the type of work, body positions and working conditions), Chemical Hazards **(**problem with sensitive chemicals like liquids like cleaning products, paints, acids), Work Organization Hazards (due to the stress) which are mainly involved in the construction induction industry.

Safety standards and Organizations in Sri Lanka

According to Dissanayake et al., (2004) , the authors cited that these organizations and standards are mainly related to the construction industry in Sri Lanka.

- The Institute for Construction Training and Development (ICTAD) – which deals with the grading of contractors, providing training and advisory services in the construction industry.
- Construction Equipment Training Centre (CETRAC) this institute take charge in arranging the customer oriented training programs including the industrial safety. This organization basically maintains a reputation in training of industry workers and professionals for the maintenance and management of construction equipment and other engineering disciplines.
- Training courses conducted at the Operator Training Centre (OTC) this is a organization which cover safety, maintenance and operating techniques of construction equipment.

- Ministry of Labour Relations and Foreign, deals specifically trying to manage the both productivity and occupational safety and health and formed acts to safety, health and welfare under the Industrial Safety Division, National Institute of Occupational Safety, Occupational Hygiene Division.

- Sri Lanka Standards Institution (SLSI) manages the OHSAS 18001 Certification Scheme (Occupational Health and Safety Management System), to control the occupational health and safety risks and improve the employees performance in the construction industry.

Except for these organizations and standards, the "Environment, Health& Safety (EHS) Handbook published by Sri Lanka Institute of Nanotechnology, mentioned that in the construction industries, in any case first it needs to check the safety and to carefully remember that it is essential to post sign "do not put yourself at risk". Also organization needs to basically adopt the safety concepts, tool in these areas.

- General Safety Requirements like Injuries, Accidents And Illnesses
- Chemical Safety Procedure in Good Chemical Practice, Procurement Of Chemicals, Chemical Storage And Handling Procedures, Chemical Transporting / Spillage Handling, Approval To Use Chemical, Disposal Of Chemical Waste, Staff Discipline
- Hazard Management Information System (HMIS System)
- Personal Protective Equipment Policy (PPE Policy) for Eye Protection, Head protection, Gloves (Hand Protection), Respiratory Protection, Laboratory Coats (Body Protection), Hearing Protection, Protective Footwear
- Electrical and Mechanical Safety
- Fire Safety
- Environmental Safety
- Clean Room Layout and Clean Room Code of Conduct
- Monitoring of Safety Standards
- Personal Aspects
- Training

2.3 Best safety practices in Sri Lanka related to the construction industry

The Fleming et al., (2004), suggested that to ensure the safety in the construction industry the best principal and practice is to **build a safety culture** in the construction workplace and to create a safety culture authors mentioning following best six practices.

organization needs to “demonstrate safety leadership” and responsible parties and to follow up with “promote design for safety” inside the workplace . Thus, also to “communicate safety information” top level to the bottom level of the organizational structure.More ever, to take actions to “manage safety risks” within the workplace. The final steps involved , organization and safety leadership must need to “continuously improve safety performance” within the workplace and that the safety leadership needs to entrench the safety practices by adding new standers, rule and new technology. The above safety culture and six best steps of principals were again proved in Edwards Deming (2007), mentioning that the construction industry has an obligation to provide safety for workers, the public, suppliers, and other participants in the construction process. In traditional perspective early, the only consideration was about the safety to technical and engineering aspects, but in modern world safety involve to every stakeholders in the construction field.

According to the article, Deming (2007), suggested several steps to create and ensure a safety environment in the construction workplace. The first step would involve with organization which needs to conduct “Pre planning for the safety” by setting the goals and objectives for the safety and communicate those safety practices among the stakeholder of the construction industry. Follwoed by the , Hiring and building safe employees” and the need to review the employee hiring process and select the knowledgeable people to the workplace and engagement & empower the employees and always put supervisors to the workers. Finally to, “Train” the employees and held the meetings and practice the safety actions to the emergency incidents (Deming , 2007).

2.4 Actually safety standards and best practices in Sri Lanka

In a local context article conducted by Wimalaratne (2012), mentioned that in Sri Lanka occupational safety and health (OSH) is an often ignored topic in the construction industry. And the main reason is that responsible parties have neglected their share in building an OSH culture in the construction workplace. The author concluded the importance of understanding the nature of safety climate. In general terms Climate can be defined as a variability of relevant atmospheric variables such as temperature, precipitation and wind. But according to the report published by the Washington DC**,** Workshop Report (2013)**,** scholars defined the safety climate as being supported to reducing injuries, illnesses and fatalities on construction worksites within the safety climate members are sharing all the safety policies and procedures. And the followings are identified as the the key indicators of safety climate.

- Supervisory leadership
- Safety as a value/safety alignment
- Management commitment
- Employee empowerment /and involvement
- Accountability
- Communication
- Training
- Owner/Client Involvement

Cameron et al., (2013),, mentioned these strategies are crucial to build a successful safety climate within the construction workplace.

- Keep the interactions between safety advisors and construction personnel by recruiting the site audits or inspections
- Held safety committee meetings, safety training or accident investigations, continuously in the work place.

According toa research article submitted by the National Standard For Construction WorkCanberra (2005) mentioned that these steps needs to be followed to create an occupational health and safety management plans in the safety climate in the construction industry.

1. Prepared a site-specific occupational health and safety management plan before start the work and monitor, maintained that plan continuously up to date that the project was completed.

2. Delegate the responsibilities and prepared the list by including names, positions and given responsibilities of relevant employees and put a coordinator.

3. Prepare the handbook by including details of occupational health and safety incidents and when they can be occur, contact details of responsible parties who will prevent the accidents, safety rules have to employees, contractors, suppliers or visitors etc.., methods that identify the safety issue and risk.

4. Provide above details to employees who work in the work force and supervise the employees.

2.5 Current safety climate in the construction industry

According to Went (1995), the scolar analysed some accidents which happened in Health and Safety Executive (HSE) in robotic systems and found most of the issues are coming through the errors happened in poor planning of maintenance activities, poor guarding design, poor systems of control, used low integrity safety devices.In the article Ahamed et al., (2006) found that according to the information which are available at Labour Department, in each year approximately 2500 to 3000 accidents are reported to Industrial Safety Division of Labour Department. Out of these accidents 40% to 60% were fatal accidents and other 30% accidents are happing due to the construction methods. But the problem is other accidents are not reported to the Labour Department due to the less knowledge on accidents reporting procedures.

When considering the estimates of the International Labour Organization (ILO), it mentioned that per year world get 4 percent losses in GDP due to the construction accidents. Within this 4% of safety issues , it directlyaffects the economy needs to contribute money for medical expenses and compensation for workers. And indirectly Department of Health needs to use resources for giving free medical facilities. With this safety issues opportunity cost occurred to the employee, employer and the government.

2.6 Safety issues in the construction industry

According to the article, Ahamed (2006) , mentioned that in the construction industry safety issues can arise in these situations.

- Construction site
- Any design relating to the construction project
- Working at height;
- Safety issues include the handling, use, storage, and on-site transport or disposal of hazardous substances
- The presence of asbestos
- Systems of work;
- Plant, including the on-site transport, installation, erection, commissioning, use, repair, maintenance, dismantling, storage or disposal of plant;
- Manual handling

- Layout and condition of the construction site
- Physical working environment

As a result of safety issues can arise physical pain, mental effects to the workers and these issues are loss valuable time for responsible parties. And need to allocate time and money spend the hospital and get treatments at the hospital.

According to the article, Ahamed et al., (2006), found that most of the accidents happened due to the improper handling of equipments and falling of objects from a height. And these are the major accidents that are highlighted in the context.

- Falling of a person
- Falling of objects
- Stuck on stationary objects
- Struck by moving objects
- Exposure to electricity
- Exposure to harmful substances
- Exposure to heat
- While handling equipments

Accordingly falling of a person is a most common accident and contractors have not adopted proper accident reporting procedures into the work place. After the occurrence of these accidents the site basically contractors are taking these following actions.

