2012

A socio-cultural analysis of building and improving safety culture : case study of the maritime industry in Sri Lanka

Prasad Manjula H. Hettiarachchie Don
World Maritime University.

WORLD MARITIME UNIVERSITY

Malmö, Sweden

A SOCIO-CULTURAL ANALYSIS OF BUILDING AND IMPROVING SAFETY CULTURE: CASE STUDY OF THE MARITIME INDUSTRY IN SRI LANKA

By

PRASAD MANJULA HETTIARACHCHIE

Sri Lanka

A dissertation submitted to the World Maritime University in partial fulfillment of the requirements for the award of the degree of

MASTER OF SCIENCE
In
MARITIME AFFAIRS

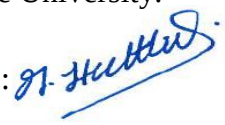
(MARITIME SAFETY AND ENVIRONMENTAL ADMINISTRATION)

2012

DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

(Signature) : 

(Date) : 22/10/2012

Supervised by:

Dr. Birgit Nolte-Schuster

World Maritime University

Assessor:

Professor Raphael Baumler

World Maritime University,

Malmö, Sweden.

Co-assessor:

Dr. Michael EkowManuel,

Regional Maritime University,

Accra, Ghana.

AKNOWLEDGEMENTS

I would like to express my sincere appreciation to my wife Lakmali, my two sons and myparent for their continued encouragement and blessings.

I would like to extend my heartfelt gratitude to the Ocean Policy Research Foundation (OPRF) andNIPPON Foundation and especially its chairman Dr.YoheiSasakawa for providing this priceless opportunity to study at World Maritime University,which has been the foundation for this research.

The immense support and guidance given by the Colombo Dockyard management and especially MD/CEO, Mr.MangalaYapais highlyappreciated.

It is with the deepest sense of gratitude that I express my sincere thanks to all professors and staff members, especially my supervisor and library staff of World Maritime University for their untiring support during my research. Last but not least, the management and staff of SLPA and SAGTare also highly appreciated for their understanding and support during my field work.

ABSTRACT

Title of Dissertation : A socio-cultural analysis of building and improving safety culture: case study of the maritime industry in Sri Lanka

Degree : Master of Science

The aim of this study is to determine the influential power of some cultural and social factors which could uplift the Safety Culture in the Sri Lankan maritime industry and to examine the underlying factors which contributed to the evolution of Safety in the maritime sector. This research has been done using amixed method approach and the researcher used a questionnaire to collect data from 101 employees attached to three key organizations inthe Sri Lankan maritime industry. Out of the six areas of the questionnaire, the first one focused on identifying the evolution of safety in this industry and the remaining five were focused on five key parameters which were widely used by previous researchers to measure safety culture. The analysis of the responses confirmed that safety in maritime industry in Sri Lanka has been significantly improved in the last two decades. However,it has shown some areas where the administrators have to focus in order to further the development of safety in the industry. Top management commitment to safety is one key area which has achieved a higher level of satisfaction. However this commitment has not been able to capture the same attention in middle level managers and their subordinates. Apart from that, risk communication, employee empowerment, and risk perceptions of employees are some of the areas which are not on par with the required level. It is also noted that trade union support to make the working environment safe is relatively poor and employees' risk acceptance level is high. It is also noted that the peer-pressure against unsafe acts and legal framework against industrial safety are also not at a satisfactory level. This paper presents real world data collected from employees who are currently engaged in the maritime industry. The quantitative data were statistically analyzed and qualitative data were analyzed using Grounded Theory approach.

Key words: Socio culture, safety culture, maritime industry in Sri Lanka

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ACSNI	Advisory Committee on the Safety of Nuclear Installations
CDPLC	Colombo Dockyard Plc
ILO	International Labour Organization
IMO	International Maritime Organization
MLC	Maritime Labour Convention
OHSAS	Occupational Health and Safety Assessment Series
PPE	Personal Protective Equipment
SAGT	South Asia Gateway Terminals (Pvt) Ltd
SLPA	Sri Lanka Ports Authority
SMS	Safety Management System

1. INTRODUCTION

The aim of this paper is to understand the evolution of safety culture in Sri Lankan maritime organizations and the underlying socio-cultural factors which could help to build and improve safety culture in these organizations. In this first chapter, we are going to discuss the back ground to this study and its significance.

Many organizations invest considerable amounts of money to improve their safety performance. But it is quite questionable whether they are getting the expected return on that investment. Similar kinds of accidents due to similar errors or mistakes are very common. From topmost administrators to grassroots-level employees, everyone is talking about safety but still most Sri Lankan organizations have not been able to reach the position that they are really looking to achieve. According toWinbow (2003, p.2):

> It is relatively unusual for new types of accidents to occur on board and many of those that continue to occur are due to unsafe acts by seafarers. These errors, or more often violations of good practice or established rules, can readily be avoided. Those who make them are often well aware of the errors of their ways. They may have taken short-cuts they should not have taken. Most will

have received training aimed at preventing them but, through a culture that is tolerant to the 'calculated risk', they still occur.

This is very much applicable to the Sri Lankan maritime organizations as well. So, the aim of this study is to understand what socio-cultural factors are driving this situation and also how to improve the safety culture to improve the situation.

1.1 Background of the study

Sri Lanka is an island situated in close proximity to major shipping routes connecting South Asia, the Far East and the Pacific with Europe and the Americas. It is also strategically very important because it is next to the fast growing economies of the Indian sub-continent and close to Southeast Asia. With a view to optimizing this geographical advantage for the country, the Sri Lankan government has launched multidimensional development programs to fortify the maritime industry in Sri Lanka.Accordingly, there are 6 major ports around the island to be developed, out of which Colombo South Harbour Project, HambantotaPort development project, Oluvil port development project and Galle tourist port development projects are key concerns and already under construction (Government of Sri Lanka, 2010, pp.100).

With these projects, the port capacities as well as the involvements of the maritime related activities expect a rapid increase. In addition to that, proposals fora new shipbuilding facility and another ship breaking yard are under consideration. Furthermore, offshore oil drilling started in 2011, intensifying the maritime involvements of the nation to a great extent. Due to all these reasons, engagement of people in maritime related activities is expected to increase rapidly in the next few years.

Many researchers and scholars believe that 80% of accidents are due to human factors. According to Shappell&Wiegmann (2004) "almost everyone agrees that somewhere between 70-80% of aviation accidents are attributed, at least in part, to human error". It is interesting to see the trend in the maritime industry because human-error contribution to maritime accidents is also 80% (Perrow, 1984, pp.224). In a very recent report on Deepwater Horizon, the author suggests that approximately 80% of the failures are rooted in Extrinsic Uncertainties (human and organizational performance, knowledge acquisition and utilization) and only 20% of the failures are rooted in Intrinsic Uncertainties (Bea, 2010, pp.1). During this study it is found that the human factor contribution of local maritime industries is also similar because accident analysis reports of Colombo Dockyard Plc clearly show that the percentage contribution of human element to organizational accidents is around 80% for years 2006 to 2008 (Accident analysis, 2009, pp.4). Therefore, it is fairly understandable that in order to uplift the safety performance, greater attention has to be given to the human factor.

The change of perception of risk in current society is another crucial factor which intensifies the importance of this study. The German Sociologist Ulrich Beck called this new emerging society a "risk society" and he explained how 'industrial society' has transformed into a 'risk society', highlighting the key features of these two societies with regards to risk and wealth production. According to Beck (1992, pp.154), the primary relationship between risk and wealth is now reversed and,

> The concept of the industrial society supposes the dominance of the 'logic of wealth' and asserts the compatibility of risk distribution with it, while the concept of risk society asserts the incompatibility of distributions of wealth and risk, and competition of their logic'.

The wealth production of the industrial society is overshadowed by risk production and society no longer sees risk as a "latent side effect" affecting limited localities or groups (Lidskog, 1993, pp.401). Beck further explained that risk created in one part of the world can make an impact on another part. He used the example how countries like Norway and Sweden get affected from deforesting of other nations, even though the above two countries are behave in an environmental friendly manner. He also pointed out sooner or later the risks of modernization will affect the people who make profits out of it and he termed it as "boomerang effect".

According to Beck(1992, pp.20), "the knowledge is spreading that the sources of wealth are 'polluted' by growing 'hazardous side effects'. This is not at all new, but it has remained unnoticed for a long time in the effort to overcome poverty". However with the development of society this paradigm has shifted as the risks in today's industries are more serious and widespread than ever before. Beck (1992) points out that severe disaster like atomic fallout may ignore the borders of the nations, how rich and powerful the people in the society may be. This understanding of society makes them more critical about risks around them, especially industries like maritime is obviously affected, as it is well known as a high risk industry.

Freedom of press and power of mass media is another crucial factor that Beck (1992) has highlighted and its link to the politics as well. Media has the ability to create different perceptions on receivers mind, may be amplification or attenuation of risk. This is very much applicable to today's Sri Lankan context. Sri Lanka suffered from a civil war for nearly three decades and during the war-period the main focus of the media was war-related incidents. As soon as the war was over, the media was always looking for some exciting news like accidents that had been able to capture the attention of the readers as well. As a result, Sri Lankan society is becoming aware of the industrial risks

and accidents than ever before and we can see a mounting of social pressure against industrial risks.

1.2 Accident statistics in Sri Lanka

In Sri Lanka, the trend of fatalities due to industrial accidents is in upward motion. As shown in Figure 1, it has significantly increased in the last five years.

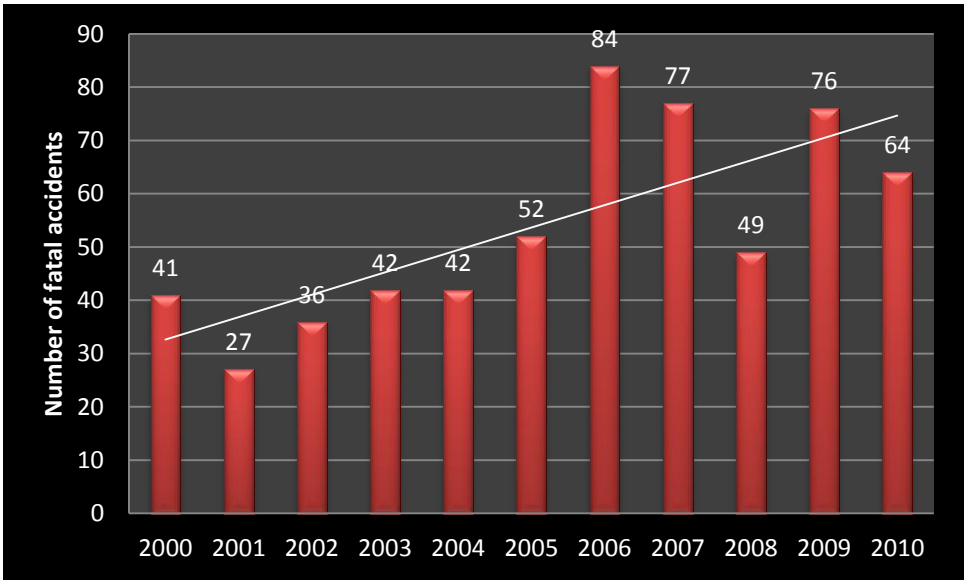


Figure 1: Fatalities due to industrial accidents (2000-2010)

Source: Department of Labour, Factory Inspecting Division, Sri Lanka

However, Table 1 shows the fatality rate in Sri Lanka is much lower than most of the other countries which are maintaining higher safety standards.Therefore, it is quite clear that accident reporting in Sri Lanka is not up to the standard. Hence, the actual fatalities should be higher than the values shown in Figure 1. On the other hand, these accident statistics are not easily accessible to the general public. It is noted that the prevailing accident statistics were not deeply analyzed and disseminated to the public by

any organization on a regular basis. This is a disadvantage to the interested parties to identify the trends in industrial accidents and educate people accordingly.

Table 1: Rates of fatal injuries for 1000,000 employees

Country	Rates of fatal injuries
SRI LANKA	0.08
Sweden	1.50
Canada	2.70
Australia	2.10
Germany	2.04
Norway	2.00

Source: International Labour Organization (LABORSTA)

According to the discussionso far, it is clear that Sri Lanka has been rapidly increasing its maritime related activities. On the other, hand it is noted that there is an increasing trend of fatalities due to industrial accidents and reporting mechanism of these accidents are not in a satisfactory level. It is also highlighted that human factor involvement for accidents is as high as 80% and the importance of establishing right culture to minimize such human factor contribution for accidents is also discussed. We also highlight that the risk perception of the society is also changing and it demands a safer working culture which should not be overshadowed by production pressure.

In suchan environment, this study attempts to understand the evolution of safety culture in Sri Lankan maritime organizations and its underlying social and cultural factors which could help to uplift the safety performance. The outcome of this study may contribute to further studies in this discipline and establish a strong safety culture in Sri Lankan organizations which could really benefit all stakeholders because it may save human lives and prevent occupational hazards to employees, which is the most crucial production factor.

1.3 Research questions and objectives of the study

Having the above issues in mind, the researcher would like to put forward the following as the three research questions of this study.

I. What are the driving forces behind the evolution of a safety culture in the maritime industry in Sri Lanka?

II. What are the underlying cultural and social factors influencing employees to violate safety procedures, instructions, rules and regulations?

III. What are the barriers to creating a positive safety culture with a view to achievinga safe work place with higher productivity

Objectives of the study:

The objective of this study is three fold viz:

I. to examine the underlying factors which contribute to improving safety culture in the maritime industry in Sri Lanka;

II. to determine the relative influential power of some social and cultural factors which could uplift the safety culture in the Sri Lankan maritime industry;

III. to understand the barriers and lapses to creating a positive safety culture within maritime organizations in Sri Lanka;

2. LITERATURE REVIEW AND FOUNDATION OF TOPIC

So far we have discussed the background of this study as well as the objectives. The aim of this second chapter is to have an overview of existing literature which could help to achieve above stated objectives.

Immediately following most accidents, we often tend to claim that the root cause of that incident is a human error or a technical failure. Of course, the proximate cause for the failure might be one of the above two factors. But having deeper insight into the facts, it may not be difficult to understand that the real cause of the accident was not merely a straight-forward human error, but instead a failure of the entire system itself. As pointed out, the circumstances surrounding major accidents such as the Texas oil refinery accident, the loss of the shuttles Challenger and Columbia, and various civilengineering, transport and nuclear incidents have revealed issues beyond the immediate causes (The institute of engineering and technology, 2010, pp.2). Situations in the maritime industry are also quite similar. For example, in accidents like Exxon Valdez, Piper Alpha, Herald of Free Enterprise and most recently the Costa Concordia accident demanded deeper insight to find the real causes of the accident than just looking at the immediate cause. This is the motive behind the statement “safer shipping requires a safety culture” by IMO in 2002 onWorld Maritime Day (IMO, 2002).Let us try to understand this term “safety culture”, its relationship to accidents and how best we can measure it.

According to Anderson &Denkl (2010, pp.1),“The accident triangle, developed by H.W. Heinrich in the 1930s, is a fundamental cornerstone of safety philosophy which postulates that there is a numerical relationship between unsafe acts, minor injuries, and major (fatal) injuries”. In his book with the title of Industrial Accident Prevention, A Scientific Approach (1931), he pointed out that, behind every major injury there are 29 accidents causing minor injuries and 300 accidents that cause no injuries (Heinrich, 1931).Therefore it is implied that major accidents are not just isolated incidents and that, they are the final consequence of a series of minor incidents which have not been able to capture the due concern of the society or the organizational administration.

It is well known that the costs of accidents are very high. It is like an iceberg, where the hidden cost is quite higher than that of the perceived or direct cost of an accident. “The accidents can hurt our business the same way what the iceberg can hurt an ocean going liner. They both poke holes in our program and potentially caused both the ocean liner and business to take on water” (Florczak, 2002, pp.13). On the other hand, the costs of accidents are not limited a particular organization. According to Kjellén (2000, pp.61), the costs of accidents are shared among the individual, the company responsible for the accident, the insurer and the public sector”. With the globalized nature of the economy, the shock waves of accidents can travel a longer distance than ever before. Although everyone knows these facts, still accidents are taking place around us claiming lots of human lives every day. Therefore, it is quite important to understand why these accidents are taking place all around the world, maritime industry in particular, despite the presence of highest socio-technical systems and under very stringent legal framework. The next two paragraph continue this dialog with special reference to the theoretical framework proposed by James Reason (1990), widely known as the Swiss Cheese Model.

According to Reason (1993), there are three overlapping ages of safety concerns. The first one is the Tactical age where people are more focused on operational and engineering methods to combat hazards. The Human Error Age is the second one which startedin 1930 where it became evident that human errors can circumvent even most advanced technical systems. According to Reason (1993) this age continued untilthe 1980's and since then a new age has emerged called the "Socio-technical Age". This age is the product of a series of tragedies, including but not limited tothe Bhopal, Chernobyl and Piper Alpha accidents and lastly we can add the Deep Water Horizon. So, these incidents emphasize that accidents do not exclusively belongto either the human or technical domain but to the interaction betweenthe technical and social aspects of systems.