- First aid given at site
- Take to the hospital
- Inform victim's house
- Grant paid leave to the victim
- Pay compensation
- Report to labour department

Mainly, according Ahamed et al., (2006), , highlighted that mainly because of five causes are the major reason for the occurrence of the safety issues as in Carelessness, Ignorance and lack of training , Lack of discipline , Distraction and Poor communication. The scholars stated that in Sri Lankan context 26% of contractors are providing advices to before starting any works

and 53% of contractors are providing instructions in sometimes and 21% of contractors are never giving or very rarely giving the instructions to the workers. And the problem is 58% of contractors are adopting the safest construction method from their own opinion and sometime there are not standard methods and 16% of contractors are sometime adopting safest methods and 26% of contractors are very rarely adopting safest construction methods to workers.Contractors not having good knowledge about the related safety instructions, rules and standers in the construction industry is also a huge issue to be solved. (White & Drucker, 1997). Because 74% of contractors have safety policies for their sites and 24% of contractor not having any policies within the construction site and 16% of contractors never carried out any safety planning before and 84% of contractors carried out safety planning in different stages in the construction istes. Went (1995),

These scholars are indicating that safety issue can arise due to improper work methods in the construction work places, unsafe behaviors of workers, working with dangerous machinery and materials and working environment, operating without authority of top managers, carelessly working with moving machinery, working without personal protective equipment, wearing

dangling clothes, unsafe lifting carrying and placing, using hand instead of using tools, unsafe handling of hazardous materials. (Roy, 2013)

According to Ahamed et al., (2006), the scholars found these problems which are arising in the process of improvement of safetycan be a real back log to the upkeeping of safety in the work place.

- Financial problems within the organization.
- Poor allocation for the personal protective equipment.
- Lack of facilities to train the workers
- Lack of consideration by the top management.
- Ignorance by the site Engineer and other technical staff.
- Difficulties in getting experienced workers because of low salaries
- Lack of site co-ordination
- Lack of consideration by the client and Engineers
- No proper safety policy available for the organization.

However Roy (2013) explained these responsible parties and their responsibilities to prevent the safety issue in the construction industry. The main element is about the responsibilities of clients as in Client responsible for undertaking the activities that don't involve with any risk to the health and safety of the worker. Also, Responsibilities of designers, as a designer need to identify risk activities in the site before involve to the construction. And plan the control methods over the design to reduce the risk of repair, cleaning, maintenance or demolition of a structure, eliminated, minimized. Also followed up by Person with control to record information because to record all details regarding the issue identification, risk assessment, and risk control process, and keep the record into this national standard, incorporated into the occupational health and safety management plan. More ever Roy (2013), suggest that a Person with control to identify hazards is needed as this Person who identifies the health or safety issues in the construction project and inform that to responsible parties. Finally a person with control to assess risks as this person's responsibility to control the resources and assets of a construction site.

Further more Mitchell et al., (2008) suggested that the person with control to review hazard identification, risk assessment and risk control measures is important also the Responsibilities of a person with control to provide information, instruction and training is also taken very seriously. Finally the Responsibilities of persons engaged to undertake construction work, Responsibility to provide information is all considered as a Joint responsibility.

2.7 Steps which can be taken to mitigate safety issues

To increase the safety in the construction industry, De Silva & Wimalaratne (2012), suggested that an organization needs to build a good leadership to overcome the safety issue arise in the construction industry and need to find the new safety and health the proposed strategies, and mechanisms. Then need to highlight the parties that have authorities to manage the safety issues and thinking pattern of the stakeholders. Also organization can build the self-evaluate management tools by considering the effectiveness index (EI) and project safety rate (PSR). And recruit the qualified, experienced safety officers who can get quick decision when the safety accidents occur.

Also, Ahamed et al., (2006) argued that Sri Lanka needs to provide safety education through the local universities and institutions. Because after getting adequate knowledge about safety rules and standards s, construction industry can enhance the workplace performance. And work place can change the technology and behavioural science suited to the safety management and develops the skilled and self-disciplined within the staff because self-disciplines can reduce safety issues occurred through the careless and it facilitate easy to create a safety culture in construction sites in Sri Lanka.

According to a report published by the National Standard for Construction Work (2005) it suggested that to improve the performance of the workplace, before starting the construction , it is needed to ensure the existing services at the construction site and risk occurring from these activities. After identifying the risky activities to the health and safety, these could be removed or disconnected, isolated, and prevented. Also in to provide the proper lighting system in risky areas and to apply emergency procedures such as specific emergency exits, routes and plans display at appropriate locations on the construction site etc...

Ahamed et al., (2006), also mention that before start the work construction sites need to have a good plan. And find the sources of accidents such as inadequate safety practices in excavation work, working at height, manual work, electrical work, working with a chemical substance, etc... After identifying the source plan the safe activities and keep the unauthorized persons away. And put warning signs, instruction at risky places within the site and to appoint a well-trained person to supervise and develop a temporary structure supporting platforms and need to adopt a rule for wearing the personal protective equipment's such as safety belts, helmets and boots. And skilled labours need to put in manual works. And careful work with shocking activities such as Electric shocks, fire hazards, and injuries caused during welding works, burning.

3.0 METHODOLOGY

3.1 Introduction ‘

The research philosophy adopted for this case study forms a qualitative approach and further, a collective (multiple) case study approach would be used. For the achievement of aforementioned research objectives, we will gather data from both primary and secondary sources. The main steps in qualitative research; delineating the sequence of stages in qualitative research is much more controversial than the quantitative research approach, because it exhibits somewhat less analytical aspect and therefore needed much more critical approach. In the research process the relationship between theory and study has been discussed. Thus, a questionnaire survey and in depth interviews has been used to collect data from construction site environment. Also the reliability and validity of the research has to be taken in to consideration in regarded with the case companies.

3.2 Data Collection

A mixed research method was chosen to examine the safety climate and safety issues in construction sector. A construction site with on-going operations of the companies are selected and approached through an introductory letter explaining the purpose of the study, and seeking permission to conduct site visits.

3.2.1Primary Data

A questionnaire and in depth interview of the personnel’s in the construction industry has been conducted. Primary data was collected through a standard questionnaire which was adopted from the study “Safety Climate in Construction Site Environments” conducted by Sherif Mohamed in Queensland, Australia. The questionnaire is distributed among the site workers, safety managers and engineers. The questionnaire has been translated to Sinhala. The questionnaire consisted,

5. General information of the respondents/company’s
6. Personal information of respondent
7. Questions under ten subtopics to measure the safety climate of the organization
8. Employee’s perception on current role that safety (concept, measures, and practices) plays within your work environment.

In depth interviews has been conducted with safety managers or relevant persons who are responsible for maintaining safety and technical officers of the selected companies. Also mainly from the managers in regard to the safety climate of companies has been interviewed. This is basically personal interviewing which is very flexible and can be used to collect large amounts of information. Such interviews will enable to gather more reliable information. When conducting interviews, questions have been focused for the standardization of the gathering information objectively.

3.2.2 Secondary sources

A document analysis based on the annual reports has been conducted and the internally generated reports on the most important organization's initiatives aimed to promote safety climate of the organization which lead to improve the quality of the organization. Therefore a detailed survey of the available literature on Safety climate in construction industry has been undertaken for the theoretical underpinnings on the subject. Available information /data about these activities and initiatives have been culled out from the annual reports of the companies.

3 .3 Population and Study Sample

A population is construction companies in Sri Lanka. Because of the limitation of time and money we will conduct our research on sample basis. So sample would be selected based on purposive sampling method i.e. a convenient sample of construction companies was selected considering the ease of access.

3.4 Sample Size and Selection of Sample

The sample was selected based on the National registration and grading scheme for constructors, conducted by Construction Industry Development Authority. We has been selecting construction companies based on the following criteria,

3. Companies specified in building construction
4. Financial Limit above 300 Mn

3.5 Data Management

Ojanen et al. (1998) argue that the only way to measure the safety climate is by surveys. A questionnaire survey and interview has been used in order to facilitate the collection of information from construction site. A questionnaire has been constructed five point likert type response format (from 1 = “strongly disagree” to 5 = “strongly agree”) and distributed among site workers to collect data. Face-to-face, in-depth interviews have been conducted with top management and middle level management.

3.6 Data Analysis Strategies

A data analyzing software has been used to analyses data and to make conclusions. Since we are only measuring the safety climate through data collected from questionnaires we will only be using descriptive statistical analysis of SPSS package. Conversation analysis method has been used to analyses data collected from interviews.

3.6.1 Quality Assessment

To achieve acceptable level of measurement reliability and validity, a draft questionnaire has been constructed and presented to a university lecturer and a construction safety manager.

3.7 Ethics and Human Subjects Issues

Names or any other personal details of the personnel will not be revealed to any outsider and any confidential details will not be obtained in any circumstances.

4.0 DATA PRESENTATION AND ANALYSIS

4.1 Qualitative Data Analysis and Quantitative Analysis

In the part of describing the company procedures on safety measures, the author has conducted five in depth interviews with the management of safety in relevant construction companies. Thus the following indicates the five companies and the safety measures they have taken in order to develop a better work environment for the workers. The following analysis shed light upon understanding the real reason behind devising the strategies of safety climate in construction industry of Sri Lanka.

4.2 Commitment of management, Management of Communication, Safety Rules and Procedures and supportive Environment

Element	Mean Value
Commitment	3.835165
Communication	4.032967
Safety rule and procedures	3.593407
Supervisory Environment	4

In terms of value for the employee commitment towards the safety environment of the construction sites the following regard can be taken. According to mean value most of people answered 3 and 4. Most of them have agreed with these questions. According to Skewness of this is negatively skewed distribution. According to Kurtosis statistics this is heavier than normal distribution. The

same can be applied for the values regarding the communication of the employees too. According to mean value most of people answered 4 as most of them have agreed with this questions.

According to Skewness of this is negatively skewed distribution. However when considered with the managers perspective upon this one manager significantly said that according to company one As per the discussion with the safety in charge officer of the Company A construction, it was seen that the sufficient controls has been implemented in the workplace to carry out the safety procedures. As indicated by the officer, the company A as a company has taken necessary measures to make sure that the environment is safe. He further elaborated that it is required to maintain better safety environment while ensuring protection of the employees and company's other assets to complete project successful manner. Also by providing safety equipment and kits to the employees and asking them to abide by safety guide lines. Furthermore Company A is vigilant about the continuity of safety measures as in carryout site construction works in proper and efficient manner prioritizing safety of the employees. Thus, many other managers too supported this notion upon the commitment of management and communication management.
However in Company E the managers are committed in a different mode. Apart from the obvious reputation requirements they consider it because of the legal requirement as said: "Of cause, it highly influences our reputation as well as those are legal requirements. That is why we highly emphasize safety. Therefore for them safety is mainly about the security of their reputation and legal requirements. However they consider that the government has to play a considerable huge role in ensuring the safety climate of construction industry. According to COMPANY E Government standards setting must be conducted with efficiency, maximizing use of public input and available data to develop and publish reasonable standards in a timely manner. Also Government consultation for improving safety and health should be made available to all employers, regardless of size. Consultations must be without threat of subsequent inspections and citations Thus, according to both employee and manager's perspective the above areas tended well and considered important in both perspectives. Many workers believed that they have the right way of dealing with the changes and the managers too ensured that the correct paths have been taken in order to make sure that the work is done.

According to Company C, as inherent to the industry, the main element of the management perspective about this is providing a safety manual and then moving on with the process. Also they consider that the awareness of the workers is enough to be. They consider it is bad for company if there are any safety issues as in statements like; "It affect directly or indirectly impact on the company's reputation, cost of construction, labor cost, availability of labors and development of the industry". For them Safety in construction environment is important for the success of the project. Safety is not important for the betterment of workers but that the safety issues are important for the reputation of the company. In company E, consultancy company they consider the safety of their employees as a major element in overall work environment model. However, they consider that there are some inherent risks in the work environment that cannot be avoided given the situation. These risks are inherent to the construction industry and thus are important to the continuity of the business. However, the company is supposed to be a profit generation entity and thus as evident to other all companies they too consider mostly about the cost of the company. However they have implemented various controls in the work environment, as in mainly educating the workers about the limits of the company and so on.

4.3 Supervisory Environment and Workers involvement

Element	Mean Value
Supervisory Environment	3.912088
Workers Involvement	3.714286

In accordance with the statistical interpretation of the questionnaire it showed that the distribution of answers was close to 3 and 4 as in average coming in closer to 4. This suggests that Most of them have agreed with these questions. According to Skewness of this is negative skewed distribution. According to Kurtosis statistics this is heavier than normal distribution. Therefore for both elements workers have a positive endorsement saying that the Supervisory environment and workers involvement on safety measures are both, can be taken as a way of positive feedback options. According to the Company A, B and C managers, every construction site is managed by the company is deemed to have a good supervisory endorsement. According to the workers requirement and managers requirement although both of them have slight differences, there is a high possibility that the both parties involved agree upon this matter.

However in company C the manger was kind of giving a brief answer to the question rose. As in to say that the company's management is giving proper training to avoid safety issues and nothing else. Thu, how and where this is being taken place and what are the other measures that have been taken for this is not provided. The attitude about the safety procedures of the company B tends to be something out of a cover story of a sales pitch. This tends to be something that does not need to be done in order for true safety issues but more as a way of gaining the public acceptance as a good company with adequate safety procedures. Thus, it is important to understand that statements like "Safety in construction environment is important for the success of the project. As a consultancy organization, company B always assure the quality of the end product while addressing the safety of the general public, end user, employee etc." does not guarantee or at least shows the methods that company B is taking to take care for their employees and to ensure proper safety environment.

4.4 Personal Appreciation of the risk & Appraisal of Physical work Environment & Work Pressure

Element	Mean Value
Personal Appreciation of the risk	4.065934
Appraisal of Physical work Environment	4.065934066
Work Pressure	3.89011

Both of these elements deals with the point of worker who has to manifest and take care of his own safety measures. The personal appreciation of the risk deals upon workers understanding about the risks involved in the work environment and how he behaves towards it. Mainly this is taken necessarily as to understand that the safety measures are a must to follow in order to work in a hazard free environment. In the category of personal appreciation of work risk, most of the workers agreed upon that the responsibility mainly lies with them in order to process a better safety environment.

However managers of the companies, especially a manager from company A suggested that some of the workers do apprehend the importance of understanding the safety measures but most of them lack common sense. He elaborately stated as true to the nature of the construction industry they expect the support of government and other institute to take care of the nonprofit generating tasks. This is considered to be a severe pitfall of companies in general. However the main take away point from him was that using common sense is important in order to prevent safety issues in work environment. Also a manager form Company D when discussed about the further steps that can be taken to mitigate the issues prevailing in the industry he elaborated that the use of common sense as a construction worker is more important. Thus it is important to hire qualified person to manage safety environment and maintain consultancy from outside parties.

4.5 Work Pressure and Competencies

Element	Mean Value
Work Pressure	3.78022
Competencies	3.923077

According to mean value most of people answered 3 and 4 as Most of them have agreed with this questions. The questions that have been followed in the research is tend to be of normative stance where the employees were questioned on whether they are under a healthy level of stress and whether they have the correct competencies to manage the work with clear safety practices. According to Skewness of this is negatively skewed distribution. According to Kurtosis statistics this is heavier than normal distribution. However the main element of the work pressure needs to be considered with competencies. The step that has been taken by the company to rectify the issues that has been happened is only about educating the workers. This cannot be seen as adequate and responsible as a company who has been on the construction industry for long. Thus it shows and resonates with the fact that the company has not been performing or working towards the same level of awareness and the sensitivity that a construction site should have upon its employees. This is a major disappointment in regard with understanding that the COMPANY B has a very downright careless attitude towards ensuring the security of the employees.

According to Company D, they sees many in common in regard to the safety issues in construction industry with other companies such as: Lack of education, Careless working habits,
Lack of understanding about first aids, Lack of awareness of safety documentation and safety standards, Use of tools for other than their intended purpose, Nature of the industry- inherent limitation and societal view on the industry operation which are mainly part of the competencies. According to the company C, When considering the positive stages and equipment's that has been supplemented by the company for the safety of its employees, it's ironical the level of awareness that they possess. The company only talks about the level of safety by using statements such as "Safety is very important construction industry and we always emphasize about work place safety.

“ Thus, this does not give proper understanding or does it shows any level of acquisition of the responsibility to take control of the safety issues.

5.0 CONCLUSION AND RECOMMENDATION

Introduction

This chapter deals with the discussion of findings in order to relate them to the existing knowledge on the subject. In this chapter the discussion variations are identified and view of their possible causes are regarded with the theoretical and practical significance of the findings. This chapter discusses the findings of the research. Finally the chapter ends with summarized results, conclusion and implications for future studies.