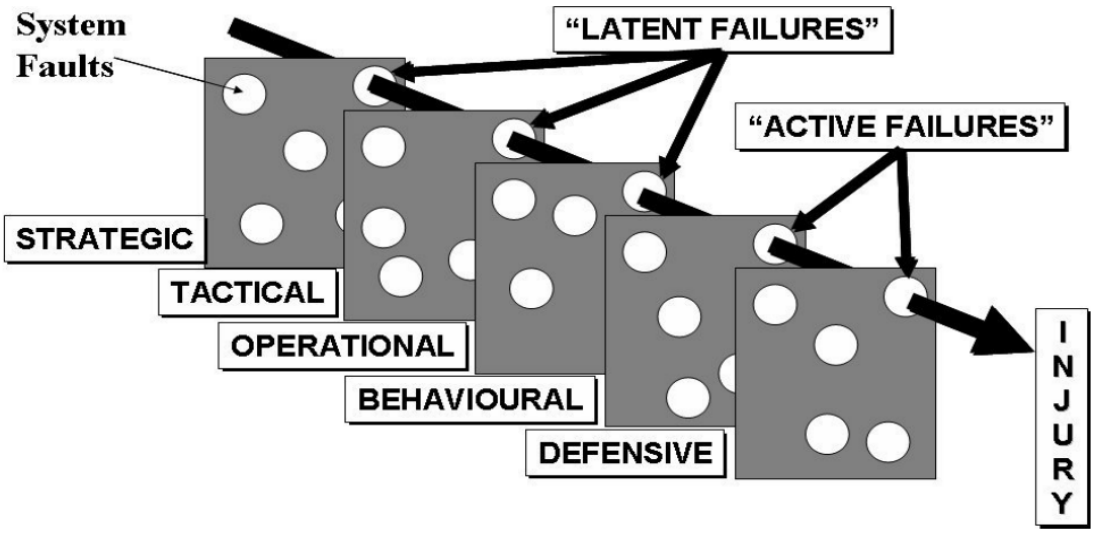


Figure 2: Swiss cheese model, Reason (1990)

Source: Reason, J. (1990). Human error

The Swiss Cheese Model of Reason (1990) provides clear insight into the above discussed situation. According to the model, injuries or incidents do not occur just

because of the failure of one person or consistent with Reason's terminology "the last level of defence". Every system has latent failures (or pathogens). Those pathogens can reside in the system for a long time without been noticed to any one and without leading to any accident. Due to the imperfections in individual safeguards ordefences, these pathogens can sneak through one level of defence but may be contained by the next level. In a situation where these pathogens managed to sneaks through all defences, it will trigger the active failure.

According toCooper (2012, pp.1)"Both latent and active failures are introduced by organizational or managerial factors (e.g.top-level decision-making), but individuals (e.g. psychological or behavioral precursors) trigger the active failure". Therefore it is understandable that accidents are not just due toa single failure of defence or human errorof one operator, rather it is an end result of a series of failures in entire system, starting from top most administrators to shop-floor workers. Therefore accidents speak about how individuals in the organization perceived risk and how best they attend to mitigate those risks. Due to the fact that safety professionals are well aware about this situation, in the recent past, most accident investigation reports make use of the term "safety culture" to explain broader spectrum requirements to establish safety in organizations, including training, knowledge, safety organization and so on. Having this background in mind, let us try to understand what is "safety culture" and how can it be measured?

The term Safety Culture was introduced by the International Atomic Energy Agency (IAEA) as a result of their first analysis into the nuclear reactor accident at Chernobyl (Lee, T. 1998, pp.217). Since then, this term and concept has become more popular in society as many accident review reports after Chernobyl used this term to discuss a broader range of shortcomings in the organizational climate which could have led to the final failure. However,there is still no universally accepted single definition of

the term Safety Culture. According to the HSC(1993), the definition given by the Advisory Committee on the Safety of Nuclear Reactors (ACSNI) is the most accepted definition for safety culture and it says that:

> Safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management.
>
> Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures.

As is indicated in the definition, safety culture necessarily should have a shared perception of importance throughout the organization. This has been clearly explained by Cooper (2002a) in his Business Process Model of Safety Culture (Figure 3).

According to this model, the inputs (different attributes such as safety values…etc) to any system are processed by a combination of the company's goals and management practices and transformed into safety culture, the product or output. By proposing this model Cooper (2002a) emphasizes that it is clear for organizations how they should have best managed their inputs to the system in view of achieving the desired outcome or level of Safety Culture (Cooper, 2002a, pp.4/5). The most important implication of Cooper's studies to this research is, according to Cooper (2000, cited in Cooper 2002a, pp.3) "Cooper (2000) tentatively conceptualised the product as: that

observable degree of effort which all organizational members direct their attention and action towards improving safety on a daily basis".

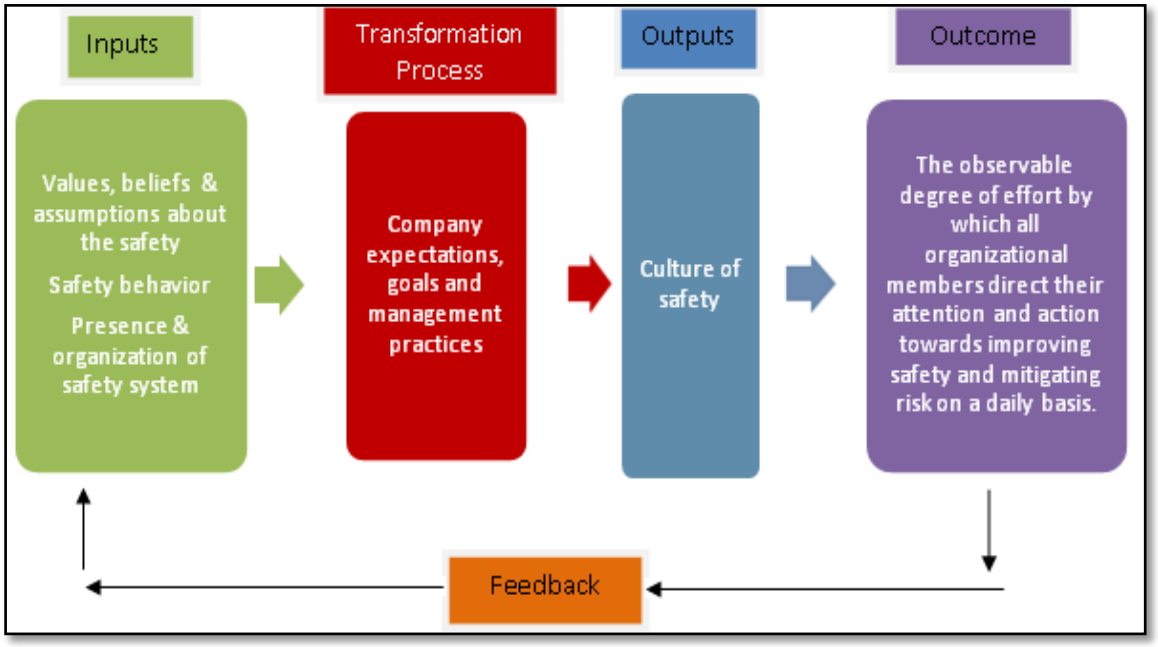


Figure 3: Business Process Model of Safety Culture (Cooper, 2002a)

Source: Cooper, D. (2002a, pp.4). *Surfacing your safety culture*

With reference to this model, safety culture can be assessed by measuring "observable degree of effort" of employees in that organization. Now the question is how to measure this "observable degree of effort" or in other words behaviors of employees and what influence these behaviors.

According to Bandura's (1986) model of reciprocal determinism, derived from the social cognitive theory, an individual's behavior both influences and is influenced by personal factors as well as the social environment (as shown in Figure.4). Therefore social environment and personal factors (like skills, attitudes, cultural values and beliefs) play an important role in determining one's behavior.

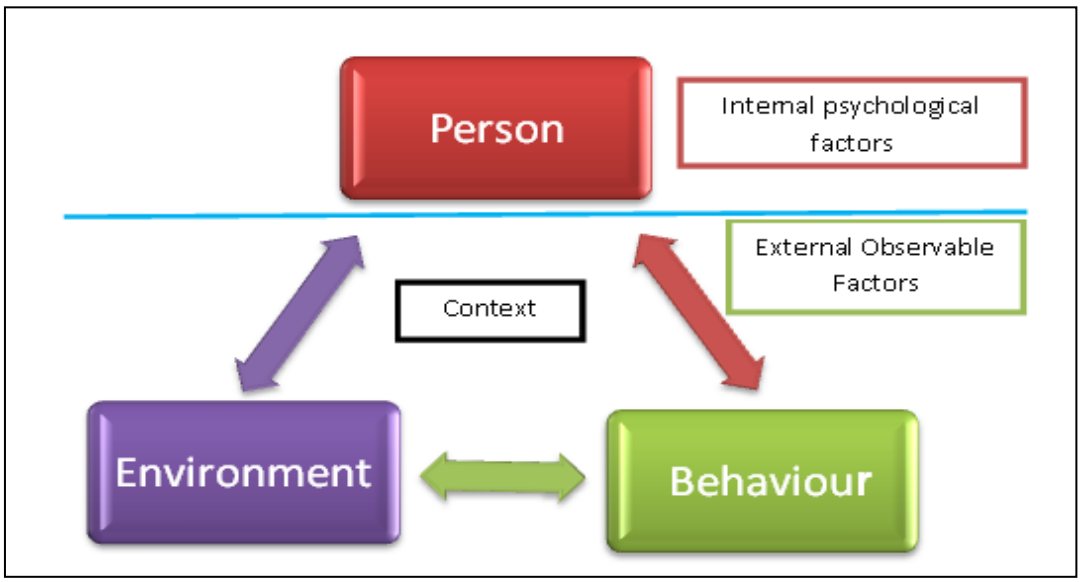


Figure 4: Bandura's (1986) Model of Reciprocal Determinism

Source: Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory.

The above Bandura's (1986) model (Fig: 4) was later used by Cooper (1993) to develop a concept for measuring and quantifying safety culture in organizations in his study of "Reciprocal Model for Measuring Safety Culture". He termed it as Reciprocal Safety Culture Model (Fig: 5) and he redefined "Person" in Bandura's model as Safety-climate (perceptual audit) and "behaviors" as Safety behavior (Behavioral safety). He replaced the word "environment" from the Bandura's model with "Organization" and considered how the safety system is organized (Cooper, 2002a, pp.6 and Cooper, 2002b, pp.32/33).

According to the discussion we had so far, we can conclude that, safety culture is measurable through the behaviors of people and these behaviors are influenced by the organizational environmental and personal factors. Therefore to estimate safety culture more accurately, one has to measure both organizational environment as well as the personal factors. Let us have a look at on previous research works, which attempted to

measure safety culture in their respective studies, in order to develop a more accurate one for this study.

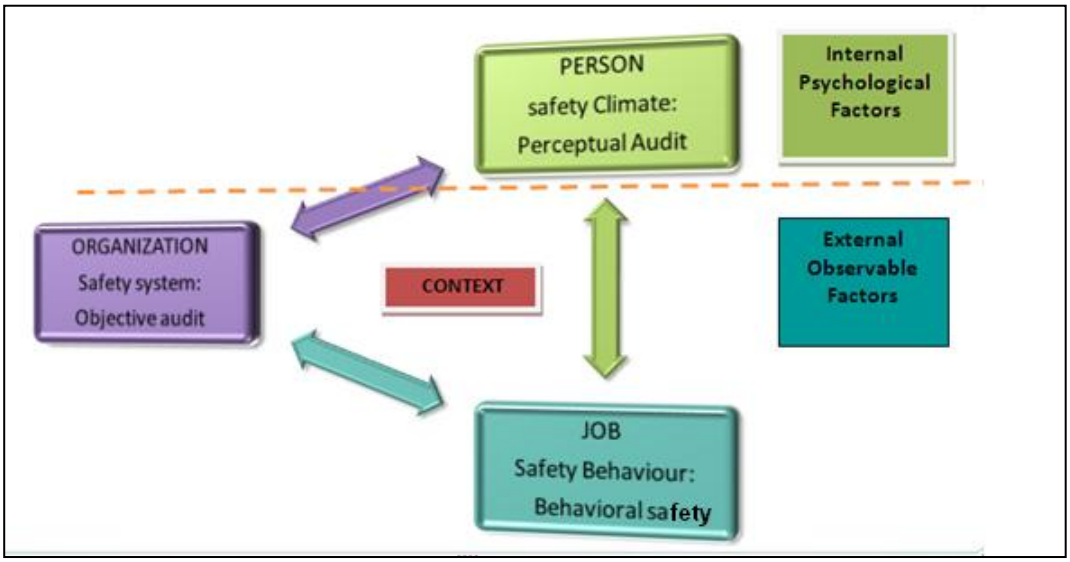


Figure 5: Cooper's (1993) Reciprocal Safety Culture Model

Source: Cooper, M.D. (1993). Reciprocal Model for Measuring Safety Culture

Just as their definitions of the term safety culture differed, different researchers and scholars used different combination of factors to measure safety culture. According to (Cox &Flin, 1998) currently, there are no standardized or "off the shelf" tools that can be used across domains or even within a single domain to measure safety culture. "However, a variety of methods or tools have been proposed" (Wiegmann et al., 2007, pp.8).Now we are going discuss some of the parameters used by different researchers in the past for their safety culture studies in view of enlighten our research work.

Pidgeon and O'Leary (1994, cited in Pidgeon and O'Leary, 2000) argued that, "good" safety culture may reflect and promote four factors namely: senior management commitment to safety, realistic and flexible customs and practices, continuous

organizational learning and care and concern for hazards which is shared across the workforce.

According toCox and Cox (1991, cited in Cheyne et al., 1998) employee attitudes are one of the most important measures of safety climate and culture because they are often influenced by other features of the working environment.

In a very recent study on Safety Culture Evaluation in the Metal Products Industry of Iran, a research group used five variables to measure safety culture, namely, organizational commitment, management involvement, employee empowerment, reporting system (which can prevent many occupational accidents) and finally the reward system which reflects how safe behaviors are appreciated(Ooshaksaraie et al, 2009a, pp.162/163). The researchers, who carried out their research to determine the impact of a company's age on safety culture in the metal products industry, in 2009, used the same set of indicators to determine the level of safety culture in their target organizations (Ooshaksaraie et al, 2009b, pp.737).

In a review of safety culture theory, Wiegmann and his fellow researchers proposed four indicators to measure safety culture. The first indicator is *Organizational commitment*. This is the level of top management's commitment to safety in strategic level decision-making and allocation resources to ensure safety. It consists of three components:

(i) Safety values—Attitudes and values expressed in both words and actions by upper management regarding safety

(ii) Safety fundamentals—Compliance with regulated aspects of safety, such as training requirements, manuals and procedures, and equipment maintenance

(iii) Going beyond compliance—Priority given to safety in the allocation of company resources (e.g., equipment, personnel time) even though they may not be required by regulations.

The second indicator is *Operational personnel*, which refers to the people who are directly engaged insupervising employees' behavior and how they have reinforced the safety values created by the top management. The third indicator is the *Formal safety system* which denotes how the reporting mechanism of the organization on occupational and process safety hazards is functioning and how the reported issues are addressed. This includes the status of the formal safety system and status of the personnel in the safety system such as the Safety Officer. The last indicator is the *Informal safety system* which considers unwritten rules of the organization and how the organization responds to safe and unsafe actions of individuals by means of rewards and punishments (Wiegmann et al, 2007, pp.6/7).

In the study of "Exploratory Study of Obstacles in Safety Culture Development in the Construction Industry",Kulchartchai and Hadikusumo (2010) considered seven factors which restrict the implementation of a strong safety culture in the construction industry. The first two factors

i. Problems related to unique characteristics of the construction industry

ii. Problems related to diversity of safety cultures (Due to decentralization and mobility in the construction industry) are not closely related to the maritime industry which is the main focus for this study, but the next five factors are common to the Sri Lankan maritime industry as well. Therefore, indeveloping the survey questionnaire those five factors were considered. They are:

iii. Problems related to the use of subcontractors. Similar to the construction industry, in Sri Lankan maritime organizations there are a significant number of subcontractors working due to the fluctuation of the work load
iv. Problems related to supervisors and workers. They are the people who are really involved in the production process.
v. Problems related to communication. Communication plays a vital role in safety culture because communication gaps often lead to accidents
vi. Problems related to reporting. A strong reporting culture is a must to create a safe working environment. Instead of accepting minor incidents as "just part of day's work" incidents have to be promptly reported.
vii. Problems related to a blame culture. Blame culture affects most of the other factors of the safety culture. Due to the existence of blame culture, people tend not to report what they observe as hazardous (Kulchartchai et al, 2010, pp.47/49). Evidence of the existence of blame culture in Sri Lankan maritime organizations will be discussed later.

According to the study of Helmreich and Merritt (1998), culture forms a complex framework of national, organizational and professional attitudes and values within which group and individual function. The focus groups of this study are professionals in aviation and medicine. In these two environments, they have shown the effects of professional, national and organizational cultures on individual attitudes, values and team interactions.

In a separate study on Safety Culture in a Norwegian shipping company, Håvold (2003) used a different scale with thefollowing factors: Management and employee commitment to safety, safety norms and compliance to rules and occupational risk behavior, workload and work pressure/stress, fatalism, knowledge/competence, espoused safety values, degree of conflict between safety and work/priori ties, reporting

culture, work appreciation, officers awareness of risk, learning culture/learning from accidents/organizational learning, safety communication, actions based on accidents, perception of safety instructions, work itself, and safety behavior (Håvold, 2003, pp.445/447).

The important observation of theabove research which is related to this study is thatthestudy confirms that different nationalities have different perceptions towards safety and quality themes. He further pointed out that in situations where national and organizational culture are in harmony there are no stress factors that can influence safety, but in situations where the values in the national and the organizational culture are in conflict, this might lead to stress and influence safety (Håvold, 2003, pp.452/453).In this study, the researcher deals only with Sri Lankan nationals. However, thechallenge for the study is selecting the most appropriate methodology and parameters to measure the safety culture because no similar study has been done of the Sri Lankan maritime organization to date. Hence the researcher has to find the most appropriate safety culture dimensionsfor this study instead of using the scales which had been previously used for different national and cultural contexts. Having this challenge in mind, let us have a look on to previous studies to understand some key features of Sri Lankan society.

2.1 Socio-cultural aspects in Sri Lankan society

Under this topic, the researcher intends to highlight some unique features of Sri Lankan society, which is very important in to understand and consider as we highlighted in previous paragraph.

There iscopious evidence to prove the great technology of ancient Sri Lankan society. The civil engineering discipline, andirrigation systems, in particular, were in a well-advancedstate. The stone working technology of the early cultures – the Balangodacultures, as they are called – appears to continue into proto-historic time. (Silva, 1981, pp.6).People belonging to different castes were restricted to a particular area of work and hence they specialized in their fields and become competent (Nanayakkara, 1998). It is also found that Sri Lankan society had well developed administrative and management systems in which most of the management concepts were similar to the well-recognized modern western management concepts (Mathupala, 1982, pp.60). However, due to the colonization of the island most of the traditional arts and technologies were gradually diminished. This is mainly due to the colonization of the country which led to a weakening of the caste concept of traditional society and, hence, the new generation did not continue their traditional work (cf. Nanayakkara, 1998).