The construction industry is a major player in the economy, generating both, employment and wealth (Sweis, 2008). According to Tookey (2005) the construction industry has been subject to deliver construction projects on time, within cost and quality targets. Mahamid (2011) stated that complete the project on time and within budget while meeting established quality requirements and other specifications is the universal objective of a construction project. Furthermore Mahamid stated that the history of the construction industry worldwide is full of projects those were completed with the significant time and cost overrun

This section concludes the research study and provides details and various findings in relation to the research objectives. According to (Santiago 2013) point that enterprises of either size each have their role in safety climate objectives of an industry, even as each have their inherent weaknesses. For instance, small firms of construction industry may prefer to stay within their niche and thus fail to expand their construction impact. On the other hand, larger firms while they possibly have resources may lack the focused passion on construction safety climate that smaller start-ups may have.

Although a venture is very small regarding the size the impact created on safety climate is far wider and enthralling therefore placing a correct benchmark for Sri Lankan construction industry giants.

The following can be stated as recommendations to improve the safety climate and overall safety measures of the construction industry in Sri Lanka.

When discussing the analysis of the research it can be seen that the many companies tend to ignore the importance of site management in construction industry. Site management, especially the site managers seemed to be not interested in in emphasizing the need of personnel safety practices among their workers in big construction companies and trust the employees and workers also tend to be less careful about it. Although this may not be interested to companies. Many of the management which was interviewed for the research tend to be focused upon the main ideas behind the safety climate. These ideas are manly surface ideas and not deeper elements that are dealt with the safety climate issues. For an example the main issue of management in regard to the accidents is about their safety procedures and not about their overall safety policy.

However there is an issue to be dealt with the management's commitment towards the safety climate of the company. It has revealed that good organizational commitment and communication are highly associated with effective role of managing accidents. Active personal role to safety and health results in greater influence among workmates, and low obstacles to safety Behaviour. Although it has not been revealed in the report, many other scholars have reasoned that safety measures of construction work sites may not be adequate because workers and other staff members are sometimes under the influence of alcohol, and drugs possibly because they are not tested for drugs and alcohol before starting and during activities in the construction sites . However, the main limitation of the research was that the findings were limited to gathering the opinion of several big company management and not on front line workers. To improve site safety, contractors in construction sites are advised to, have an organizational safety policy for the proper administration of safety, this has been highlighted in all five companies contacted but wasn't that much evident in the process of gathering data from the workers. They were not thoroughly advocated to getting these policy manuals around their system because it was treated as another document. The most necessary implementation is to provide formal safety training for their workers and conduct daily "toolbox" safety talks. This has been recommended by many scholars and even few of the members in the company's stated that the this type of practice can do well.

5.2 Recommendation

Companies are advised to conduct weekly formal safety meetings at the project level, always secure safety protection measures at the job site, always provide to their workers, post safety signs and posters at the job site, conduct weekly safety inspections, reward workers for their safe Behaviour, personalize workers for their unsafe Behaviour encourage workers to make use of secure equipment .

To identify the factors affecting safety climate of construction industry in Colombo District Sri Lanka

This research study identifies that there are construction issues linked with many countries economic development. Global warming, Ozone depletion, Natural disasters, Health problems, Pollution, Poverty, Un-employment and Economic downturn were identified as some of the consequences of un-construction. According to the survey, managers have found out that they have a collective responsibility in construction issues and though the results show the respondents have sufficient knowledge on general awareness of construction aspects, there are some influencing factors to the higher level of unsustainable practices. Therefore the attitude, value system, peer pressure and specially the government role in applying law and order has been identified as main factors which affect safety climate of construction industry in.

To identify the priorities of company safety managers in regard with construction safety practices

The priorities of Construction managers tend to be in regard with environment and social construction practices among other. As per the study the Construction managers tend to identify there is a vast importance in protecting the lives of the members. Other than that Construction managers do not necessarily have identified any other elements which would adhere to practicing construction safety climates in business.

Though the Construction managers are aware of the general perspectives of construction, there is still a need to enhance the level of understanding and the knowledge to the Clients, Investors, in businesses to enable the implementation of safety climates in all disciplines of the country.

Safety is an often ignored term in the Construction Industry and hence is not addressed to the required extent due to several reasons. The responsibility for providing and building the necessary safety culture, which goes beyond just preventing injuries in the construction sites, is a shared duty among all the stakeholders. In a construction site, it can be shared by the workforce and the management, which includes client, contractor and consultant and the government or the relevant authorities. Referred as Safety meetings, Accident Insurance Policy, A qualified safety officer, Safety planning; pre-project and pre-task planning, Safety specialized training

Creating Awareness with Safety Meetings, Awareness with Involvement of workers for Safety decision making, Awareness with Accident Insurance Policy, Awareness with Qualification of Safety Officer, Awareness with Providing safety manuals hand-outs and toolkits to workers and management, Awareness with Safety planning; pre project and pre task, Awareness with Safety signs and symbols and Awareness with Safety specialized Training Specific instructions on Policies with Safety Meetings, Accident Insurance Policy, Providing safety manuals hand-outs and toolkits to workers and management, Safety planning; pre project and pre task, Paying allowance for workers who work at risks, Safety signs and symbols and Safety specialized Training.

Local government can create incentives that will encourage Construction managers who perform works in a sustainable way, to further increase their own environmental protection goals. Depending on local conditions and the resources of the local government, the incentives can be set up as large monetary rewards. Health hazards in construction sites can be categorized into two: acute health hazards and chronic health hazards. Lack of awareness about site safety or dislike wearing Personal Protective Equipment and identified as one of the main causes for scarcity of safety practices in construction sites. ‘

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APPENDIX I

Questionnaire

Questionnaire on the Safety Climate in Construction Site Environment

This survey seeks to examine the relationship between the safety climate and safe work behavior in construction site environments. The result of this survey will help us to understand the importance of the role of management commitment, communication, workers' involvement, attitudes, competence, as well as supportive and supervisory environments, in achieving a positive safety climate. Your participation in this study is voluntary and the information you share with us will be treated highly confidential. ss

Part I

Name of the company

Date of incorporation

Industry

Company Type

☐ Private Limited Company

☐ Public Limited Company

☐ Other

If other, please specify …….

Financial Limit

☐ below 300Mn

☐ Above 300Mn

Part II

Gender ☐ Male ☐ Female

Age

Service Period

Part III

Please indicate your level of agreement or disagreement with the following statements about construction site safety (1=strongly disagree; 2= disagree; 3= neither disagree nor agree; 4= agree; 5=strongly agree)

1. Commitment

	Management,					
1.1	Clearly considers safety to be equally as important as production	1	2	3	4	5
1.2	Expresses concern if safety procedures are not adhered to	1	2	3	4	5
1.3	Acts decisively when a safety concern is raised	1	2	3	4	5

1.4	Acts quickly to correct safety problems	1	2	3	4	5
1.5	Acts only after accidents have occurred	1	2	3	4	5
1.6	Praises site employees for working safely	1	2	3	4	5
1.7	Disciplines site employees for working unsafely	1	2	3	4	5

2. Communication.

Management,

2.1	Clearly communicates safety issues to all levels within the organization	1	2	3	4	5
2.2	Continues to bring safety information to site employees' attention	1	2	3	4	5
2.3	Operates an open-door policy on safety issues	1	2	3	4	5
2.4	Encourages feedback from site employees on safety issues	1	2	3	4	5
2.5	Listens to and acts upon feedback from site employees	1	2	3	4	5
2.6	Communicates lessons from accidents to improve safety performance	1	2	3	4	5
2.7	Undertake campaigns to promote safe working practices	1	2	3	4	5

3. Safety rules & procedures

3.1	Current safety rules and procedures are made available to protect us from accidents	1	2	3	4	5
3.2	Current safety rules and procedures are adequate sources of information on safety	1	2	3	4	5
3.3	Current safety rules and procedures are so complicated that some workers do not pay much attention to them	1	2	3	4	5
3.4	Current safety rules and procedures should be consulted only by new recruits	1	2	3	4	5
3.5	Current safety rules and procedures require us to report any malpractice by a fellow worker	1	2	3	4	5
3.6	Current safety rules and procedures enforce the use of personal protective equipment whenever necessary	1	2	3	4	5
3.7	Current safety rules and procedures require detailed work plans from subcontractors or self- employed individuals	1	2	3	4	5

4. Supportive Environment

	As a group, we					
4.1	Adopt a no-blame approach to highlight unsafe work behaviour	1	2	3	4	5
4.2	Often remind each other on how to work safely	1	2	3	4	5
4.3	Believe it is our business to maintain a safe workplace environment	1	2	3	4	5
4.4	Always offer help when needed to perform the job safely	1	2	3	4	5
4.5	Endeavour to ensure that individuals are not working by themselves under risky or hazardous conditions	1	2	3	4	5
4.6	Maintain good working relationships	1	2	3	4	5
4.7	Ensure that the workload is reasonably balanced among our- selves	1	2	3	4	5