During the colonization,the Sri Lankan private sector was restricted to export primary products (tea, rubber, coconut) and manufacturing was not quite attractive for investors (Nanayakkara, 1988, pp.10). Therefore, the traditional manufacturing processes and social system entirely changed due to this foreign intervention.However,recent studies found that the western concepts were not perfectly matched with the local social system.Nanayakkara (1988) examined the six most important socio-cultural institutions in Sri Lankan society, namely family, caste, class, ethnicity, education and religion (Buddhism), to understand the possible relationship of cultural institutions to individual personality and behavior which are relevant to the management of the organization.

Proposing his culture-behavior matrix based on this study (Table 2), he says “except for the ethnicity factor which is considered in a context of conflictual

perceptions, all other cultural institutions contribute positively to the formation of a behavioral syndrome, which is incompatible with the expectations of western management theory and practice" (Nanayakkara, 1988, pp.72).

Behavior	Family	Caste	Ethnicity	Class	Education	Buddhism
Dependence	X	X	-	X	X	X
Lack of self confidence	X	X	-	X	X	X
Accepting the status quo	X	X	-	X	X	X
Work as means	X	X	-	X	X	X
Respect for authority	X	X	-	X	X	X
Lack of system and perfection	X	X	0	X	X	X
Attitude toward opposite sex	X	0	0	0	-	X

X = positive effect on the syndrome, - = negative effect on the syndrome, 0 = no relationship can be seen

Table 2: A culture-behavior matrix for Sri Lanka

Source: Culture and management in Sri Lanka (Nanayakkara, 1998)

In his study Nanayakkara (1988) pointed out three very important factors in the society, which are influenced by family structure; they are dependence, lack of self-confidence and respect for authority. According to him:

> **Dependence:** The decision making system in the family is hierarchical, in which major decisions are made by the father or the mother or by both. As the desire to be independent is curtailed since childhood, the individuals develop a tendency to look for approval from the hierarchy

Lack of self-confidence: The impact of collectivity and hierarchy on the individual is such that he hardly gets an opportunity to assess his strength and weaknesses realistically.

Respect to authority: The family hierarchy demands obedience and respect for authority. The child learns this almost every day as, for example, when parents, particularly the father return home he has to get up from his seat.

(Nanayakkara, 1988, pp.40).

The researcher has given due consideration to the above findings in designing his research work. As employees tend to be dependent, lacksin self-confidence and respect authority, the researcher favored the questionnaire option rather than interviews, to give the respondents more freedom to answer the questions. The researcher also included questions to measure the impact of the above personality traits in the creation of safety culture in organizations.

Going through this chapter, we understood that safety culture is measurable through behavioral response of employees and those behaviors are influenced by, both environmental (according to Cooper's model Organizational) and personal factors. We also discussed some previous work carried out by few researchers to measure the safety culture and finally special attention has been given to the socio-cultural status of Sri Lanka society as we understood national culture plays an important role in determining safety culture in organizations. Having this theoretical background in our mind, now we are moving to develop an appropriate methodology for this study.

3. METHODOLOGY

The aim of this chapter is to discuss how this study was carried out, from the point of selection of sample to data analysis. It also provides justifications for selecting questionnaire and mixed method approach for this study.

This study was carried out based on three major maritime institutions in Sri Lanaka, namely Colombo Dockyard Plc, Sri Lanka Ports Authority (Colombo port) and South Asia Gateway Terminals (Pvt) Ltd. CDPLC is the leading ship repair, ship building, heavy engineering and offshore engineering facility in Sri Lanka, which recorded Rs.12,000 million revenue in 2011 (Annual report, 2011, pp.48). The Colombo port under SLPA, is the main port of Sri Lanka, which achieved recorded monthly container handling volume of 205,539 TEUs in February 2011. The SAGT is the terminal located in the port of Colombo and owned by a consortium of local and international establishments of repute. SAGT together with the SLPA reached 366,971 TEUs in January 2011 (LBO, 2011).

For this study the researcher has exercised a mixed methodology, which is a combination of both qualitative and quantitative approaches. This is an area whereno previous research has been done in the Sri Lankan context. Therefore, the underlying factors are not clear and hard to predict. A questionnaire has been administered to collect data.

3.1 Why is a questionnaire appropriate for this study?

As indicated, in most cases employees are reluctant to give their genuine comments in face to face interviews. Especially Sri Lankans are not outspoken by culture.They do not criticize their superiors and want to be rather polite and obedient due to the high power distance (cf. Hofstede 1980).On the other hand we have discussed under the literature review some of the unique characteristics of Sri Lankan society namely Dependence, Lack of self-confidence and respect to authority (cf. Nanayakkara, 1998). Therefore, the possibility of getting exact ideas via face to face interview is very remote. This is one of the reasons for administering a questionnaire to collect data for this study, instead of the interviewing method.

Secondly, most of the time, these organizations have many hierarchical levels (up to 7 from MD/CEO to shop-floor employee). Therefore, shop-floor level people may not be able to perceive the top management's involvement and attitudes at once. Asking questions or interviewing will make this perceptional error more significant than providing questionnaires with sufficient time to think deeply and freely before answering.

The third reason for using the questionnaire is that in most Sri Lankan organizations, a blame culture still exists. Therefore, employees are reluctant to express their real experience due to the fact that accepting or disclosing their own mistakes could affect them adversely. This is quite evident when going through the previous accident cases, where top management always tries to trace the one who was responsible for the last level of defence or the one who triggered the active failure, instead of latent failures of the system as a whole.

So far the practical issue for selecting questionnaire option for this research has been discussed.From the theoretical view point, many scholars acceptquestionnaires as a

valid tool for research work. Gillham (2008) gives a list of nine advantages of administrating a questionnaire for research work, which include some of the points mentioned above. The nine advantages are:

i. Low cost in time and money
ii. Easy to get information from a lot of people very quickly
iii. Respondents can complete the questionnaire when it suits them
iv. Analysis of answers to close questions is straightforward.
v. Less pressure for the immediate response
vi. Respondents anonymity
vii. Lack of interviewer bias
viii. Standardization of questions (but true for structured interview).
ix. Can provide suggestive data for testing an hypothesis

(Gillham, 2008, pp.6)

Time factor is another challenge for this study. The researcher had to complete this study in a relatively short period of time. In such situations, using questioner with rating scales is a good option.According Carlsmith et al (1976, pp.204):

> It is nevertheless uncommon for social psychologists to use behavioral or even behavioroid data. Instead, they rely very heavily on the rating or scale. Occasionally, it may be impossible to get anything more, but we feel that it is seldom the case. All too often, it appears that the questionnaire is chosen because it is simpler to concoct and easier to administer.

In addition, there are many previous researchers who have used questionnaires for their studies, a fewof which have been cited in this paper. Therefore, considering all the

above facts it was decided to use a questionnaire as the tool to collect data for this research work.

Being a structured questionnaire, some of the employees had difficulties as they were not competent/conversant enough to answersome of the questions in written format, especially in the safety domain,which they do not deal with in their day to day work. Therefore, the researcher maintained close contact with the respondents to make sure that they understood the questions properly and answered all questions to their best understanding. With the understanding of the lack of competency in the English language of shop-floor level employees, the researcher used questionnaires in both English and Sinhala (state language) languages to improve the accuracy of the feedback (Appendix B and C).

Under this chapter the many positives of using a questionnaire option for this study have been discussed. However there are some drawbacks to this questionnaire option as well, which have been discussed under the Limitations of the study.

3.2 Justifications for using a mixed method approach

The researcher used mixed method approach for this study. The aim of this subheading is to justify the appropriateness of selecting mixed method approach to this type of research work.

Due to the fact that this research deals with a broader scope, the researcher used a mixed methodology approach for this study. Both quantitative and qualitative methods

were considered appropriate to achieve the highest possible success of the study. This decision was influenced by some of the previous studies and literature.

Johnson and Onwuegbuzie (2004) discussed the mixed methods approach deeply. While explaining the fundamental principle of mixed research and how to apply it, they have pointed out 17 strengths of this method and 7 weaknesses. The following are some of the strengths they highlighted. Meanwhile special consideration has been given to minimize the 7 weaknesses mentioned in their article.

* Words, pictures, and narrative can be used to add meaning to numbers.

* Can provide quantitative and qualitative research strengths.

* Researcher can generate and test a grounded theory.

* Can answer a broader and more complete range of research questions because the researcher is not confined to a single method or approach.

* A researcher can use the strengths of an additional method to overcome the weaknesses in another method by using both in a research study.

* Can provide stronger evidence for a conclusion through convergence and corroboration of findings.

* Can add insights and understanding that might be missed when only a single method is used.

(Johnson et al, 2004, pp.20).

Citing the previous research work of Wreathall(1995), Wiegmann&Thaden (2007) mentioned the following statements in their research to emphasis the success of utilizing the mixed method for safety culture research:

> There is general consensus among researchers that both qualitative and quantitative methods have unique potential for assessment and theory testing. There is a benefit to combining methods to gain a comprehensive understanding of safety culture. Nonetheless, quantitative approaches, especially surveys of individuals' responses, are often more practical, in terms of time and cost-effectiveness

(Wiegmann&Thaden, 2007, pp.9).

In a different work it is stated that:

> The key in any safety culture improvement program is to develop effective measures to evaluate the current state of a particular safety culture, as well as to determine whether interventions have been effective in achieving a desired cultural change. Both quantitative and qualitative techniques can contribute to this goal
>
> (Thaden, 2008, pp.6).

Therefore, this research is strengthened by using the positives of both quantitative and qualitative methods.

3.3 Outline of the questionnaire

So far we have discussed the background to select questioner option and mixed method for this study. Let us have a look on to the outline of the questionnaire which used to collect data for this study.

The questionnaire development was done mainly based on the questionnaires which had been used by previous researchers. The main focus was given to the studies discussed under the literature review of this paper.However, some of the questions were included to capture the unique characteristics of Sri Lankan society, which we discussed under the literature review. In addition to above facts, twenty five different definitions for safety culture summarized by Wiegmann&Thaden (2002) were also considered (appendix A). Furthermore, the researcher gave special attention to capture the unique organizational and culture related implications to the safety culture of these organizations.

The questionnairewasdeveloped under 6 main topics namely;

i. Safety culture evolution
ii. Socio-cultural dimensions
iii. Top management commitment
iv. Employee empowerment
v. Risk communication
vi. Employees' attitudes and behaviors

Each topic starts with yes/no questions and then the questions move to a 5-point Likert-type response scale to capture the level of agreement of respondents to certain areas. Finally, it moves to open-ended questions with space at the end of each section for respondents to give their own views.According to Thadenand Gibbons (2008, pp.7)

“The quantitative portion of the survey gives information to gauge the extent of the organization’s commitment to safety culture and allows for statistical measures of concepts that heretofore havebeen speculative”. Mentioning about the mixed method approach,Thadenand Gibbons (2008, pp.10), emphasized that this strategy allows to measure the safety culture through quantitative feedbacks while qualitative feedback providing deeper insight to areas working well within the system or need more attention to improve. These researchers further pointed out that:

> Numbers alone do not tell a full story. Consider a neutral measure;without qualitative information to understand the basis behind variance in responses; is there broad variation in the responses leading to a neutral result, or is there low variability in theresponses and a large portion of the respondents feel uncertain? Numerical data alone may not provide adequate information of the true concerns affecting an organization and its employees
>
> (Thadenand Gibbons, 2008, pp.10)

3.4 Administering the questionnaire

Let us have a quick overview on how the questionnaire is administrated in view of collect data for this study.

The first step of data gathering was distributing the questionnaire to the respondent/or group of respondents and explaining the content. These briefing sessions took about 15 to 20 minutes and includedthe background of the researcher, background

and motive of the study and a brief explanation of each and every question in the questionnaire.

Employees atdifferent levels of the organizational hierarchy have different perceptionsof safety. The way they perceive the commitment of other parties towards safety is also different. On the other hand,the influence they can havealso varies with the organizational position. According to Thompson (1998) “different levels of management may influence health and safety in different ways, for example managers through communication and supervisors by how fairly they interact with workers”. Looking at the British Rail train drivers, their supervisors and senior managers, Clarke (1998) found that although they shared a perception of the importance of safety, inter group perceptions of safety were not realistic.For example, drivers considered that supervisors and managers would have less awareness of the importance of safety than themselves. Clarke highlights that ratings given for the same question by the three above mentioned groups are significantly different (Clarke, 1998, pp.194/195).

Taking the above findings into consideration the respondents were selected in such a way that they represent the highest (as much as practicable) number of organizational levels and different work groups. For example, senior managers to shop-floor or subcontract employees from both core production and support services are represented. The researcher closely coordinated with the respondents to make sure that they were clear enough about each question and provided feedback for all questions. Feedback was collected from 35 employees from the CDL, 33 employees from the SLPA and another 33 form the SAGT.

3.5 Presenting qualitative and quantitative data

The data analysis was done under two categories, namely qualitative and quantitative methods. The quantitatively collected data, that is questions provided with aLikert scale

and Yes/No answers were summarized and calculated for their mean values. The summary of the questions with Yes/No answers were presented as percentages.

The researcher used the Grounded Theory (GT) approach to analyze the qualitative data of this study, which was developed by Glaser and Strauss to describe a new qualitative research method in 1967. Two main reasons to select this method are:

I. it is "unencumbered by explicit expectations about what the research might find, or by personal beliefs and philosophies"

II. it is "an approach that leaves itself open to charges of relativism"

(Pole and Lampard, 2002, pp.206)

As we discussed at the beginning of this chapter, this is an area where previous studies had not been carried out in Sri Lanka. On the other hand there is no universally acceptable framework to measure the safety culture in organizations.Therefore, the researcher believes that the GT is the most appropriate approach to analyze this data, because according to Glaser and Holton (2004) "following the full suite of GT procedures based on the constant comparative method, results in a smooth uninterrupted emergent analysis and the generation of a substantive or formal theory". According to Creswell (2009,pp.13), grounded theory is "Alternatively, in a qualitative study,the inquirer may generate a theory during a study and place it at the end of a project, such as in Grounded Theory".

Glaser& Strauss(1967, cited in George 2003, pp.1)emphasized that "GT investigates actualities in the real world and analyses the data with no preconceived hypothesis".Therefore, qualitative answers given by the respondents were analyzed separately using the Grounded Theory (GT) approach. The aim of this approach is to

understand the concept behind the actual situation through the collected data by techniques called open coding, axial coding and selective coding. The three techniques are briefly discussed below.

Open coding: Open coding is the process of identifying the key points of the data/statements instead of considering each individual word and its meaning. In this step the data were selected and placed into categories based on their main idea. However,special attention has been given to relate the statements given by respondents with key safety culture related issues and dimensions used by previous researchers in order to find the relative influential power of each safety culture parameter.

Axial Coding: To develop core codes, in this step it is necessary to find relationships between the above open codes. In order to understand the phenomenon behind the data, the researcher tried to find casual relationships between categories and subcategories.

Selective coding: This is the process of selecting the central or core category and systematically relating it to other categories either directly or indirectly (Allan, 2003).

The tables & figuresin the next chapter representhow the key points are concluded (Table 7), how axial coding wasdone from the open codes (Table 6) and finally the selective coding is shown in Figure 21.

In this chapter we discussed underlying factors to select questioner and mixed method approach for this study. It also discussed the process of data collection and how these data is going to be analyzed. Now we can continue our discussion in the next chapter emphasizing the outcome of data analysis.

4. DATA ANALYSIS

The data collected through the questionnaires was analyzed and presented under two separate subtopics. In the first part of this chapter we are going to discuss the quantitative data and the second part will illustrate the qualitative date.

4.1 Quantitative data analysis

As we pointed out previously, the questionnaire was organized under six different themes namely:

i. Safety culture evolution
ii. Socio-cultural dimensions
iii. Top management commitment
iv. Employee empowerment
v. Risk communication
vi. Employees attitudes and behaviors

Therefore, analyzed data were also presented under these topics separately. The following tables and graphs show the summary of quantitative data collected through the questionnaire.

Q1: Safety culture evolution:

As illustrated under the introduction, the objective of the first question of the questionnaire was "to examine the underlying factors which contribute to the improvementof safety culture in the maritime industry in Sri Lanka". The researcher wants to know the perception of the employees in the maritime industry regarding the evolution of safety in the industry.

Among 101 respondents, 100 (that is 99%) marked "yes" (Table 3) to the question which gives strong evidence that employees of the Sri Lankan maritime industry believed that safety has improved in their organizations during the last 20 years.

Table 3: Improvement of safety in maritime organization	Yes	No
Do you think that the safety of your organization had been improved during the last 20 years?	100	1

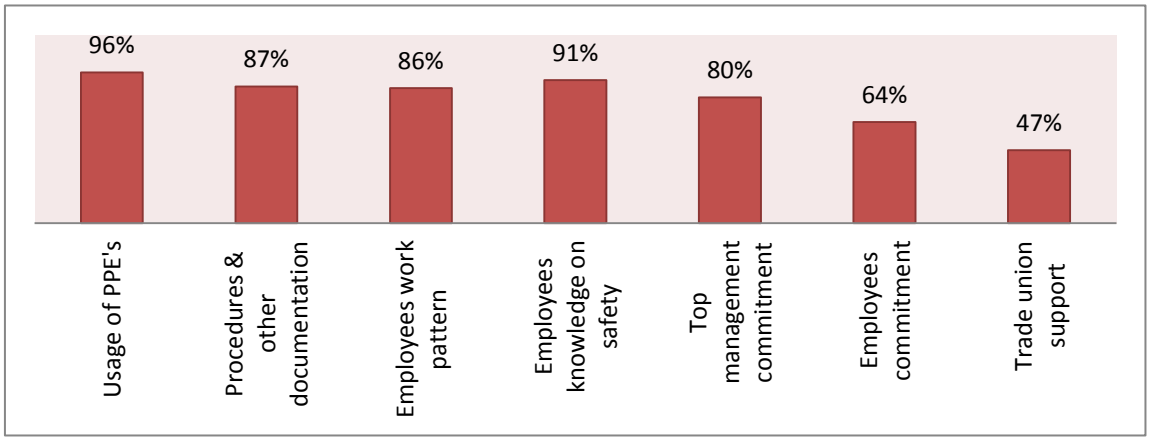


Figure 6: Development of maritime safety in Sri Lanka within the last 20 years

The bar charts in Figure-6show some of the areas developed in the past to improve safety in the working environment. Usage of Personal Protective Equipment (PPE's) and knowledge of employees on safety are the two key areas improved representing 96% and 91% respectively while trade union support was the area where improvement was at a minimum and amounted to 47%.

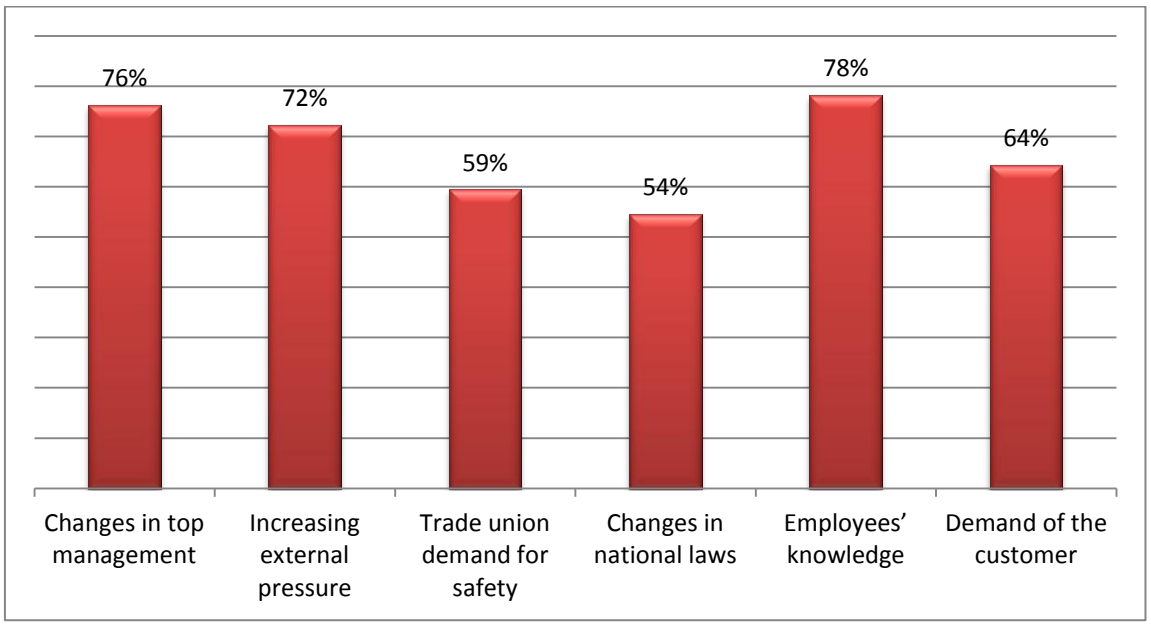


Figure 7: Influential factors for development in areas presented in Figure 6

Answers to the next question of the questionnaire, which is "what are the factors that influenced these changes" are represented in Figure 7. According to the feedback, employees' knowledge and understanding about the importance of safety is the most significant factor for improving safety in the industry (78%), followed by changes in top management (76%). Changes in national laws made a minimal contribution (54%) to the above mentioned development and this will be further discussed in the following

chapter. Here also the impact of trade unions on improving safety came in secondto last (59%).

Figure: 8illustrates the summary of the last part of the first question. The questionnaire provided a five point Likert scale as shown in the Table 4, to record the response of the employees.

Table 4: Likert scale given in questionnaire

Extremely poor	Poor	Moderate	Good	Excellent
1	2	3	4	5

Figure 8: Rating of management attitude, employees' attitude and competency level

According to the bar charts, all three factors exceeded the midpoint of the Likert scale, which is 2.5, but none of them reached 80% level to be considered as "good". The Chart also suggests that, competency level increase of employees is more significant than the other two factors. It is also interesting to note that respondents believed that

evolution of top management's attitude towards safety is more significant than that of employees (non-managerial level).

Q2: Socio-cultural dimensions

The aim of question number two of the questionnairewas to understand some social and cultural dimensions which could affect the safety culture of their working environment. The same five point Likertscale discussed above was used for this part as well. The outcome of the response is summarized and presented in Figure 9.

Figure 9: Relative influence of social & cultural factors.

Figure 9 highlights that individuals are highly motivated to improve their job related skills and knowledge. Also, it is important to note that their academic and technical

qualifications are higher. The value 4.14 means average qualification of employee is equal to General Certificate of Education (Advanced Level) which can be considered as a high academic standard. The family income of an average employee is just above the moderate before they joined the industry, which indicates that most of the employees are from middleclass families as far as family income is concerned.

The formal education system of the country has not put much emphasis on safety because the overall rating for question 2.2 is 2.97, which is just above the midpoint of the scale, but in moderate range. The respondents' attitudes towards safety in day to day life isalso relatively poor, meaningthat they are not very serious about safety in their everyday life, which could have influenced their organizational performance.

Q3: Top management commitment

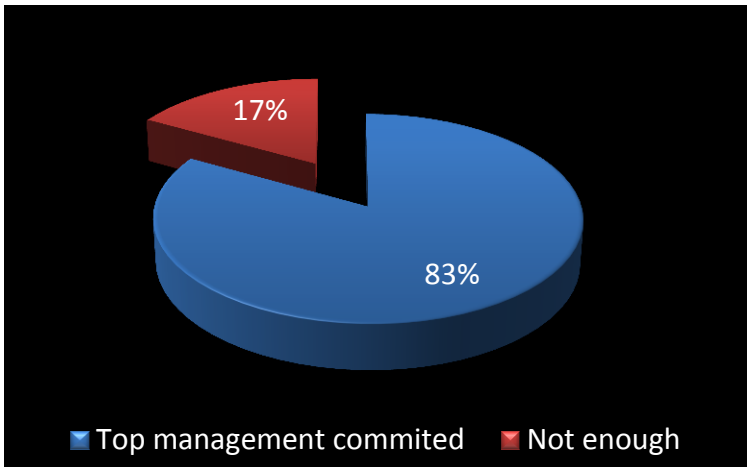


Figure 10: Top management commitment for safety

It is interesting to note that 83% of the (Figure10) respondents said 'yes' to the question "Do you think that the present top management is committed enough to create a safe working environment in the organization?" The perception of the sample group towards the management's commitment to safety did not vary much from one

organization to the other. Figure 11 showsthat employees in all three organizations rated their management's commitment above the 75% mark.

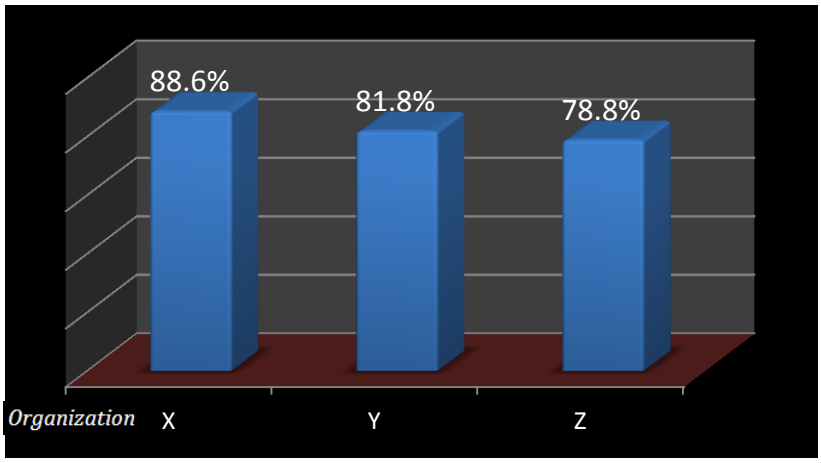


Figure 11: Top management commitment for safety in three organizations

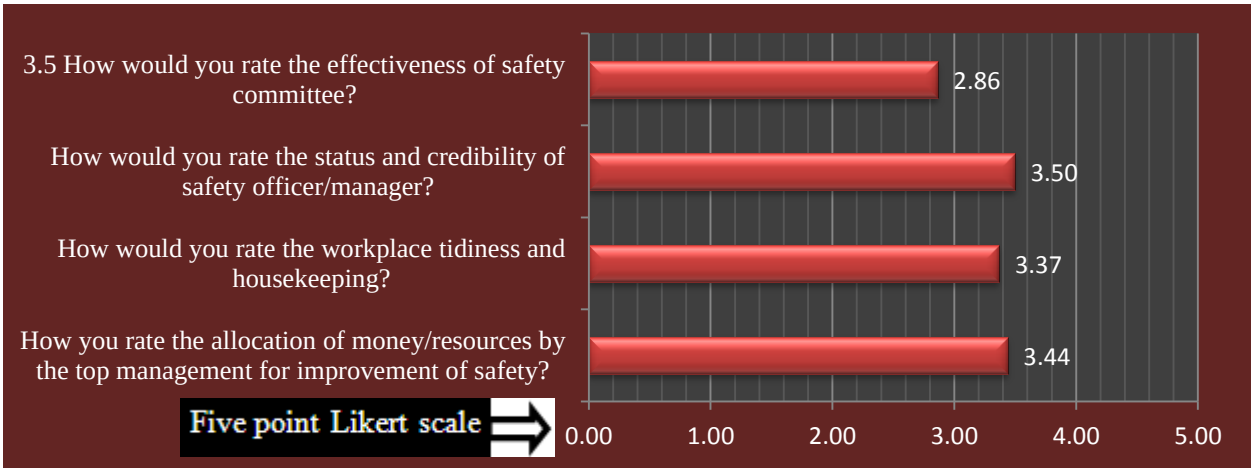


Figure 12: Overall rating for top management commitment

Safety committees are key requirements in many Safety Management Systems including OHSAS18001. According to the feedback, the effectiveness of safety committees in maritime organizations in Sri Lanka is significantly low. The outcome is quite comparable for all three organizations. In contrast, the feedback for

questionsrelated to the credibility of safety officers, tidiness/housekeeping and allocation of resources are significantly different from one organization to the other (Figure 13).

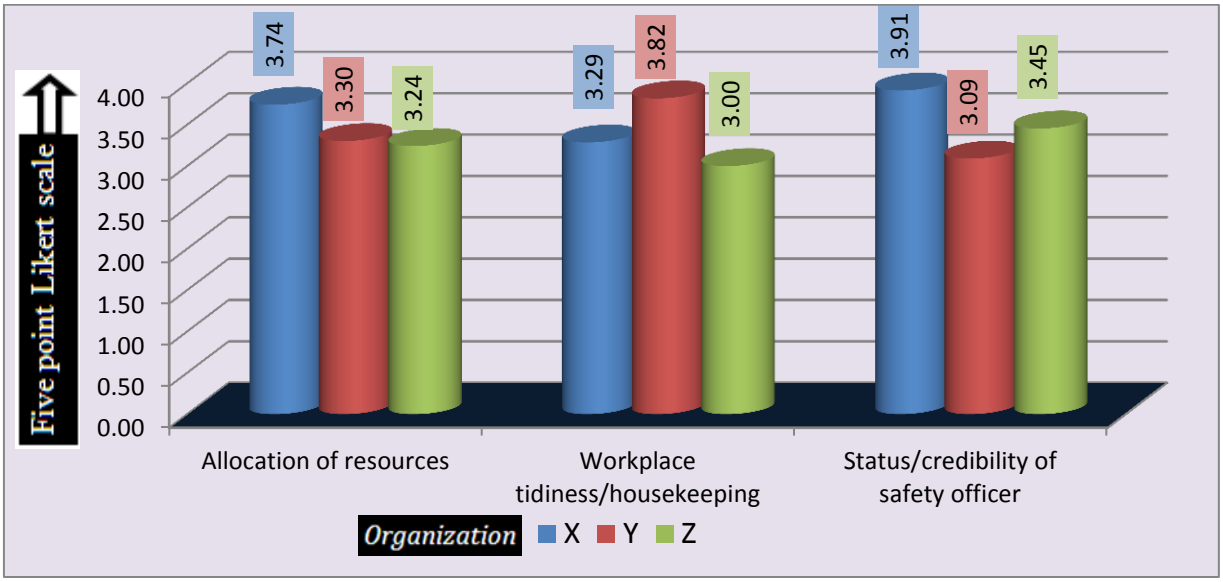


Figure 13: Top management commitment rating in three different organizations

Q4: Employee Empowerment

The next parameter used to measure the safety culture is employee empowerment/involvement. 65% of the sample group believes that the employees are empowered and they are involved in important safety related decision making.

Figure 14 illustrates the response by the sample groupto 3 questions. As per the first graph employees are quite confident about their level of knowledge, which scored 4 on a 5 point Likert scale. With comparison to the employees' competency level, job pre-planning is not up to that standard, which is the second bar chart with value 3.49. The last bar chart which represents the employees' empowerment is the lowest one with 3.34 on the Likert scale. 65% of the respondents agreed that employees are involved in safety

related decision making.However this graph indicates that the level of empowerment of employees is very limited and may not be sufficient to make a significant impact on decision making.

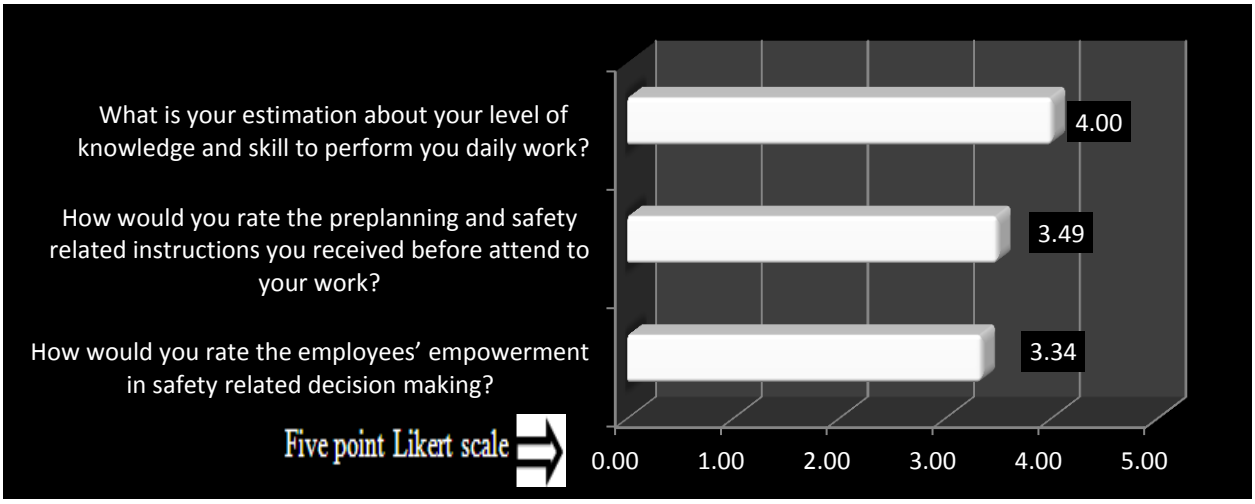


Figure 14: Employees knowledge, pre-planning & level of empowerment

Responding to the question "Do you know your responsibility assigned by the organization with regard to safety of work?" 93 respondents out of 101 confirmed that they are well aware of the responsibilities assigned to them in their area of work. In addition to that the summarized data indicate that the respondents strongly believe that they are fulfilling the assigned responsibility to them quite well, by giving overall mark of 4.13 onthe likert scale.

80% of the members in the sample group have marked that trade unions are exerting a positive influence to create a strong safety culture in their respective organizations. However, the influential power of the trade unions was marked as only 2.95 on the Likert scale which is within the moderate scale. However, this is not exactly similar for the 3 organizations; instead,the following graphs show some significant variations in the influence of trade unions in their organizations (Figure 15).

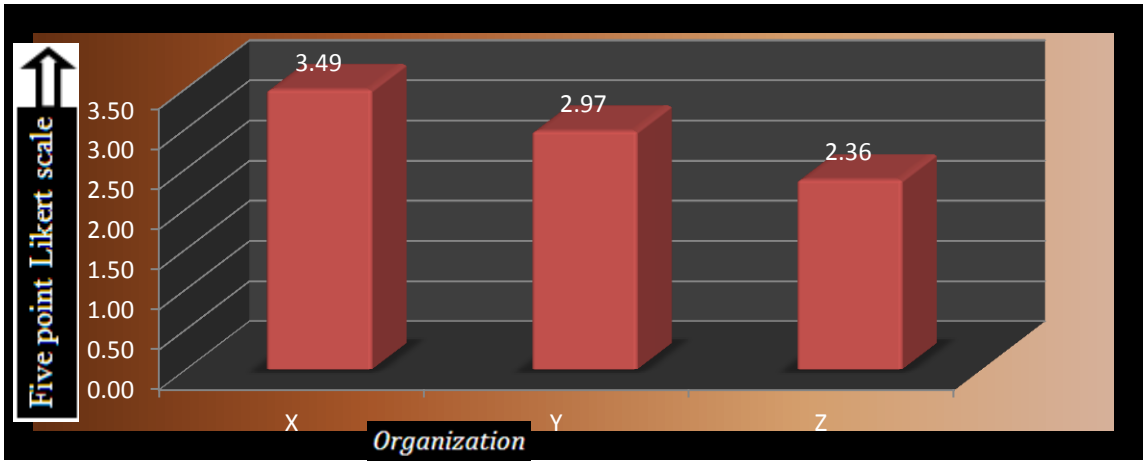


Figure 15: Influence of trade unions to create safety culture in their organizations

Q5:Risk Communication

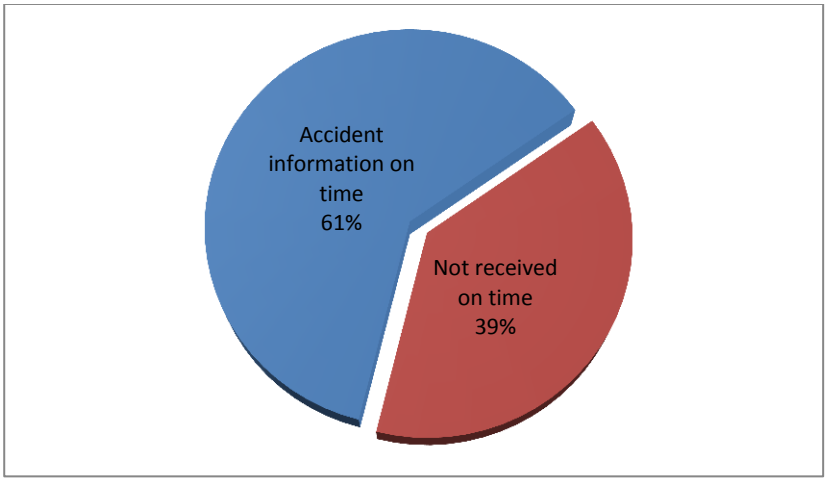


Figure 16: Receiving important organizational safety related information in time

Risk communication is the focus area for question number 5. In this part of the questionnairerisk communication mechanisms and their effectiveness were measured. When compared with previous factors risk communication recorded a lower rating. Only 62% of the employees believe that they receive important safety related information in good time, whereas 38% believe that they are not receiving that information at the correct time. The pie chart provided in Figure 16 represents this data.