7. Supervisory Environment

	My supervisor/safety manager,					
5.1	Has positive safety behaviour	1	2	3	4	5
5.2	Believes safety is very important	1	2	3	4	5
5.3	Usually engages in regular safety talks	1	2	3	4	5
5.4	Welcomes reporting safety hazards/incidents	1	2	3	4	5
5.5	Is a good resource for solving safety problems	1	2	3	4	5
5.6	Advocates working around safety procedures to meet important deadlines	1	2	3	4	5
5.7	Values my ideas about improving safety when significant changes to working practices are suggested	1	2	3	4	5

Workers' Involvement	Everyone,					
6.1	Aims to achieve high levels of safety performance	1	2	3	4	5
6.2	Plays an active role in identifying site hazards	1	2	3	4	5
6.3	Reports accidents, incidents, and potentially hazardous situations	1	2	3	4	5
6.4	Participates in safety planning, according to our safety policy if being asked	1	2	3	4	5
6.5	Has the responsibility to reflect on safety practice	1	2	3	4	5
6.6	Avoids being involved in accident investigations	1	2	3	4	5
6.7	Contributes to job safety analysis if being asked	1	2	3	4	5

7. Personal Appreciation of Risk

7.1	I am sure that it is only a matter of time before I am involved in an accident	1	2	3	4	5
7.2	I am sure I can influence the level of safety performance	1	2	3	4	5
7.3	I am clear about what my responsibilities are for safety	1	2	3	4	5
7.4	I am aware that safety is the number one priority in my mind while workings	1	2	3	4	5
7.5	I believe some rules are really necessary to get the job done safely	1	2	3	4	5
7.6	I believe some rules and policies are not really practical	1	2	3	4	5
7.7	I cannot do the job safely without following every safety procedure	1	2	3	4	5

8. Appraisal of Physical Work Environment & Work Hazard

In our work environment,

8.1	Safety is a primary consideration when determining site lay out	1	2	3	4	5
8.2	Poor site layout planning is an accepted feature of the industry	1	2	3	4	5
8.3	The chances of being involved in a site accident are quite large	1	2	3	4	5
8.4	Operating site conditions may hinder one's ability to work safely	1	2	3	4	5
8.5	Detecting potential hazards is not a major aim of the site planning exercise	1	2	3	4	5
8.6	Working with defective equipment is not allowed under any circumstances	1	2	3	4	5
8.7	Potential risks and consequences are identified prior to execution	1	2	3	4	5

9. Work Pressure

9.1	I work under a great deal of tension	1	2	3	4	5
9.2	I am not given enough time to get the job done safely	1	2	3	4	5
9.3	It is necessary for me to depart from safety requirements for production's sake	1	2	3	4	5
9.4	I perceive operational targets in conflict with some safety measures	1	2	3	4	5
9.5	It is normal for me to take shortcuts at the expense of safety	1	2	3	4	5
9.6	I tolerate minor unsafe behaviours performed by co-workers	1	2	3	4	5
9.7	It is not acceptable to delay periodic inspection of plant and equipment	1	2	3	4	5

10. Competence

10.1	I received adequate training to perform my job safely	1	2	3	4	5
10.2	I am aware, through training, of relevant safety procedures	1	2	3	4	5
10.3	I do fully understand current, relevant legislation	1	2	3	4	5
10.4	I am skilled at avoiding the dangers of workplace hazards	1	2	3	4	5
10.5	I am capable of identifying potentially hazardous situations	1	2	3	4	5
10.6	I am proactive in removing workplace safety hazards	1	2	3	4	5
10.7	I am capable of using relevant protective equipment	1	2	3	4	5

Part IV

Please rate each statement on a 1–9 scale (where 1=very strong endorsement) Think about the current role that safety (concept, measures, and practices) plays within your work environment.

1. Safety in My Current Work Place

1.1	Plays an effective role in preventing accidents	
1.2	Reduces occupational risk	
1.3	Makes it possible to get the job done	
1.4	Is of high quality compared to other sites	
1.5	Is not restrictive and superficial	
1.6	Helps increase my productivity	
1.7	Contributes to my work satisfaction	
1.8	Inspires me to work more safely	
1.9	Has a positive influence on morale	
1.10	Makes me proud to tell others I am part of it	

Part IV

On a scale of 0–100%, please indicate, on average, the percentage of time

1. Safe Work Behavior

1.1	I follow all of the safety procedures for the jobs that I perform	
1.2	My co-workers follow all of the safety procedures for the jobs that they perform.	

Thank you very much for contributing for this research

APPENDIX II

Interview Transcript

Name of the company : Sanken Construction Ltd
Designation : Civil Engineer
Service Period : 5 Years
Age : 30 Years
Gender : Male
Highest Educational Qualification : Bsc. Eng

What do you think about safety in construction site environment? How your organization addresses it? What areas in what level?

It is required to maintain better safety environment while ensuring protection of the employees and company's other assets to complete project successful manner.
Mainly providing safety equipment and kits to the employees and safety guide lines.
Carryout site construction works in proper and efficient manner prioritizing safety of the employees.

What are the main issues regarding safety in construction site environment?

Lack of safety tools
Lack of awareness of the employees
Carelessness of the employees
Rush time line /unachievable time line targets

In your point of view what are the route courses for those issues? Why these are happen? Who is responsible?

Lack of funds for safety issues
Proper induction programs are not conduct in proper time intervals.
Employees are moving
Lower level of involvement Top management's for safety matters

What are the consequences of safety issues? Will it affect to the company's reputation? Cost of construction project? Labour cost? Availability of laborers? Development of the industry?

There are lots of bad consequences. It will badly affect to the entire organization

What is the contribution of the company and its management to reduce those issues? (Adequate equipment, funds, training and induction programs, gives instructions to workers, having good health & safety policy, etc.)

Provide most required safety tools for the employees
Employees are forced to ware proper safety equipment before enter into the construction site
Exhibit the safety instruction banners in sites
Restrict the unwanted people in hazardous areas

Does the awareness of the workers is adequate regarding safety issues?

Awareness is just for ware the safety equipment and proper awareness is required

Employees are provided only to ware safety equipment

What is the role of the government and the legislation regarding the safety issues? (Standards, Rules and regulations, etc.)

It is required to introduce safety policy to the construction company by the government ensuring safety of the employees
Government shall monitor continuously on safety of employees
Government shall take counter actions on organizations which have been violated safety rules

What is the role of you as a responsible body in your organization?

I have to use gained experience on safety climate and use common sense

Are there sufficient technology, equipment and qualified person in the industry regarding safety?

Yes but in our organization there are no sufficient technology and awareness

What should be improved and how can reduce the safety issues?

Hire qualified person to manage safety environment and take consultancy

Name of the company : CESL
Designation : Network Designer

Service Period : 05 years
Age : 29
Gender : Male
Highest Educational Qualification : Bsc

What do you think about safety in construction site environment? How your organization addressed it? What areas in what level?

Our organisation follows safety standarads in every construction site.

What are the main issues regarding safety in construction site environment?

Most of the Site workers do not like to follow those safety standards.

In your point of view what are the route courses for those issues? Why these are happen? Who is responsible?

They always trust themselves with their experiences and dont like to obey the safety rules.

What are the consequences of safety issues? Will it affect to the company's reputation? Cost of construction project? Labour cost? Availability of laborers? Development of the industry?

Safety issues will directly affect the company's reputation.

What is the contribution of the company and its management to reduce those issues? (Adequate equipment, funds, training and induction programs, gives instructions to workers, having good health & safety policy, etc.)

By giving a proper training .

Does the awareness of the workers is adequate regarding safety issues?

No

What is the role of the government and the legislation regarding the safety issues? (Standards, Rules and regulations, etc.)

Educate the people about the importance of safety.

What is the role of you as a responsible body in your organization?

Educate the staff about safety.

Are there sufficient technology, equipment and qualified person in the industry regarding safety?

Yes

What should be improved and how can reduce the safety issues?

Obeying the safety rules will minimize troubles.