The overall rating given to the question “How would you rate the communication mechanism of the organization with respect to the flow of important safety related information across the organization?” by sample group is 3.26, which is also of relativelylow value in the five point Likert scale. However the individual rating for both X and Y is around 3.66 but for Z, it was 2.45 (Figure 17).

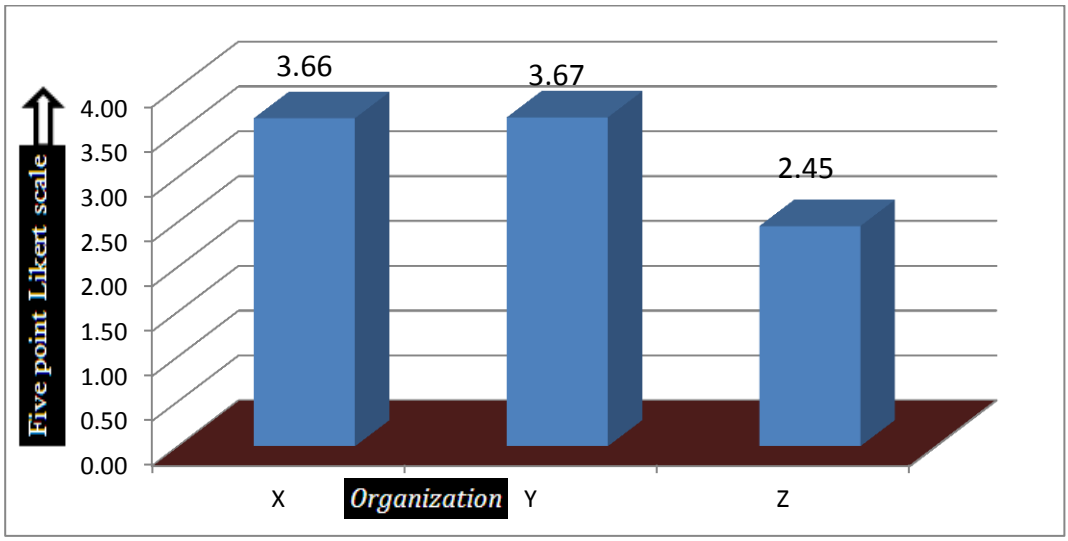


Figure 17: Rating for risk communication in individual organizations

However, in contrast to the above response, 93% of respondents confirm that they are aware of the safety rules and procedures in force related to their area of work and

also they rated their compliance to them as 3.91 (overall rating) on the given five point Likert scale.

It is very significant that the rating given to the next question, that is "If you come across with any incident/near miss, would you prefer to report the incident to the safety department/higher authority?" Only 59% of the respondents said that they would inform any incident/near-miss to the relevant authorities whereas 41% of the participantsindicated they would not. It is also important to highlight here that the percentages for the individual organizations are quite similar to the above mentioned overall outcome.

Q6: Employees' Attitudes and behaviors

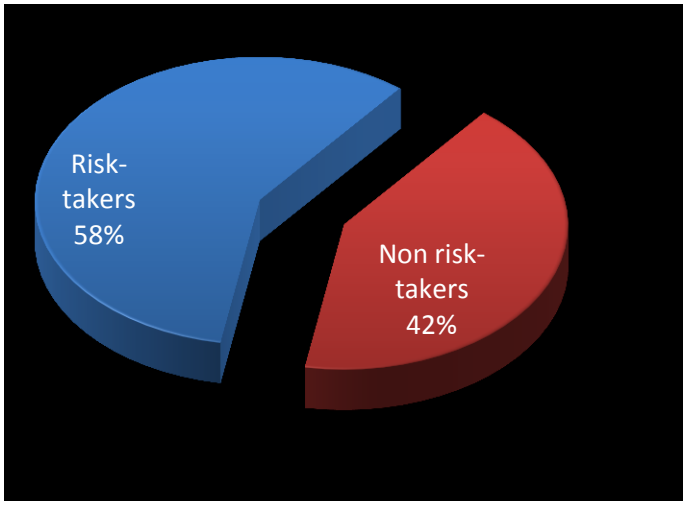


Figure 18: Taking risks while performing duties

The last part of the questionnaire focused on the behaviors and attitudes of employees with regards to safety. A significantly high number of participants (42%) accept that they are taking risks such as working without PPE during their everyday

work. Only 52% of the sample group said that they are not taking any risks while they are performing their jobs.

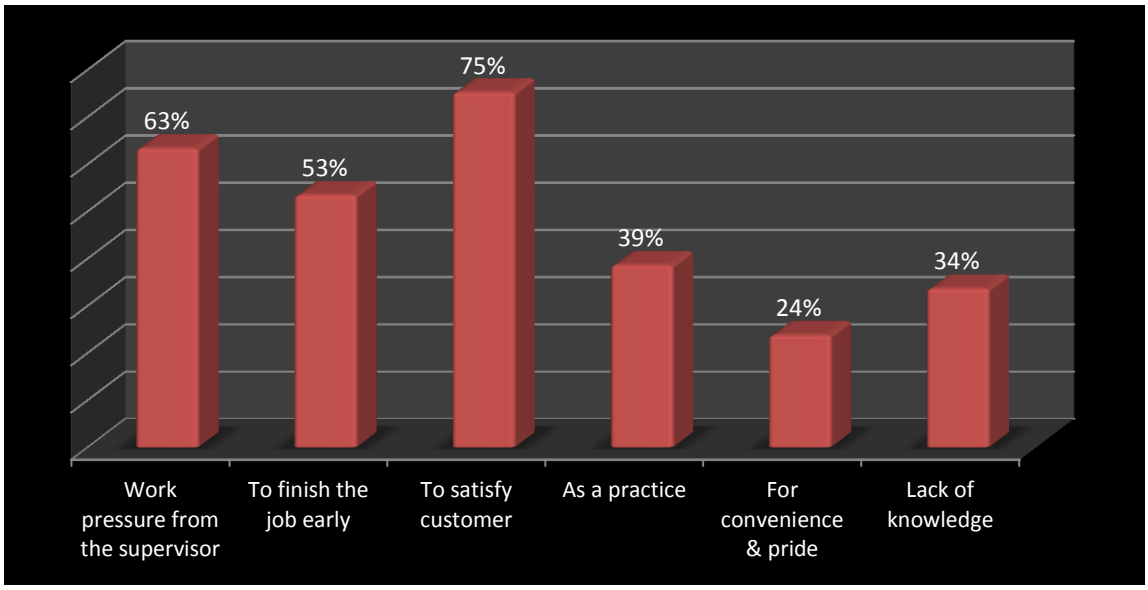


Figure 19: Level of influential power of each factor which encourage risky operations

Figure 19 describes some key factors which could encourage employees to take shortcuts andrisks while performing their duties and the level of influence of each factor. According to the statistics, the sample group recognized that customer demand is the most influential factor for performing risky jobs, with the highest percentage of 75%. Apart from customer demand, the next influential factor is pressure from their superiors/supervisors. It is worthwhile to highlight that the influence of customers is making a bigger impact on employees to go for risky operations. It is also important to note that lack of knowledge is not a key factor for employees in taking risks and it has been given only 34%. Employees taking risks for their convenience/pride is the least significant factor among other factors with 24% on the graph.

Among the sample group only 55% of participants confirmed that they are doing their best to make the working environment safe and the remaining 45% is not.

Table 5: Personal commitment for safety

	Yes	No
Do you think that you are doing your best to make the working environment safer?	55%	45%

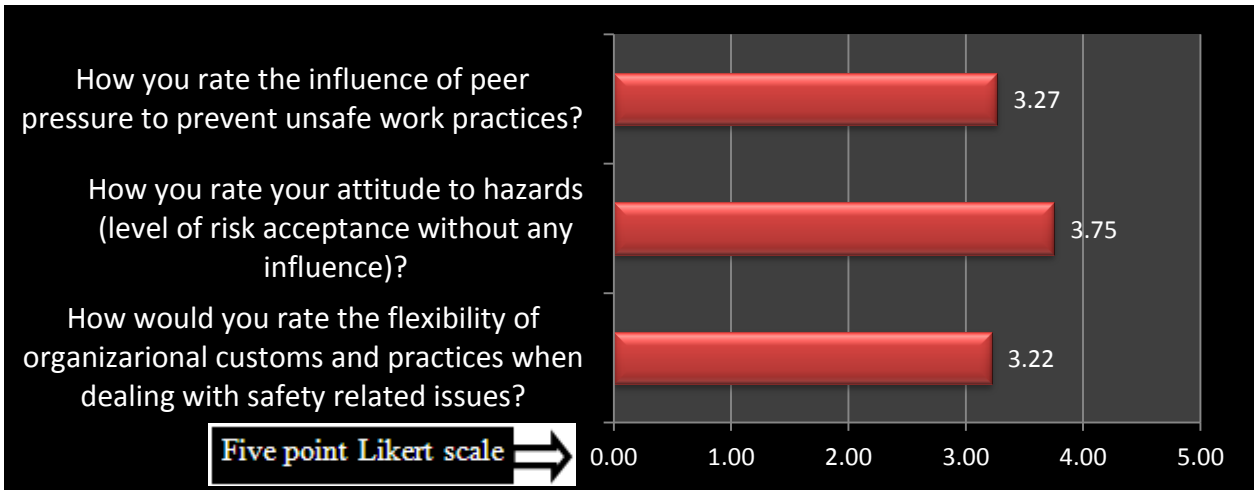


Figure 20: Influence of peer pressure, attitude towards risk and flexibility of customs

The bar charts in Figure 20 represent the summary of the final part of the questionnaire. As shown in the graph peer pressure against unsafe working practices are not very high in Sri Lankan maritime organizations and it is only 3.27 in point Likert scale. In a industry like marine, where the risk level is high, this value is not in acceptable level. Compared to that, employees risk acceptance is higher, scoring 3.75 on the scale, which means employees are ready to accept risk. Finally the flexibility of organizational customs and practices was rated as 3.22 the lowest in Figure 20, which can interpret as not very flexible, reluctant to change their practices and not ready to accept changes to the system.

Therefore we can say that though the trade unions supportthe creation ofa Safety-culture in maritime organizations in Sri Lanka, the effort or the influence they are making is minimal.

So far we have analyzed and discussed quantitative data and in the next section we are going to inquire about qualitative data.

4.2 Qualitative data analysis

As discussed under the Methodology, the qualitative data collected through the questionnaire was analyzed using the Grounded Theory (GT) approach and presented in this section. Table 6shows the summary of the key points coding. Axial coding is summarized in Table 7. Finally the summary of selective coding is presented in Table 8 and Figure 21.

Table 6: Key points and codes from the data in questionnaire

(Company X)

ID	Key points	Code
X1	Improvement of social status makes employees stressful	Social status
X2	Lack of updated legal infrastructure in the country for safety standards	Legal framework
X3	Interdepartmental communication is poor, therefore poor planning	Lack of communication
X4	Money is the key motivational factor of the people	Money oriented
X5	Safety department should be independent and empowered	Lack of empowerment
X6	High turnover of subcontract employees due to job insecurity & poor working conditions	Subcontractors' issues
X7	Poor educational status of subcontract employees	Subcontractors' issues
X8	Not taking prudent decisions instead passing the ball	Decision making
X9	Not providing sufficient funds, facilities and authority to relevant officers	Allocation of resources
X10	Higher number of subcontract employees with lower educational background	Subcontractors' issues
X11	Lack of teamwork	Attitude about others
X12	No punishment & benefits, so free to do unsafe acts	Attitude about safety
X13	Not following instructions which are frequently given to the employees	Attitude about safety
X14	Level of education	Education system

X15	Accidents should be reported/announced with victims names	Communication mechanism
X16	Taking shortcuts	Wrong habits
X17	Not punctual, therefore always everyone has to rush	Wrong habits
X18	Have to be an example	Setting bad example
X19	General education & intelligence	Education system
X20	Lack of support from the employees due to poor attitude about safety	Attitude about safety
X21	Society is not aware about safety	Education system
X22	Education system does not match with the developments of technology	Education system
X23	Lapses in formal education in safety	Education system
X24	Social pressure for high living standards	Social status
X25	The way of thinking and analytical skills	Education system
X26	No proper pre planning for work	Setting bad example
X27	Poor social background	Social status
X28	Poor accident reporting by in-charge engineers	Communication mechanism
X29	Not enough social pressure for higher safety standards	Social pressure
X30	No punishments to victims	Decision making
X31	No proper hazard identification system	Safety management system
X32	No motivation from the management for safe behaviors	Behavioral issues

X33	Employees not giving their best to the organization	Attitude about safety
X34	Lack of external pressure from responsible organizations	Legal framework
X35	Commitment to safety is not well organized	Safety management system
X36	No sufficiently educated employees to make attractive presentation	Lack of resources
X37	Lapses in PPEs	Allocation of resources
X38	Poor communication	Lack of communication
X39	Bad examples of top management deteriorate employees commitment to safety	Setting bad example
X40	No proper pre planning for work	Behavioral issues
X41	Not considering safety as their own responsibility	Attitude about safety
X42	Lack of team work	Attitude about others
X43	Need Competent persons for safety inductions	Allocation of resources
X44	Report/announce the accident with victims name	Communication mechanism
X45	Employees reluctant to be accountable/take responsibility	Social issue
X46	Poor attitude towards safety by subcontract owners	Attitude about safety
X47	Safety department should be empowered and free from interferences	Lack of empowerment
X48	No consideration about inconvenience to others	Attitude about others
X49	One should concentrate on his own safety	Attitude about safety
X50	Trade union interferences in disciplinary matters	Misuse of power

X51	People donot care about the safety of others	Attitude about safety
X52	Poor maintenance of common telephones affect emergency communication	Lack of resources
X53	Level of technical education & training	Education system
X54	Safety should be a subject in school syllabuses	Education system
X55	No toolbox meetings before starting work	Lack of communication
X56	Trainees are trained under employees who are not working safely	Education system
X57	Communications must be improved	Lack of communication
X58	Attitudinal errors of employees regarding safety	Attitude about safety

(Company Y)

ID	**Key points**	**Code**
Y1	No Continuous updating	Lack of communication
Y2	Lack of consideration for work place tidiness/discipline	Cultural background
Y3	Not self disciplined, need more pressure to enforce safety rules and eliminate wrong habits	Wrong habits
Y4	Methodical risk communication mechanism	Communication mechanism
Y5	Need frequent instructions to followers	Close communication/monitoring

Y6	Outside resource persons should conduct lectures on safety	Lack of resources
Y7	No proper maintenance of walkways & safety signs	Safety management system
Y8	Not having sufficient organizational legal framework	Safety management system
Y9	At least once in 3 months the top management of the organization should talk to employees regarding safety issues	Close communication/monitoring
Y10	Over confidence on themselves	Cultural background
Y11	Circulars are ineffective, lectures are better	Communication mechanism
Y12	Imitate senior workers	Behavioral issues
Y13	Never updated employees about safety rules & regulations	Lack of communication
Y14	Safety included to the formal education	Education system
Y15	No job related training and awareness/tool box meetings	Communication mechanism
Y16	Trade unions interferences to protect safety violators	Misuse of power
Y17	Lack of personal commitment	Attitude about safety
Y18	Frequent audits by recognized organizations	Legal framework
Y19	Different attitudes due to different education/training levels	Education system
Y20	Lack of monitoring	Close communication/monitoring
Y21	Lack of implementation of policies and procedures	Safety management system

Y22	Frequent updating from top management is required	Communication mechanism
Y23	Lack of patience of employees	Cultural background
Y24	Safety policies and procedures have to be implemented	Safety management system
Y25	Proper and in-depth accident investigation	Safety management system
Y26	Not obeying traffic/organizational rules	Social issue
Y27	No proper maintenance of walkways & safety signs	Attitude about safety
Y28	No holistic approach	Safety management system
Y29	Lack of modern tools for communication	Lack of resources
Y30	Influence of high family commitments	Social issue
Y31	Influence of behaviors at school	Social issue
Y32	Inconsistency of disciplinary actions	Decision making
Y33	Behavioral influence of family	Social issue
Y34	Trade unions are not encouraging members for higher level of safety	Misuse of power
Y35	Lethargic approach of empowered employees	Improper empowerment
Y36	Not ready to accept instructions	Cultural background
Y37	Need more government pressure to improve industrial safety	Legal framework
Y38	Willingness to stay with relaxed clothing due to high temperature & humidity	Cultural background
Y39	Although it says empowered, in reality employees do not have power to execute	Lack of empowerment

Y40	People are not patient	Cultural background
Y42	Lack of punishments for unsafe behaviors	Behavioral issues

(Company Z)