Name of the company : cecb

Designation : civil engineer
Service Period : 4 years
Age : 29
Gender : male
Highest Educational Qualification : BSc Eng

What do you think about safety in construction site environment? How your organization addressed it? What areas in what level?
Safety in construction environment is important for the success of the project.
As a consultancy organization, Cecb always assure the quality of the end product while addressing the safety of the general public, end user, employee etc.

What are the main issues regarding safety in construction site environment?
Lack of education
Careless working habits
Mainly not use the common sense

In your point of view what are the route courses for those issues? Why these are happen? Who is responsible?
Every individual is responsible for not using their common sense.

What are the consequences of safety issues? Will it affect to the company's reputation? Cost of construction project? Labour cost? Availability of laborers? Development of the industry?
Yes, if any damage caused due to lack of safety measures. It will directly or indirectly impact on the company's reputation, cost of construction, labor cost, availability of labors and development of the industry.

What is the contribution of the company and its management to reduce those issues? (Adequate equipment, funds, training and induction programs, gives instructions to workers, having good health & safety policy, etc.)
Company provides a safety manual for the project.

Does the awareness of the workers is adequate regarding safety issues?
Yes

What is the role of the government and the legislation regarding the safety issues? (Standards, Rules and regulations, etc.)
Government should introduce not only rules and regulations but also latest safety elements and safety procedures.

What is the role of you as a responsible body in your organization?

Deliver my knowledge and experience for the betterment of the company while safeguarding the general public.

Are there sufficient technology, equipment and qualified person in the industry regarding safety?

Yes. But the thing is people are more reluctant to think about the safety.

What should be improved and how can reduce the safety issues?
Use your common sense.

Name of the company : Venora (Pvt) LTD

Designation : civil engineer
Service Period : 5 years
Age : 31
Gender : male
Highest Educational Qualification : BSc Eng

What do you think about safety in construction site environment? How your organization addressed it? What areas in what level?
Safety is very important construction industry and we always emphasize about work place safety.

What are the main issues regarding safety in construction site environment?

Lack of proper training
Careless working habits
Mainly not use the common sense

In your point of view what are the route courses for those issues? Why these are happen? Who is responsible?
Lack of awareness about working environment.

What are the consequences of safety issues? Will it affect to the company's reputation? Cost of construction project? Labour cost? Availability of laborers? Development of the industry?
Safety issues adversely affect our reputation as well as increase medical expenses. If we not confirm safety in our site difficult to attract labor force

What is the contribution of the company and its management to reduce those issues? (Adequate equipment, funds, training and induction programs, gives instructions to workers, having good health & safety policy, etc.)
Communicate your health and safety policy to staff.

Does the awareness of the workers is adequate regarding safety issues?
Yes

What is the role of the government and the legislation regarding the safety issues? (Standards, Rules and regulations, etc.)
Government should encourage, through significant incentives and recognition, voluntary employer programs for excelling in safety and health achievement.

What is the role of you as a responsible body in your organization?

Encourage employees concentration regarding safety practices
Are there sufficient technology, equipment and qualified person in the industry regarding safety?
Yes.
What should be improved and how can reduce the safety issues?
Provide proper training and improve knowledge regarding safety.

Name of the company : Green TEK Consultants
Designation : civil engineer
Service Period : 5 years
Age : 32
Gender : male
Highest Educational Qualification : BSc Eng

What do you think about safety in construction site environment? How your organization addressed it? What areas in what level?
We always work in hazardous environment. Therefor safety is very important. Safety in construction environment is important for the success of the project.

What are the main issues regarding safety in construction site environment?
Lack of education
walking in off limited area
Mainly not use the common sense

In your point of view what are the route courses for those issues? Why these are happen? Who is responsible?
There are inherent risks are available in our industry which is difficult to eliminate.

What are the consequences of safety issues? Will it affect to the company's reputation? Cost of construction project? Labour cost? Availability of laborers? Development of the industry?
It affect directly or indirectly impact on the company's reputation, cost of construction, labor cost, availability of labors and development of the industry.

What is the contribution of the company and its management to reduce those issues? (Adequate equipment, funds, training and induction programs, gives instructions to workers, having good health & safety policy, etc.)
Company provides a safety manual for the project.

Does the awareness of the workers is adequate regarding safety issues?
Yes

What is the role of the government and the legislation regarding the safety issues? (Standards, Rules and regulations, etc.)
Government's support of research to improve occupational safety and health is critical. The causes and severities of accidents should be analyzed to prioritize research.

What is the role of you as a responsible body in your organization?
Deliver my knowledge and experience.

Are there sufficient technology, equipment and qualified person in the industry regarding safety?
Yes.
What should be improved and how can reduce the safety issues?
Use your common sense.

Name of the company : ICC
Designation : civil engineer
Service Period : 4 years
Age : 31
Gender : male
Highest Educational Qualification : BSc Eng

What do you think about safety in construction site environment? How your organization addressed it? What areas in what level?
Safety is one of the most important sides like our construction industry. We always think safety when performing any task. Without safety we can't prosper and survive. Therefor we maintain higher level of safety in over sites.

What are the main issues regarding safety in construction site environment?
Lack of education
Negligence
Mainly not use the common sense
Lack of understanding about first aids
walking in off limited area

In your point of view what are the route courses for those issues? Why these are happen? Who is responsible?
In most of the time issues occurred as negligence.

What are the consequences of safety issues? Will it affect to the company's reputation? Cost of construction project? Labour cost? Availability of laborers? Development of the industry?
Of cause, it highly influences our reputation as well as those are legal requirements. That is why we highly emphasize safety.

What is the contribution of the company and its management to reduce those issues? (Adequate equipment, funds, training and induction programs, gives instructions to workers, having good health & safety policy, etc.)
We provide proper training to employees before recruit them.

Does the awareness of the workers is adequate regarding safety issues?
Yes

What is the role of the government and the legislation regarding the safety issues? (Standards, Rules and regulations, etc.)
Government standards setting must be conducted with efficiency, maximizing use of public input and available data to develop and publish reasonable standards in a timely manner.
Government consultation for improving safety and health should be made available to all employers, regardless of size. Consultations must be without threat of subsequent inspections and citations.

What is the role of you as a responsible body in your organization?

Help to maintain proper safety environment within the sites.

Are there sufficient technology, equipment and qualified person in the industry regarding safety?
Yes.

What should be improved and how can reduce the safety issues?
Display safety information clearly.

Name of the company : Maga Engineering
Designation : civil engineer
Service Period : 4 years
Age : 29
Gender : male
Highest Educational Qualification : BSc Eng

What do you think about safety in construction site environment? How your organization addressed it? What areas in what level?

In economical aspect when considering safety issues, company can reduce the labor turnover and can achieve the completion targets according to the plan.
In societal perspective, safety consideration leads to sustainability enhancing towards employees. This will create good public image.
This is compliance with legal requirements related to labor law.

What are the main issues regarding safety in construction site environment?
Lack of education
Careless working habits
Lack of understanding about first aids
Lack of awareness of safety documentation and safety standards
use of tools for other than their intended purpose

In your point of view what are the route courses for those issues? Why these are happen? Who is responsible?
Nature of the industry- inherent limitation
Societal view on the industry operation
Lack of involvement of the government

What are the consequences of safety issues? Will it affect to the company's reputation? Cost of construction project? Labour cost? Availability of laborers? Development of the industry?
High labor turnover
Labor attraction will be reduced
Labor cost high
If some litigations are filed by labors, company has to incur a high cost for compensations
Create bad image
Demand for projects will be low
Return will be low

What is the contribution of the company and its management to reduce those issues? (Adequate equipment, funds, training and induction programs, gives instructions to workers, having good health & safety policy, etc.)
Display the safety symbols in the project area

Does the awareness of the workers is adequate regarding safety issues?
No

What is the role of the government and the legislation regarding the safety issues? (Standards, Rules and regulations, etc.)

Government should introduce not only rules and regulations but also latest safety elements and safety procedures.

What is the role of you as a responsible body in your organization?

Deliver my knowledge and experience for the betterment of the company while safeguarding the general public.

Are there sufficient technology, equipment and qualified person in the industry regarding safety?
Yes. But the thing is people are more reluctant to think about the safety.

What should be improved and how can reduce the safety issues?
Use your common sense.

Safety Climate-Data Analysis Summary

Commitment

Questions	N	Range	Min	Mix	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
1.1	13	3	2	5	3.769	0.231	0.832	0.692	-1.554	0.616	2.378	1.191
1.2	13	3	2	5	3.923	0.211	0.760	0.577	-1.213	0.616	3.154	1.191
1.3	13	2	3	5	4.000	0.160	0.577	0.333	0.000	0.616	1.036	1.191
1.4	13	2	3	5	4.077	0.137	0.494	0.244	0.262	0.616	2.573	1.191
1.5	13	3	2	5	3.231	0.303	1.092	1.192	-0.081	0.616	-1.660	1.191
1.6	13	3	2	5	3.923	0.211	0.760	0.577	-1.213	0.616	3.154	1.191
1.7	13	3	2	5	3.923	0.178	0.641	0.410	-2.196	0.616	8.379	1.191
Total	**13**	**3**	**2**	**5**	**3.835**	**0.204**	**0.736**	**0.575**	**-0.856**	**0.616**	**2.716**	**1.191**

According to mean value most of people answered 3 and 4. Most of them have agreed with this questions. According to Skewness of this is negatively skewed distribution. According to Kurtosis statistics this is heavier than normal distribution.

Communication

Questions	N	Range	Min	Mix	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
2.1	13	3	2	5	3.846	0.191	0.689	0.474	-1.605	0.616	4.594	1.191
2.2	13	2	3	5	4.077	0.137	0.494	0.244	0.262	0.616	2.573	1.191
2.3	13	2	3	5	4.077	0.137	0.494	0.244	0.262	0.616	2.573	1.191
2.4	13	3	2	5	4.077	0.239	0.862	0.744	-1.085	0.616	1.772	1.191
2.5	13	3	2	5	3.923	0.211	0.760	0.577	-1.213	0.616	3.154	1.191
2.6	13	3	2	5	4.000	0.226	0.816	0.667	-1.086	0.616	2.277	1.191

2.7	13	3	2	5	4.231	0.231	0.832	0.692	-1.524	0.616	3.706	1.191
Total	**13**	**3**	**2**	**5**	**4.033**	**0.196**	**0.707**	**0.520**	**-0.856**	**0.616**	**2.950**	**1.191**

According to mean value most of people answered 4Most of them have agreed with this questions. According to Skewness of this is negatively skewed distribution. According to Kurtosis statistics this is heavier than normal distribution.

Safety rule and procedures

Questions	N	Range	Min	Mix	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
3.1	13	3	2	5	3.923	0.178	0.641	0.410	-2.196	0.616	8.379	1.191
3.2	13	3	2	5	3.769	0.231	0.832	0.692	-0.528	0.616	0.519	1.191
3.3	13	2	2	4	3.692	0.208	0.751	0.564	-2.179	0.616	3.223	1.191
3.4	13	4	1	5	3.231	0.343	1.235	1.526	-0.514	0.616	-1.191	1.191
3.5	13	3	1	4	3.462	0.291	1.050	1.103	-1.667	0.616	1.367	1.191
3.6	13	4	1	5	3.769	0.303	1.092	1.192	-1.735	0.616	3.174	1.191
3.7	13	4	1	5	3.308	0.286	1.032	1.064	-0.733	0.616	1.026	1.191
Total	**13**	**3**	**1**	**5**	**3.593**	**0.263**	**0.947**	**0.936**	**-1.364**	**0.616**	**2.357**	**1.191**

According to mean value most of people answered 3 and 4Most of them have agreed with this questions. According to Skewness of this is negatively skewed distribution. According to Kurtosis statistics this is heavier than normal distribution.

Supportive Environment

Questions	N	Range	Min	Mix	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
4.1	13	4	1	5	3.615	0.311	1.121	1.256	-1.179	0.616	1.435	1.191
4.2	13	2	3	5	3.846	0.154	0.555	0.308	-0.143	0.616	0.901	1.191
4.3	13	1	4	5	4.308	0.133	0.480	0.231	0.946	0.616	-1.339	1.191
4.4	13	1	4	5	4.154	0.104	0.376	0.141	2.179	0.616	3.223	1.191
4.5	13	2	3	5	4.000	0.113	0.408	0.167	0.000	0.616	6.000	1.191

4.6	13	2	3	5	4.231	0.166	0.599	0.359	-0.065	0.616	0.051	1.191
4.7	13	3	2	5	3.846	0.191	0.689	0.474	-1.605	0.616	4.594	1.191
Total	**13**	**2**	**3**	**5**	**4.000**	**0.168**	**0.604**	**0.419**	**0.019**	**0.616**	**2.124**	**1.191**

According to mean value most of people answered 4Most of them have agreed with this questions. According to Skewness of this is normal skewed distribution. According to Kurtosis statistics this is heavier than normal distribution.

Supervisory Environment

Questions	N	Range	Min	Mix	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
5.1	13	3	2	5	4.000	0.196	0.707	0.500	-1.671	0.616	6.000	1.191
5.2	13	3	2	5	3.923	0.178	0.641	0.410	-2.196	0.616	8.379	1.191
5.3	13	3	2	5	3.846	0.222	0.801	0.641	-0.845	0.616	1.506	1.191
5.4	13	2	3	5	3.923	0.137	0.494	0.244	-0.262	0.616	2.573	1.191
5.5	13	2	3	5	3.923	0.178	0.641	0.410	0.053	0.616	0.061	1.191
5.6	13	2	3	5	3.846	0.154	0.555	0.308	-0.143	0.616	0.901	1.191
5.7	13	3	2	5	3.923	0.239	0.862	0.744	-0.758	0.616	0.852	1.191
Total	**13**	**3**	**2**	**5**	**3.912**	**0.186**	**0.671**	**0.465**	**-0.832**	**0.616**	**2.896**	**1.191**

According to mean value most of people answered3 and 4Most of them have agreed with this questions. According to Skewness of this is negative skewed distribution. According to Kurtosis statistics this is heavier than normal distribution.

Workers Involvement

Questions	N	Range	Min	Mix	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
6.1	13	2	2	4	3.692	0.175	0.630	0.397	-2.051	0.616	3.711	1.191
6.2	13	2	2	4	3.462	0.215	0.776	0.603	-1.114	0.616	-0.155	1.191
6.3	13	3	2	5	3.846	0.274	0.987	0.974	-0.876	0.616	0.294	1.191

6.4	13	2	2	4	3.308	0.263	0.947	0.897	-0.732	0.616	-1.609	1.191
6.5	13	3	2	5	3.769	0.231	0.832	0.692	-0.528	0.616	0.519	1.191
6.6	13	2	3	5	3.923	0.137	0.494	0.244	-0.262	0.616	2.573	1.191
6.7	13	2	3	5	4.000	0.113	0.408	0.167	0.000	0.616	6.000	1.191
Total	**13**	**2**	**2**	**5**	**3.714**	**0.201**	**0.725**	**0.568**	**-0.795**	**0.616**	**1.619**	**1.191**

According to mean value most of people answered 3 and 4Most of them have agreed with this questions. According to Skewness of this, it is negatively skewed distribution. According to Kurtosis statistics this is heavier than normal distribution.

Personal Appreciation of Risk

Questions	N	Range	Min	Mix	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
7.1	13	2	3	5	4.077	0.137	0.494	0.244	0.262	0.616	2.573	1.191
7.2	13	3	2	5	3.923	0.211	0.760	0.577	-1.213	0.616	3.154	1.191
7.3	13	1	4	5	4.077	0.077	0.277	0.077	3.606	0.616	13.000	1.191
7.4	13	2	3	5	4.154	0.154	0.555	0.308	0.143	0.616	0.901	1.191
7.5	13	1	4	5	4.308	0.133	0.480	0.231	0.946	0.616	-1.339	1.191
7.6	13	1	3	4	3.923	0.077	0.277	0.077	-3.606	0.616	13.000	1.191
7.7	13	2	3	5	4.000	0.160	0.577	0.333	0.000	0.616	1.036	1.191
Total	**13**	**2**	**3**	**5**	**4.066**	**0.136**	**0.489**	**0.264**	**0.020**	**0.616**	**4.618**	**1.191**

According to mean value most of people answered 4Most of them have agreed with this questions. According to Skewness of this is normal positively skewed distribution. According to Kurtosis statistics this is heavier than normal distribution.