ID	Key points	Code
Z1	Inherent risks in marine industry (Space)	Industry issues
Z2	Should set an example	Setting bad example
Z3	No one appointed to work full time on safety related issues	Safety management system
Z4	Lack of practical knowledge	Education system
Z5	Empowerment and appreciation of employees who are not safety concerned	Improper empowerment
Z6	No continuous effort, Continuous updating	Communication mechanism
Z7	Not patient	Cultural background
Z8	Ineffectiveness of safety committees	Decision making
Z9	Being a tropical country, people prefer comfortable clothing, they do not like to wear PPEs	Geographical influence
Z10	Money is the key factor in decision making	Attitude about others
Z11	Commitment limited to words	Setting bad example

Z12	Trade union protection for misbehaved employees	Behavioral issues
Z13	Resistance to wear PPE	Attitude about safety
Z14	Priority given to profit making, not to safety	Allocation of resources
Z15	Empowering wrong people owing to trade union pressure	Improper empowerment
Z16	Lack of awareness through printed and electronic media	Lack of resources
Z17	Lack of care about other people	Social issue
Z18	Unsafe habits of employees, they are reluctant to change	Cultural background
Z19	Enforce traffic rules within the organizational premises	Decision making
Z20	Resistance to change	Cultural background
Z21	No methodical risk assessment criteria	Safety management system
Z22	Lack of encouragement for safety through mass media	Social issue
Z23	Over self-confidence	Cultural background
Z24	Safe attitudes are not been promoted	Social issue
Z25	Lack of care about other people	Attitude about others

Table 7: Categories of concepts coding from questionnaire

Problems related to Socio-cultural issues

Category	**Explanation**	**ID**
Cultural background	Employees are overconfident and not patient enough to listen to others' instructions because they are reluctant to change their behaviors. They prefer relaxed clothing and do not like PPE. Being a nation which is attached to agriculture for many thousands of years, safety aspects related to technical environment are not much appreciated.Workshop discipline is not up to high standards.	Y2, Y10, Y23, Y36, Y38, Y40, Z7, Z18, Z20, Z23
Education system	Due to lapses in the education system Safety has not been properly integrated into both school and technical education. Therefore, general concern of the society towards safety in everyday life is poor	X14, X19, X21, X22, X23, X25, X53, X54, X56, Y14, Y19, Z4

Social status	Historically, Safety had not been able to draw much attention of the society and family influence on safety is also minimal. Therefore, media attention to safety is also low. Due to these factors people are not very worried about safety in their own environment (in school, home). However, due to high family commitments and social pressure for high living standards, people are highly money oriented. Due to the reason that incomes of employees in the maritime industry are quite high, employees are reluctant to be responsible for factors like safety due to the fear of losing their jobs in case of accident/ negligence.	X1, X4, X24, X27, X29, X45, Y30, Y31, Y33, Z17, Z22, Z24
Subcontractors' issues	Due to fluctuation inthe maritime industry, there are many subcontractors working in these organizations. Most of these employees are from rural areas of the country with low educational background and attached to an agriculture based background. However, due to the tough working/living conditions and job insecurity of the industry and their seasonal demands for cropping and harvesting of their own farms, they are not continuing in their contract work.	X6, X7, X10
Wrong habits	Due to lack of self-discipline, employees are not punctual. Therefore they have to rush through their duties and tend to take short cuts.	X16, X17, Y3

Problems related to Communication

Category	Explanation	ID
Communication mechanism	Due to the unavailability of streamlined and established communication mechanism, accident information is not reported precisely. Employees prefer to have frequent safety updates especially via verbal communication rather than circulars.	X15, X28, X44, Y4, Y11, Y15, Y22, Z6
Lack of communication	Lack of communication, both intradepartmental and inter-departmental, make barriers to the flow of important safety related information and also poor job planning which could also lead to accidents.	X3, X38, X55, X57, Y1, Y13
Lack of resources	The prevailing communication mechanism is not attractive enough due to lack of resources, both technical and human.	X36, X52, Y6, Y29, Z16

Problems related to Employee empowerment

Category	Explanation	ID
Lack of empowerment	The safety department has to be empowered to make decisions without interferencefrom others and that empowerment has to be clear and precise.	X5, X47, Y39
Misuse of power	Trade unions are not encouraging their members to achieve higher safety standards and also they use their power to protect employees against punishment for safety violations	X50, Y16, Y34, Y50

Improper empowerment	Due to improper empowerment and improper appreciation of employees, the effectiveness of empowered people is low.	Y35, Z5, Z15

Problems related to Management commitment

Category	**Explanation**	**ID**
Allocation of resources	Due to higher commitment to profit maximization, resources are not sufficiently allocated for safety	X9, X37, X43, Z14
Close communication/ monitoring	Top management should have close contact with shop floor level employees with frequent discussions on safety and close monitoring	Y5, Y9, Y20
Decision making	Top management has to take prudent and unbiased decisions with respect to safety related issues	X8, X30, Y32, Z8, Z19
Safety management system	The prevailing safety management systems are not comprehensive and effective enough. A holistic approach to achieve higher safety standards through proper implementation of policies, and procedures (including risk assessment and accident investigation) is vital.	X31, X35, Y7, Y8, Y21, Y24, Y25, Y28, Z3, Z21
Setting bad example	Top management should set a good example to others to encourage their commitment to safety without getting restricted totalkingand decision making.	X18, X26, X39, Z2, Z11

Problems related to Attitudes & Behaviors

Category	Explanation	ID
Attitude about others	Decision making of people is highly dependent on financial benefits. Therefore, they tend to ignore their colleagues and not be cooperative	X11, X42, X48, Z10, Z25
Attitude about safety	Employees do not realize that safety is their own responsibility andthat they themselves have to commit to improve the safety of their organizations. Lack of rewards/punishments for their safety related behavior makes things worse.	X12, X13, X20, X33, X41, X46, X49, X51, X58, Y17, Y26, Y27, Z13
Behavioral issues	Due to the lack of proper mechanisms to rewardsafe behavior and discourage unsafe behavior, employees are not interestedin changing their unsafe behavior. This has been supported by the trade unions.	X32, X40, Y12, Y42, Z12

Problems related to External factors

Category	Explanation	ID
Legal framework	The legal framework related to the industrial safety standards of the country have not been updated and are not strong enough to address the current industrial safety issues.	X2, X34, Y18, Y37
Industry related issues	Inherent risks in the maritime industry (e.g.: Confined spaces, chemicals/paints)	Z1
Geographical influence	As a tropical country located closely to the equator, temperature is relatively high throughout the year. Therefore many people prefer to work without PPE.	Z9

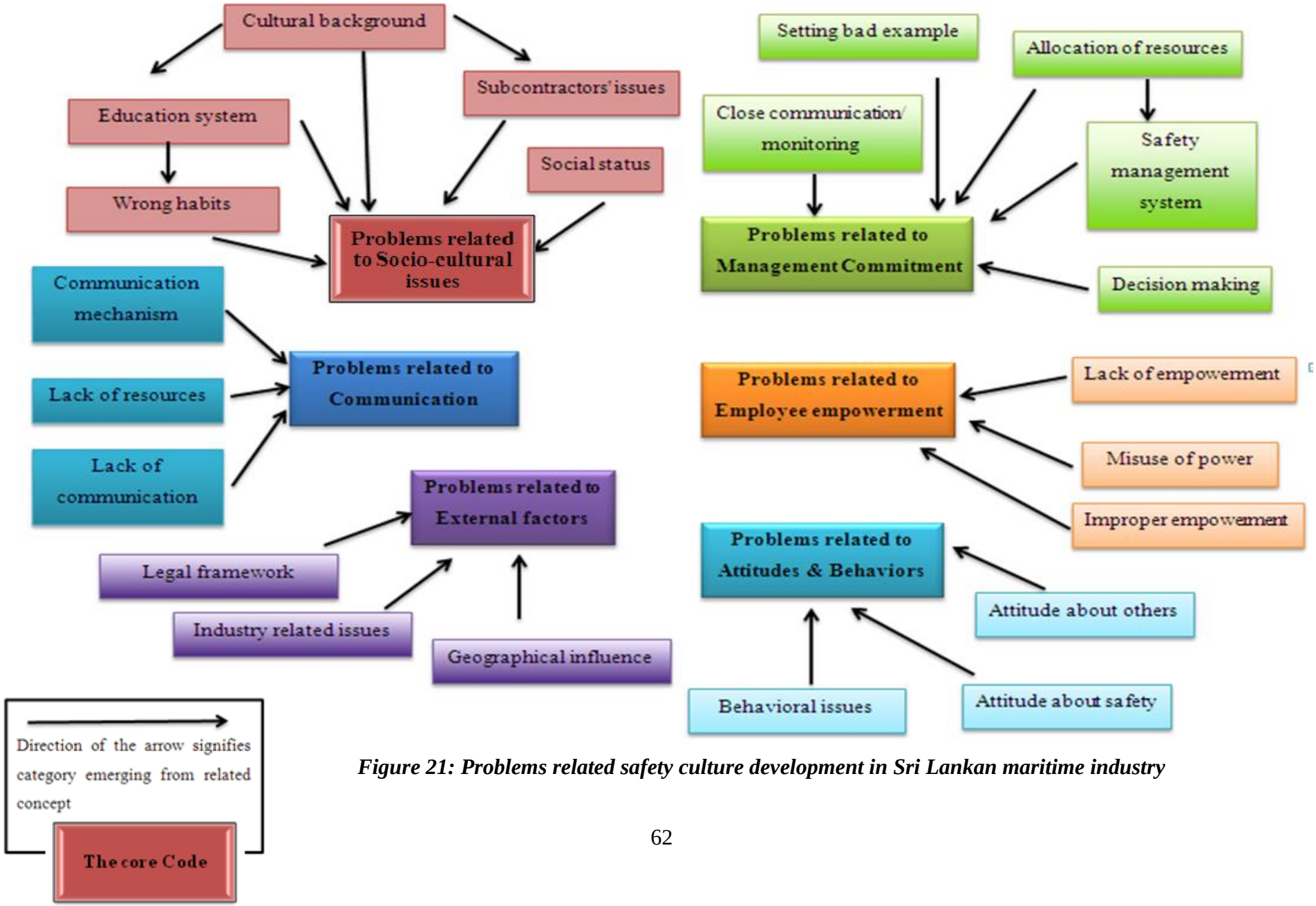


Figure 21: Problems related safety culture development in Sri Lankan maritime industry

Table 8: Code frequency and percentage, (Challenges to developing safety culture in Sri Lankan maritime industry)

Problem	Number	Percentage
Problems related to Socio-cultural issues	40	32%
Problems related to Management Commitment	27	22%
Problems related to Attitudes and Behaviors	23	18%
Problems related to Communications	21	17%
Problems related to Employee-empowerment	8	6%
Problems related to External factors	6	5%

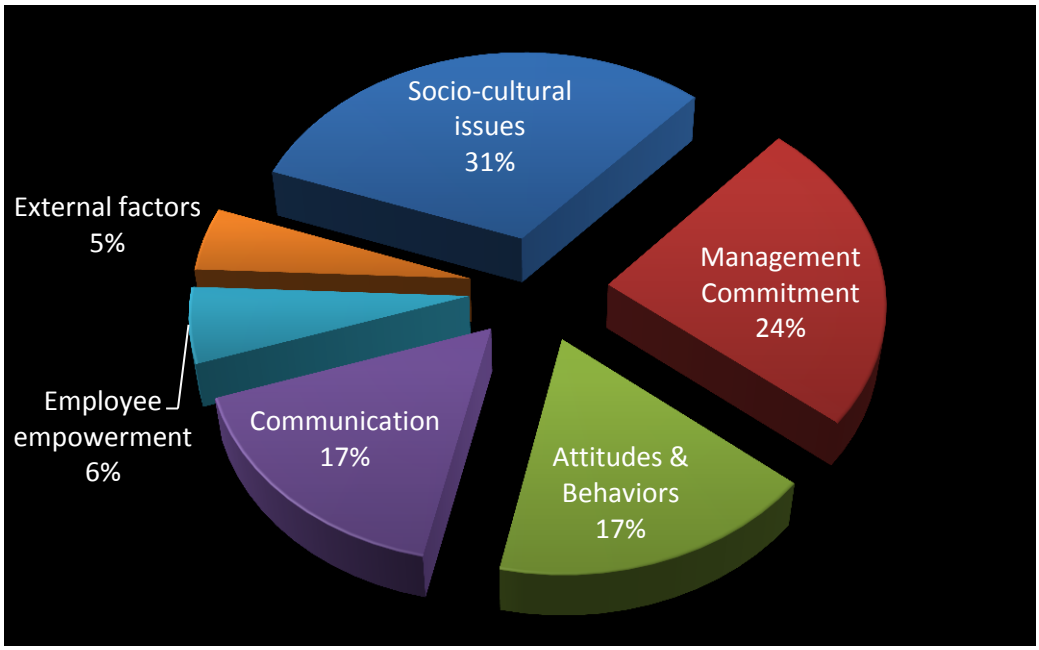


Figure 22: Relative contribution of each factor to create safety culture (based on code frequency).

As discussed previously, Table 6 of this data analysis consistsof names and labels createdby the researcher depending on his own interpretations of the collected data. Following Glaser's key point codingtechnique, the table was developed considering the key words and ideas, rather than considering each individual word. The keyword identifiers are given in the first column of the table 6 (under ID) in which X, Y and Z

are indicated as the three different marine organizations, whichwere selected for this study. For an example X8 denotes the 8th key point of organization X which is explained in the next column. The last column of Table 6 is the code.

After the above open coding, the data are further analyzed and regrouped in such a way that common areas of concern are grouped together in order to develop the core codes. Table 7 represents the above process. Then selective coding was done using the core codes, which presented most frequently in the data collection, to identify the direct or indirect relationship between those codes as shown in Figure 21.

As presented in Table 8, six areas were identified as the focus of concentration to improve the safety culture in the Sri Lankan maritime industry and their relative influence werealso recognized.Among the above six factors the highest code frequency of 40 (32%) was reported in problems related to Socio-cultural issues.

Problems related to Socio-cultural issues.

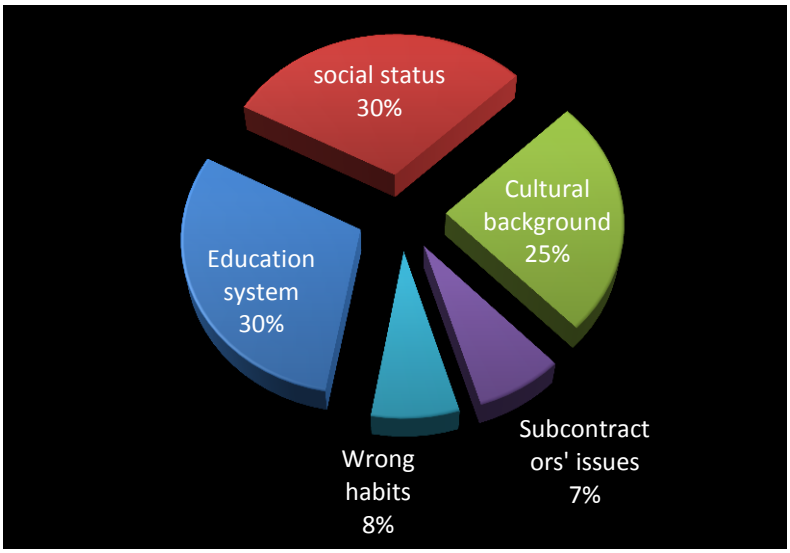


Figure 23: Relative contribution of each factor within socio-cultural issues

We have identified and discussed 5 factors within the Socio-cultural domainwhich negatively influenced the safety culture in this industry. According to the analysis, Education system, social status and Cultural background are the threekey factors which contribute heavily for this situation (Figure 23).

Problems related to Management Commitment

Problems related to Management Commitment were recorded at the second highest code frequency of 27 (22%). Relative influential power of each factor within Management commitment domain is presented in Figure 24. It is interesting to note that lapses in safety management systems are responsible for 37% of lapses in management commitment. Allocation of resources by top management is not very crucial with compared to other factors and this confirms the finding we discussed above under the qualitative analysis, where employees rated it with higher value (3.44) presented in Figure 12.

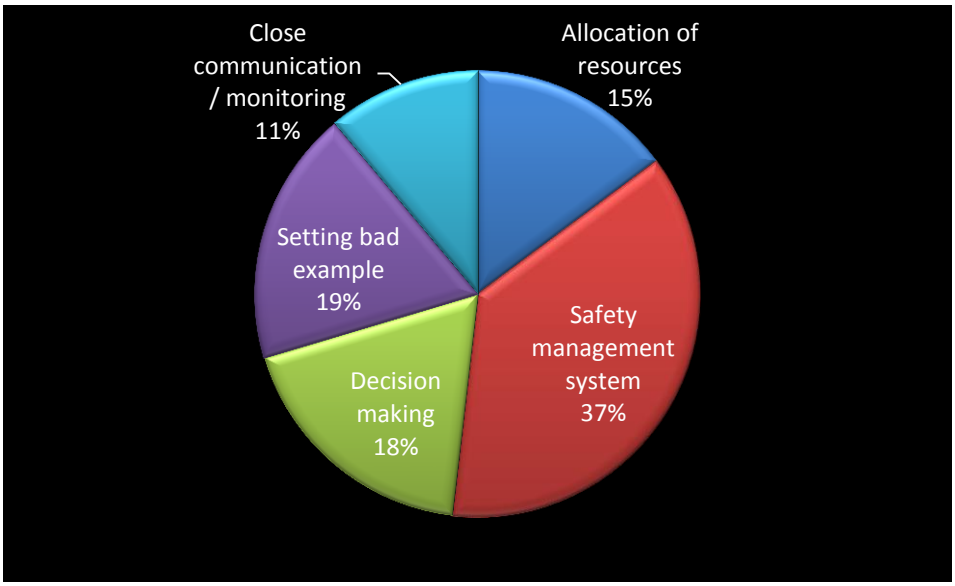


Figure 24: Relative contribution of each factor within management commitment

Problems related to Attitudes and Behaviors

Problems related to Attitudes and Behaviors have the 3rd highest code frequency of the list. Improper attitude regarding the safety of employees is the key factor behind this issue, which represents 50% of total. As we highlighted in Table 7, employees did not recognized that safety is their own responsibility and that they themselves have to commit to improve safety.