Appraisal of Physical Work Environment & Work Hazard

Questions	N	Range	Min	Mix	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
8.1	13	3	2	5	3.846	0.222	0.801	0.641	-0.845	0.616	1.506	1.191

8.2	13	3	2	5	3.923	0.239	0.862	0.744	-0.758	0.616	0.852	1.191
8.3	13	1	4	5	4.077	0.077	0.277	0.077	3.606	0.616	13.000	1.191
8.4	13	2	3	5	4.231	0.166	0.599	0.359	-0.065	0.616	0.051	1.191
8.5	13	2	2	4	3.692	0.175	0.630	0.397	-2.051	0.616	3.711	1.191
8.6	13	2	2	4	3.615	0.180	0.650	0.423	-1.576	0.616	1.801	1.191
8.7	13	1	3	4	3.846	0.104	0.376	0.141	-2.179	0.616	3.223	1.191
Total	**13**	**2**	**3**	**5**	**3.890**	**0.166**	**0.599**	**0.397**	**-0.553**	**0.616**	**3.449**	**1.191**

According to mean value most of people answered 3 and 4Most of them have agreed with this questions. According to Skewness of this is negatively skewed distribution. According to Kurtosis statistics this is heavier than normal distribution.

Work Pressure

Questions	N	Range	Min	Mix	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
9.1	13	2	2	4	3.769	0.166	0.599	0.359	-2.682	0.616	6.964	1.191
9.2	13	3	2	5	3.846	0.222	0.801	0.641	-0.845	0.616	1.506	1.191
9.3	13	3	2	5	3.846	0.191	0.689	0.474	-1.605	0.616	4.594	1.191
9.4	13	1	3	4	3.846	0.104	0.376	0.141	-2.179	0.616	3.223	1.191
9.5	13	3	2	5	3.769	0.231	0.832	0.692	-1.554	0.616	2.378	1.191
9.6	13	2	2	4	3.308	0.263	0.947	0.897	-0.732	0.616	-1.609	1.191
9.7	13	1	4	5	4.077	0.077	0.277	0.077	3.606	0.616	13.000	1.191
Total	**13**	**2**	**2**	**5**	**3.780**	**0.179**	**0.646**	**0.469**	**-0.856**	**0.616**	**4.294**	**1.191**

According to mean value most of people answered 3 and 4Most of them have agreed with this questions. According to Skewness of this is negatively skewed distribution. According to Kurtosis statistics this is heavier than normal distribution

Competence

Questions	N	Range	Min	Mix	Mean	Std. Deviation	Variance	Skewness	Kurtosis

	Sta t	Stat	Stat	Stat	Statistic	Std. Error	Statistic	Statisti c	Statistic	Std. Error	Statistic	Std. Error
10.1	13	3	2	5	3.769	0.201	0.725	0.526	-1.156	0.616	2.469	1.191
10.2	13	1	3	4	3.846	0.104	0.376	0.141	-2.179	0.616	3.223	1.191
10.3	13	2	2	4	3.769	0.166	0.599	0.359	-2.682	0.616	6.964	1.191
10.4	13	2	3	5	4.000	0.113	0.408	0.167	0.000	0.616	6.000	1.191
10.5	13	2	3	5	4.154	0.154	0.555	0.308	0.143	0.616	0.901	1.191
10.6	13	1	3	4	3.923	0.077	0.277	0.077	-3.606	0.616	13.000	1.191
10.7	13	0	4	4	4.000	0.000	0.000	0.000		.	.	.
Total	**13**	**2**	**3**	**4**	**3.923**	**0.116**	**0.420**	**0.225**	**-1.580**	**0.616**	**5.426**	**1.191**

According to mean value most of people answered 3 and 4Most of them have agreed with this questions. According to Skewness of this is negatively skewed distribution. According to Kurtosis statistics this is heavier than normal distribution

Safety Practices Data Analysis Summary

Management Commitment

Variable	N	Min	Max	Mean	Std.D.	Variance	Skewness		Kurtosis	
	Statist ic	Statis tic	Statis tic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
v1	36	1	4	1.667	0.676	0.457	1.109	0.393	2.568	0.768
v2	36	1	4	2.056	0.754	0.568	0.330	0.393	-0.062	0.768
v3	36	1	5	2.083	0.906	0.821	0.804	0.393	1.410	0.768
v6	36	1	5	1.889	0.854	0.730	1.676	0.393	4.580	0.768
Total	**36**	**1**	**5**	**1.924**	**0.798**	**0.644**	**0.980**	**0.393**	**2.124**	**0.768**

According to mean value most of people answered 1 and 2. Most of them are disagreed with this questions. According to Skewness of this is positively skewed distribution. According to Kurtosis statistics this is heavier than normal distribution

Resources and Insurance Policies

Variable	N	Min	Max	Mean	Std.D.	Variance	Skewness		Kurtosis	
	Statist ic	Statis tic	Statis tic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
v4	36	1	4	1.861	0.762	0.580	0.654	0.393	0.347	0.768

v5	36	1	5	2.250	0.937	0.879	0.785	0.393	0.941	0.768
v7	36	1	5	2.417	0.906	0.821	0.994	0.393	0.907	0.768
v9	36	1	5	2.278	0.974	0.949	1.359	0.393	2.080	0.768
v10	36	1	5	2.806	0.980	0.961	0.028	0.393	-0.484	0.768
v12	35	1	5	2.429	0.884	0.782	0.365	0.398	0.892	0.778
v13	36	1	5	2.417	0.874	0.764	1.221	0.393	1.319	0.768
Total	**36**	**1**	**5**	**2.351**	**0.903**	**0.819**	**0.772**	**0.393**	**0.857**	**0.769**

According to mean value most of people answered 2. Most of them are disagreed with this questions. According to Skewness of this is positively skewed distribution. According to Kurtosis statistics this is heavier than normal distribution

Safety Documentation

Variable	N	Min	Max	Mean	Std.D.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
v8	36	1	5	1.972	0.941	0.885	1.366	0.393	2.400	0.768
v14	36	1	5	2.556	1.157	1.340	0.618	0.393	-0.226	0.768
v15	36	1	5	2.583	0.967	0.936	0.152	0.393	-0.046	0.768
v16	36	1	5	1.778	0.989	0.978	1.415	0.393	2.045	0.768
v17	36	1	5	2.250	0.841	0.707	1.011	0.393	2.267	0.768
v18	36	1	5	2.444	0.939	0.883	0.498	0.393	0.370	0.768
v19	36	1	5	2.639	0.990	0.980	0.058	0.393	-0.231	0.768
Total	**36**	**1**	**5**	**2.317**	**0.975**	**0.958**	**0.731**	**0.393**	**0.940**	**0.768**

According to mean value most of people answered 2. Most of them are disagreed with this questions. According to Skewness of this is positively skewed distribution. According to Kurtosis statistics this is normal distribution

Controlling the Workers Safety Behavior

Variable	N	Min	Max	Mean	Std.D.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
v11	36	1	5	2.194	0.980	0.961	0.935	0.393	0.862	0.768
v20	36	1	5	3.528	1.207	1.456	-0.637	0.393	-0.347	0.768

v21	36	1	4	1.861	0.762	0.580	1.065	0.393	1.892	0.768
v22	36	1	4	1.778	0.797	0.635	0.790	0.393	0.180	0.768
v23	36	1	3	2.083	0.692	0.479	-0.110	0.393	-0.802	0.768
v24	36	1	5	2.083	0.874	0.764	0.919	0.393	2.016	0.768
v25	36	1	4	2.028	0.810	0.656	0.631	0.393	0.320	0.768
v26	36	1	5	2.083	0.996	0.993	0.743	0.393	0.491	0.768
Total	**36**	**1**	**4**	**2.205**	**0.890**	**0.816**	**0.542**	**0.393**	**0.577**	**0.768**

According to mean value most of people answered 2. Most of them are disagreed with this questions. According to Skewness of this is positively skewed distribution. According to Kurtosis statistics this is normal distribution

Safety Education and Awareness

Variable	N	Min	Max	Mean	Std.D.	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
v27	36	1	4	2.361	0.683	0.466	0.537	0.393	0.395	0.768
v28	35	1	4	3.029	0.985	0.970	-0.648	0.398	-0.631	0.778
v29	35	1	4	2.314	1.078	1.163	0.215	0.398	-1.199	0.778
v30	36	1	5	3.194	1.142	1.304	-0.038	0.393	-0.840	0.768
v31	36	1	4	2.222	0.681	0.463	0.843	0.393	1.350	0.768
Total	**36**	**1**	**4**	**2.624**	**0.914**	**0.873**	**0.182**	**0.395**	**-0.185**	**0.772**

According to mean value most of people answered 2 and 3. Most of them give neutral answer for this questions. According to Skewness of this is positively skewed distribution. According to Kurtosis statistics this is lower than distribution