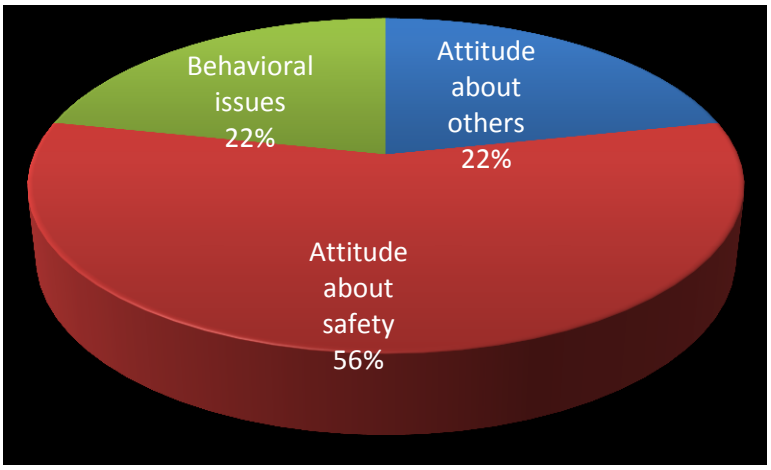


Figure 25: Relative contribution factors under attitudes and behaviors

Problems related to Communications

Communication related issues recorded the fourth highest code frequency of 21, which is responsible for 17% of total barriers. Out of three categories of issues, lapses in communication mechanism is more prominent than other two due to its relative contribution of 42% (Figure 26). Figure 22 suggests that influence of employee empowerment and External factors are not as significant as the other four factors. Therefore those two are not separately discussed under this chapter.

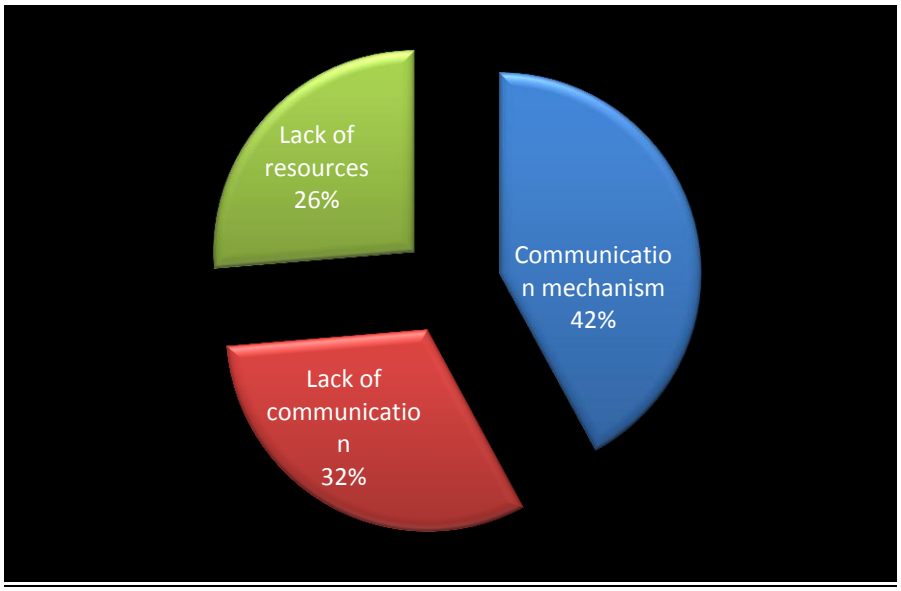


Figure 26: Relative contribution factors under communication

In this chapter we have discussed the data collected through the questionnaire in more generic terms, under two major topics, quantitative and qualitative. Apart from that we have highlighted some significance within the data. These findings will be further discussed in the next chapter.

5. DISCUSSION

The aim of this chapter is to discuss the findings highlighted under the previous topic of Data Analysis in a broader perspective, beginning with quantitative data and following the same sequence.

5.1 Quantitative data: General considerations

Based on the statistics, it is reasonable to say that safety in the Sri Lankan maritime industry has been improving significantly in the last 20 years. Use of Personal Protective Equipment (PPE's), safety knowledge of employees, documentation, employees work patternsandtop management commitment to safety are the key areas developed in that period of time. However,in comparison to top management commitment, employee commitment has not significantly improved. This observation is materialized by the evidence which says that trade union support for improving safety has changed only by 47%.

According to the respondents,employees knowledge, changes in top management and increasing external pressures on organizations are key to the above mentioned improvements. However, here also it can be observed that trade union pressure is not very influential in those developments. Sri Lanka has ratified all 8 fundamental ILO conventions, including the C 87 and C 98 which declare the right to form trade unions and sign collective agreements. Trade unions in Sri Lanka are very strong and well organized. However, due to the fact that "political parties continue to seek the support of the working population through trade unions and also manipulate

unions to achieve political objectives from time to time" (Shahul, 2002, pp.6) they have diverted from their key industrial issues. Even today there are a lot of labour disputes between employers and employees in Sri Lanka for various demands and none of these are demanding a safe working environment, rather they are looking for salary enhancements.

The other important area to notice is the changes in national laws which have made a minimal contribution of 54% to the above mentioned developments in safety. This is a very important area to discuss because in reality nothing has significantly changed in last 20 year in the area of national laws related to occupational health and safety. In Sri Lanka, there are two main ordinances which govern the industrial safety standards in the country, namely, Factories Ordinance and Workmen's Compensation Ordinance. As the sample group correctly indicated, these two ordinances were not updated to meet the present industrial requirements. Therefore,neither employees nor employers are tightly bound by the legal framework. Although the national level regulations are not strict, employers have to be on par with the international standards as the maritime industry is highly globalized and, therefore, the organizations have to meet their international customers' requirements. But the same pressure may not exist for employees and trade unions.This may be the reason for the previous observation of less employee commitment and trade union support for improving safety in maritime organizations. However, it is evident that individual employees have realized the importance of safety and, hence, the employees' attitudes to make the working environment safer, commitment to improve workplace safety and safe handling of their jobs have improved on par with the increase in management commitment to safety.

Tripartite committees are very common and highly promoted in today's context. This has been internationally encouraged under various organizations such as theILO for labour disputes and negotiations, and IMO especially in MLC 2006. What is very common in these discussions is both the trade unions and government representatives

are demanding or influencing employers to improve safety and health in their respective organizations. However,the above discussion revealed that the contributions of governments and trade unions are not as good as those ofemployers in maritime organizations in Sri Lanka.

The analyzed data suggests that the social background in Sri Lanka is not very favorable to uplift safety in industries. It shows that the sample group's attitudes towards safety in daily activities are significantly low. One major reason might be that the country's education system has not given its due consideration to improve the "occupational safety" related knowledge of its students through the formal education system. Not only in the school education system, even in the tertiary education system,safety isnot yet playing an active role within the formal syllabus. Until The National Institute of Occupational Safety and Health was established on 28th April 2005, under the Ministry of Labour Relations and Manpower, Sri Lanka did not have a government approved institute for formal safety education.

It is quite interesting to note that the education level of the employees in Sri Lankan maritime organizations is quite high. Majority of them have completed their secondary education. This can be a reason for their high level of commitment to improving their own safety related skills and knowledge. Most of these employees are from families with an average income and of parents with reasonable level of education. This family background might encourage them to continue their education for a better future.

Although the top management itselfis committed to improving safety in their respective organizations, the effort has not penetrated through to the next level of the organizational hierarchy. It is understood that the higher management is providing the necessary financial support and other resources to improve the safety performance of the organization.However, the contributions of the middle level management and shop-level managementto the achievement of that task are quite questionable as it is evident that the effectiveness of safety committees is quite

poorly rated. As described under the clause 4.4.3 of OHSAS 18001standard(Kausek, 2007, pp.19),consultation and communication are key requirements of a comprehensive Safety Management System. These safety committees play a vital role in employee-consultation and participation. Therefore, missing this link between higher management and the shop-floor will pose a great challenge to the achievement of higher safety standards in the Sri Lankan maritime industry because this situation is common to allthree organizations about which this study is concentrated.

Allocation of resources and status/credibility of safety officers do not necessarily guarantee a safe working environment. For example X has gained the highest rating in both factors but its rating for tidiness is lower than that of the other two organizations. Of course, one can argue it is due to the nature of the business of X, which is more prone to getting dirty than the other two. But here it is not a matter of cleanliness but tidiness of the workplace. Here again,it can be pointed out that investing money to improve infrastructure and facilities does not necessarily improve the safety of the work place, without improving the people because a tidy workplace is nothing but employees' attitudes to keep it clean and tidy.

Data has shown that employeeswho are empowered to make safety related decisions, make themat a reasonable level. It is also evident that these employees are competent and hence have the self-confidence to perform their duties. According to clause 4.4.2 of OHSAS 18001 Standard (Kausek, 2007, pp.18), Training, Awareness and Competence is an important indicator of effective SMS. However, it is observed that pre-planning of jobs is not on par with other factors, which could negatively affect performance.

Employees in all three organizations are well informed about the responsibilities assigned to them by theorganization. This is also a fulfillment of an important clause (4.4.1)under OHSAS 18001standard (Kausek, 2007, pp.17), that is Structure and Responsibility which requires define, document and communicate roles and responsibilities which affect Health and Safety (OSHAS 18001, 2007).

Although the overall contribution and influence of trade unions to promoting safety in the maritime industry of Sri Lanka is rated as poor, the levels of influence of the three trade unions are significantly different in their own organizations. Trade union support in organization Z is the lowest compared to the other two organizations.

According to the available data,top down flow of risk communication is very strong in comparison to bottom up communication. The analysis provesthat the mechanism for communicating accident/incident related information as well as job related safety information from top to bottom is quite successful. But it is common to all organizations that bottom up communication is rather poor. Employees seem very reluctant to report incidents and near misses to the relevant management representatives. The obvious reason for this situation could be the blame culture in Sri Lankan organizations. As wasdiscussed under the Swiss Cheese Model in the literature review,these organizations are still focusing on active failures, not latent failures, which have existed for a long time within the organization itself. Therefore, employees are reluctant to accept their failures due to the fear of punishment. This situation creates a great barrier to gettingactual and real time information of incidents/near-misses; hence, effective corrective measures cannot be implemented to prevent recurrence. In most of the quality and safety management systems including the ISO family and OHSAS, continuous improvements are highly promoted to keep the system dynamic, through a PDCA (Plan, Do, Check, Act) cycle. However, as far as Safety Management Systems are concerned accident/incident reporting is a key factor in the feedback loop. Therefore, weaknesses in bottom up communication might disturb the effectiveness of the entire management system.

The data analysis showed a significant number of employees in the maritime industry in Sri Lanka are risk takers. 42% of respondents agreed that they take risks on their jobs. It is important to understand the influential social and environmental

factors related to taking risks. It is clear that customer pressure for meeting time targets and high quality jobs exert great pressure on employees in the maritime industry in Sri Lanka. The pressure from customers exceeds that of their own administration forcing them to commit some unsafe acts. Followed by the customer pressure, employees tend to resort to shortcuts to complete their tasks due to pressure from their superiors/supervisors. Here it is reconfirmed that unsafe acts due to lack of knowledge or for convenience are very limited and it proves that working groups are knowledgeable and they probably know the consequences as well. However, the concern of these employees about their working environment is very poor. The data confirms that they are not making great efforts to make the working environment safer. One key reason behind this situation may be lack of peer pressure (3.27 on 5 point Likert scale, Figure: 20) to prevent them from making the environment unsafe. It is also noticed that employees are willing to take risks even without external pressure up to a certain extent. Consequently, it is understood that employees in the maritime industry in Sri Lanka accept risks.This attitude and behavior is not challenged by their peer groups and they are reluctant to change their customs and work patterns.

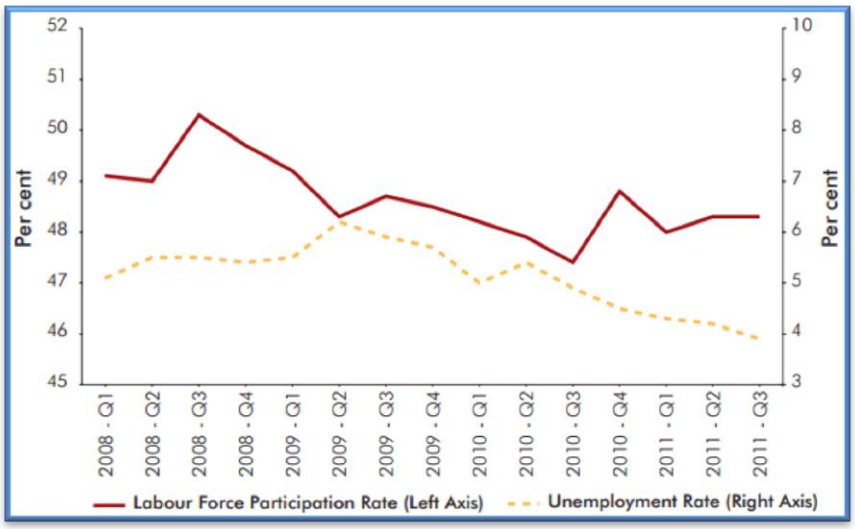
5.2 Qualitative data: General considerations

The outcome of the qualitative data analysis is discussed in this section. This part of the analysis also provides some insight into the results ofthe quantitative analysisand some of the comments of the respondents confirm the previous results.

It is important to note that the greatest challenge to developing a safety culture in the maritime industry in Sri Lanka is a Socio-cultural issue. The social status of people and their cultural background are the two key socio-cultural barriers amongst others and these two factors negatively influenced both theeducation system and the subcontractor related issues (Figure 21& 23). The education system and its negative

impact in developinga safe working culture has already been discussed in theprevious discussion under the quantitative data analysis and this analysis reconfirmsthe previous argument.

Being a developing country, the average family income of a Sri Lankan family is not very high. Due to the war that lasted three decades in the country with the separatist Tamil rebels, the country had to invest huge amounts of money in the war until 2009. This year President Rajapaksha's government eradicated the terrorism from the island and we can see improvements in many sectors after the year 2009."A survey conducted by the Department of Census and Statistics indicate that the average income of Sri Lankans have increased by 38.7% during the 2009/2010 compared to the income received in 2006/2007" (Media center for national development of Sri Lanka, 2011). In addition to that, people have more employment opportunities than in the war period. The unemployment rate also dropped to its lowest ever rate of 4.2 per cent in 2011 (Central Bank of Sri Lanka, 2011, pp.82).The graph in Figure 27 shows theincreasingemployment and decreasing unemployment rates of the country in the recent past.



Source: Central Bank of Sri Lanka Annual Report – 2011 pp.92

Figure 27: Labour force participation and unemployment rate in Sri Lanka

According to the Maslow (1970, pp.18), “if the physiological needs are relatively well gratified, there then emerges a new set of needs, which may be categorized roughly as the safety needs”. Accordingly, the situation can be interpreted by saying that the society was devoted to fulfillingits physiological needs in the past due to the poor economic situation and with the current positive trends of development we can expect society will give their due consideration to establish safety in their organizations as well as in the society.

Thenext key-factor which was highlighted under Socio-cultural issues is Cultural background, which indicates that employees are reluctant to change their work patterns and habits. This factor was also discussed under the quantitative data analysis with relation to flexibility of customs and practices (Figure 20). However, it is interesting to note, according to the respondents, that habits such as lack of punctuality also create barriers to the development of a safety culture (X17, Table 6). “The people of Sri Lanka are not strictly punctual in social situations, where personal relationships, especially with family, take priority” (Society and Culture Sri Lanka, 1993, pp.11).

Problems related to Management Commitment, the factor with the second highest code frequency, also highlighted one key obstacle to safety culture development, namely Safety management systems. None of these three organizations havea certified SMS in their organization (e.g.OHSAS 18001, BS 8800).This issue was noted when analyzing the quantitative data because it was highlighted that the top management commitment has not penetrated through to the next level of administration and reached the shop-floor.

Problems related to Attitudes and Behaviors highlighted the attitude towards the safety of employees, which is responsible for 50% of this situation.This was discussed previously under the lack of peer pressure for unsafe acts of employees. The overall rating for peer pressure was 3.27 in 5point Likert scale, which is

relatively low value (Figure 20), for a industry like maritime, where the risk level is quite high.

Under this analysis it was found that some of the respondents mentioned the inappropriateness of punishment/reward schemes for unsafe/safe behaviors of employees. It says that “culture may impact what employees find motivating, as well as how they respond to rewards and punishments. For example, Americans tends to emphasize personal growth, accomplishment, and ‘getting what you deserve’ for performance as the most important motivators” (Benowitz, 2011). Therefore finding appropriate reward and punishment schemes and establishing them throughout the organizations is quite important.

Risk Communication has the fourth highest code frequency. The inadequacy of resources in both human and physicalspheres negatively affectsthe communication mechanism and cause lack of communication within the organizations.

The impact of Employee Empowerment related issues onsafety culture development is notas prominent as the factors discussed so far. However,lack of a strong health and safety legal framework is highlighted under the External Factors, which is quite important to encourage both employers and employees toward higher safety standards.

6. CONCLUSION

The aim of this chapter is to conclude the findings conferred under the topics of Data Analysis and Discussion, with special reference to the three-fold objectives of this study put forward at the beginning.

One of the objectives of the study was “to examine the underlying factors which contribute to the improvement of safety culture in the maritime industry in Sri Lanka”. It is quite clear that most of the safety performance indicators in the Sri Lankan maritime industry have been improved significantly in the last 20 years. However, it is understood that trade union support and employee commitment has not developed compared to other areas such as top management commitment, usage of PPEs, and documentation. It was found that the improvement of employee knowledge, changes in top-management, customer demand and increasing external pressures on organizations for safety are the key underlying factors for the above mentioned developments. Here also the trade union role is not as significant as others.

The second objective of the study was “to determine the relative influential power of some social and cultural factors which could uplift the safety culture in the Sri Lankan maritime industry”. It was understood that people are not very safety conscious in their day to day life and also noted that their level of risk acceptance is high. Therefore, it is reasonable to conclude that employees are ready to take a high

level of risk on their jobs. It is also noted that peer-pressure to prevent their colleagues from unsafe acts is not strong. Respondents rated them as reluctant to change and the flexibility of working practices and customs is limited. This gives an idea that people are reluctant to give-up their way of doing things although it is not safe to continue.

However the majority of employees are from middle class families with higher educational backgrounds and they have the willingness to continue their education. This is one key factor in the historical evolution of safety in this industry. Since the maritime industry is highly globalized, social pressure to achieve higher safety standards is imminent.

The third objective of the study was "to understand the barriers and lapses to create a positive safety culture within maritime organizations in Sri Lanka". Unavailability of sound and updated regulatory infrastructure for industrial safety standards is identified as one key barrier tothedevelopment of a safety culture in Sri Lankan organizations. It is also noted that safety is not included in the formal education system and safety education has not been promoted in the past. External pressure to uplift the safety performances, such as from customers andlabour officers is basically directed to the top management. But the impact of that pressure does not pass to the shop floor level employees and, hence, their commitment to improve the safety of their working environment is minimal.

There is enough evidence to prove that top-management's high degree of commitment to creatinga safe working environment exists, but that effort is not reflectedin the middle level management of these organizations as efforts such as safety committees are not properly functioning. It is also found that the SMSs of these organizations are not certified. Therefore the top management should have a holistic approach to overcome this hurdle, which is a significant barrier to developinga safety culture. It was also noted that trade unions are not exerting a positive influence on the development of a safety culture.

Bottom-up communications of these organizations are significantly poor due to the existence of blame culture. This is a big barrier to improving safety because most of the important information does not reach the top-level decision makers. High-level of risk acceptance of employees also makesa negative impact on safety culture.

The researcher used five main safety culture parameters which have been used by several researchers for many years to measure safety culture in organizations as was pointed out under the Literature Review (e.g.Ooshaksaraie 2009, Weegmann 2007, Kulchartchai, 2010). They are:Socio-cultural Dimensions, Top-Management Commitment, Employee Involvement & Empowerment, Risk Communication and Employees Attitudes and Behaviors.

According to the quantitative data analysis, the overall rating of socio-cultural dimensions is 3.5, which is not very strong as it is just at the mid-point of "good" on theLikert scale. On the other hand, the qualitative data shows that socio-cultural issues is the key area which poses the greatest challenge to creating a safety culture in these organizations.

As much as 87% of respondents believe that the present top managements are committed to safety. However, it should be noted that due toa lack of recognized and certified SMS, this commitment at the top-management leveldoes not penetrate through to the next administration levels and ultimately to the shop floor level employees to achieve higher results.

65% of the participants were satisfied with the level of empowerment of employees, which is a high value. However, it is highlighted that trade union support for improving safety culture is insufficient (i.e. 47%, Figure .6) It is also found that trade union pressure for improper empowerment and misuse of their power against safety related decision making creates barriers for safety culture development.

Level of Risk Communication is accepted by 61% of participants, which is another area deservingof concentration for improvements. The lack of resources and

mechanism to convey risk related information is highlighted under the qualitative data analysis.

The final key point, Attitude to Risk is one area which is marked significantly low. The results proved that employees are taking risks due to various factors; especially due to inappropriate attitudes towardthe safety of employees that make them rather lethargic in safety related work.

Being a tropical country, employees have natural resistance to the use of PPEs due to the high temperature and humidity throughout the year. Also,the inherent unsafe conditions of this industry are another challenge to creating a positive safety culture. It is also very important to provide a comprehensive legal framework by the government to encourage both employers and employees to give their fullest support to the creation of a safety culture in their respective organizations.

However considering the overall result, the researcher would like to conclude this discussion by stating thatthe safety culture of the maritime industry in Sri Lanka has significantly improved in the recent past and at the moment it is well established. However, there are a few areas to concentrate on and improve with a view to making it stronger, with special attention to the Socio-cultural aspects and behaviors and attitudes of the Sri Lankan society.

6.1 Limitations of the study

The researcher has justified his criteria of this research providing various examples. However it is obvious that still there are limitations of this study which could influence the final result. The aim of this chapter is to discuss some of these limitations which were identified by the researcher.

There are a significant number of subcontract employees with minimum literacy levelswho are handling the most risky jobs in this industry. This type of questionnaire may not be able to capture their ideas for analysis.

Due to the fact that this questionnairewasstructured around six key factors to measure safety culture, it has been noted that employees tendtorelatemost of the prevailing issues to one of the above six factors, which could restrict them from coming up with their own views.

Questionnaire always tend to restrict respondents to a given framework. Even when the questionnaire carries open-ended questions, the depth of answers that the respondent can provide tend to be more-limited than in other methods such as interviewing.

It is also practically difficult to set the questionnaire in a way that employees at all levels of the organizational hierarchy can provide their views with the same effectiveness. On the other hand there is no way to measure how truthful a respondent is being.

When it comes to the Grounded Theory approach, it is said that due to the difficulties and weaknesses encountered when applying grounded theory, this methodology is still not widely used or understood by researchers in many disciplines (Allan, 2003). On the other hand it was noted that most of the respondents tried to relate their comments to one of the 6 key topics of the questionnaire and they restricted themselves to that framework. The other important factor is people who are not strongly literate were not been able to express their ideas, so their experience and perceptions are not reflected in this outcome.

Due to the time restrictions for this study, the researcher did not extensively analyze the existing accident and incident data of these maritime organizations, instead collecting views of employees. Employees naturally wanted to pretend to be safe workers and hence their answers may not be very accurate every time.

This is a study which was completed in reasonably short period of time. Therefore, the sample population is restricted to 101. If the sample size werelarger, the researcher would have reached a better conclusion with much clearer trends.

6.2 Recommendations for further studies

This research was focused on a wide range of variables/parameters which possibly affect the safety culture in the maritime industry in Sri Lanka. From this study it was found that there is a major barrier from Socio-cultural factors and employees' attitudes towards safety to creating a safety culture in the Sri Lankan maritime industry. Therefore,further studies on the above two factors could help to have a clear idea about the underlying factors for these issues and possible countermeasures to improve the situation. It is also important to develop a reliable assessment tool to measure the above two factors with close attention to national culture.

There were a lot of opinions and criticisms about the lack of updated regulatory framework and lapses in formal safety education. Therefore, it wouldbe interestingto research whether there is an influence of these two factors onsafety culture development in Sri Lanka.

7. REFERENCES

Agarwal, M., &Misra, G. (1993). Socio-cultural values and relative deprivation in work organizations. *Journal of industrial relations*, *28*(4), 327-340.

Aini, M. S., &Fakhrul-Razi, A. (2010).Development of socio-technical disaster model. *Safety Science*,*48*(2010), 1286-1295.

Allan, G. (2003). A critique of using grounded theory as a research method. Electronic Journal of Business Research Methods, 2(1): 1–10.

Allen, S. (2009). *Developing a safety culture: The unintended consequence of a 'one size fits all' policy* (Unpublished master's thesis).University of Technology Sydney.

Alwis, W. P. G., &Senathiraja, R. (2003, November). *The impact of socio – cultural background of the entrepreneur on management and business practices of selected small and medium scale businesses in srilanka*. , Matara, Sri Lanka. Retrieved on August 23, 2012 from the World Wide Web:http://www.slageconr.net/slsnet/9thicsls/fullpapers/fullp103.pdf

Anderson, M., &Denkl, M. (2010, April). *The Heinrich accident triangle - too simplistic a model for HSE management in the 21st century?*.SPE international conference on health, safety and environment in oil and gas exploration and production, Rio de Janeiro, Brazil.doi: 10.2118/126661-MS.

Baird, D. (2003). *The Interaction between the implementation of an occupational health and safety management system and safety culture : A case study in the rubber industry* (Unpublished master's thesis). The university of as Aston in Birmingham.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ : Prentice-Hall Prentice-Hall.

Bea, R. (2010, May 18). Failures of the deepwater horizon semi-submersible drilling unit [Letter].Center for catastrophic risk management, California, Deepwater Horizon Study Group.

Beck, U. (1992). *Risk society: Towards a new modernity*. (2008 ed.). London: Sage Publications.

Benowitz, E. A. (2011). *Cliffsquickreview Principles of management*. Hoboken: Wiley Publishing Inc.

Bhattacharya, S., & Tang, L. (2012). Middle managers' role in safeguarding ohs: The case of the shipping industry.*Safety science, 51*(2013), 63-68.

Blumenberg, M. A. (1996). *Human factors in diving* (Doctoral dissertation, University of California). Durham: The Rubicon Research Repository.

Bosse, H. (1975). Socio-cultural factors of underdevelopment. overcoming underdevelopment as a learning process . *Journal of peace research,12*(4), 315-329.

Bowden, E. (1971). Cluster density analysis of dimensional socio-cultural evolution models. *American anthropologist, 73*(1), 96-100.

Carlsmith, J.M. Ellsworth, P.C and Aronson, E. (1976).*Methods of research in social psychology,* Anderson – Wesley. London, UK.

Central Bank of Sri Lanka.Ministry of Finance, (2011).*Annual report 2011*.Retrieved September 5, 2012 from the World Wide Web: http://www.cbsl.gov.lk/pics_n_docs/10_pub/_docs/efr/annual_report/AR2011/English/content.htm

Cheyne, A., Cox, S., Oliver, A., &Manuel , J. (1998). Modelling safety climate in the prediction of levels of safety activity. *Work & Stress: An International Journal of Work, Health &Organisations, 12*(3), 255-271.

Clarke, S. (1999). Perceptions of Organizational Safety: Implications for the Development of Safety Culture. *Journal of Organizational Behavior, 20*(2) (March., 1999), pp. 185-198. http://www.jstor.org/stable/3100419

Colombo Dockyard Plc. (2009).Accident analysis report.

Cooper, M.D. (1993). *Reciprocal Model for Measuring Safety Culture*, Applied Behavioral Sciences, Hull, UK.

Cooper, D. (1998). *Improving safety culture: A practical guide*. Hull: John Wiley & Sons Ltd.

Cooper, D. (2000). Towards a model of safety culture..*Safety Science, 36*, 111-136.

Cooper, D. (2002a, March). *Surfacing your safety culture*. Major Hazard Commission at the Federal Ministry of Environment Human factors conference, Germany.

Cooper, D. (2002b). Safety culture: A model for understanding and quantifying a difficult concept. *Professional Safety, 4*(June), 30-36.

Cooper, M. D. (2004). Exploratory analysis of the safety climate and safety behavior relationship. *Journal of safety research, 35*(2004), 497-512.

Cooper, M. D. (2008, April). *Risk-weighted safety culture profiling*.Spe international conference on health, safety, and environment in oil and gas exploration and production, Nice, France.

Cooper, D. (2012, March). *Human factors in accidents*.Revitalising health and safety- achieving the hard target, Durham, UKRetrieved September 09, 2012 from the World Wide Web: http://www.behavioural-safety.com/articles/Human_factors_in_accidents.pdf

Cox, S., & Cox, T. (1991). structure of employee attitudes to safety - a European example. *Work and Stress, 5*, 93-106. Cox, S. J., &Flin, R. (1998). Safety culture: philosopher's stone or man of straw? . *Work and Stress, 12*(3), 189-201.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed method approaches*. Thousand Oaks, CA: Sage Publications.

Crone, W. P. (1987). *Maritime safety administration and contemporary pressures*. Canberra, A.C.T.: [s.n.].

Department of Census and Statistics. (2010). *Sri lankalabour force survey: Annual report - 2010* .Retrieved September 08, 2012 from the World Wide Web:http://www.statistics.gov.lk/samplesurvey/LFS_Annual Report_2010.pdf

Florczak, C. M. (2002). *Maximizing profitability with safety culture development*. Amsterdam: Butterworth-Heinemann.

George, A. (2003). A critique of using grounded theory as a research method . *The Electronic Journal of Business Research Methods, 2*(1), 1-10. September 19, 2012 from the World Wide Web http://ejbrm.com/volume2/issue1/p1

Gillham, B. (2008). *Developing a questionnaire* (2nd ed.). London, UK: Continuum International Publishing Group Ltd.

Glaser , B. G., & Holton, J. (2004). Remodeling grounded theory. *The Grounded Theory Review, 4*(1), 1-24.

Glaser, B. G., & Strauss, A. L. (2009). *The discovery of grounded theory: Strategies for qualitative research*. New Brunswick, N. J.: Aldine Publishing. (2009 ed.).

Government of Sri Lanka.Ministry of finance and planning, (2010). *Mahindachinthanaya*. Colombo: Department of national planning.

Guldenmund, F. W. (2007). The use of questionnaires in safety culture research – an evaluation. *Safety Science,45*(2007), 723-743.

Havold, J. I. (2000). Culture in maritime safety. *Maritime policy & management: The flagship journal of international shipping and port research, 27*(1), 79-88.

Håvold, J. I. (2005, April 11). Safety culture in a Norwegian shipping company. *Journal of Safety Research,36*(2005), 441 – 458.

Health and Safety Commission (HSC). 1993. ACSNI Study Group on Human Factors. 3rd Report: Organising for Safety. London: HMSO.

Health and Safety Executive (HSE), 2002. *Human Safety Culture: A review of the literature.* : Final Report. Prepared by Ron S Gadd and A M Collins.

Health and safety executive. (2005).*A review of safety culture and safety climate literature for the development of the safety culture inspection toolkit* (Rep. No. 367). Bristol: Human Engineering.

Hee, D. D., Pickrell, B. D., Bea, R. G., & Roberts, R. B. (1999). Safety management assessment system (smas): a process for identifying and evaluating human and organization factors in marine system operations with field test results. *Reliability engineering and system safety, 65*(1999), 125-140.

Heinrich, H. W. (1931). *Industrial accident prevention: A scientific approach*. (1959ed.). New York: McGraw-Hill.

Helmreich, R. L. and Merritt, A R. L., (1998). *Culture at Work in Aviation and Medicine: National, Organizational and Professional Influences*, Ashgate Publishing Limited, United Kingdom.

Hetherington, C., Flin, R., &Mearns, K. (2006). Safety in shipping: The human element. *Journal of Safety Research*, *37*(2006), 401-411.

Hofstede, G. (1980). *Culture's consequences.International differences in work-related values*. Beverly Hills, Calif.: Sage.

Hofstede, G. H. (2002). *Culture's consequences, comparing values, behaviors, institutions, and organizations across nations*. Sage Publications, Inc.

Høivik, D., Tharaldsen, J. E., Baste, V., & Moen, B. E. (2009). What is most important for safety climate: The company belonging or the local working environment? – a study from the norwegian offshore industry. *Safety Science*, *47*(2009), 1324-1331.

Huang, P. Y., Chen, Y. C., Krauss, A. D., & Rogers, D. A. (2004). Quality of the execution of corporate safety policies and employee safety outcomes: Assessing the moderating role of supervisor safety support and the mediating role of employee safety control.*Journal of business and psychology*, *18*(4), 483-506.

International Labour Office.(2005). *Safety and health in ports*. Geneva: International Labour Office.

International Maritime Organisation. (2002). Safer shipping demands a safety culture. Paper presented at the World Maritime Day.

Johnson, M. L., &Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educ Researcher*, *33*(7), 14-26. Retrieved from http://www.socsci.uci.edu/ssarc/sshonors/webdocs/MixedMethodsResearch.pdf

Jones, M. L., Kriflik, G., &Zanko, M. (2005).*Grounded theory: A theoretical and practical application in the Australian film industry*.

Kaplan, M. (2004). *Cultural ergonomics.* Amsterdam: Elsevier JAI.

Kasperson, R. E., &Kasperson, J. X. (1996). The social amplification and attenuation of risk . *American Academy of Political and Social Science*, *545*, 95-105.

Kausek, J. (2007). *OHSAS 18001: Design and implementing an effective health and safety management system*. Plymouth: Government institute.

Kjellén, U. (2000). *Prevention of accidents through experience feedback*. London: Taylor & Francis. (pp.61).

Kletz, T. A. (2001). *Learning from accidents*. Oxford: Gulf Professional.

Krause, T. R., Hidley, J. H., &Hodson, S. J. (1990). *The behavior-based safety process: Managing involvement for an injury-free culture*. New York: Van Nostrand Reinhold.

Kulchartchai, O., &Hadikusumo, B.H.W. (2010).Exploratory Study of Obstacles in Safety Culture Development in the Construction Industry: A Grounded Theory Approach. *Journal of Construction in Developing Countries*, *15*(1), 45–66.

Kuo, C. (2007). *Safety Management and its maritime applications*. Middlesex: The Nautical Institute.

LBO. (2011, February 09). Sri lanka port container volumes hit new high. *Lanka Business Online*. Retrieved from http://www.lankabusinessonline.com/fullstory.php?

Lee, T. (1998).Assessment of safety culture at a nuclear reprocessing plant. *Work & Stress: An International Journal of Work, Health &Organisations*, *12*(3), 217-237.

Lei, T. J., Butler, S., &Sabagh, G. (1972).Family socio-cultural background and the behavioral retardation of children. *Journal of health and social behavior,13*(3), 1972.

Lidskog, R. (1993). Book Reviews : Ulrich Beck: The Risk Society. Towards a New Modernity. London: Sage, 1992. *ActaSociologica*, *36*(4), 400-403. doi: 10.1177/000169939303600409

Manuel, M. E. (2009). *Safety-related orgnizational learning and risk construal in shipping companies* (P.hD thesis, World Maritime University, 2009). Malmo, Sweden: World Maritime University.

Mathupala, M. C. (1982). In G Nanayakkara (Chair).*Tranferability of western management systems in the srilankan context*.Management in a socio-cultural context, Colombo.

Nanayakkara, G. (1988). *Culture and Management in Sri Lanka*.(3rd, Ed.) Colombo: Postgraduate Institute of Management.

New Safety Culture: Conference Proceedings. London: Institute of MarineEngineers, 1998. Print.

New Safety Culture: Conference Proceedings. London: Institute of Marine Engineers, 1999. Print.

Ooshaksaraie, M. Majid.A.Ab,Yasir.M.S, Yahaya.R, (2009a), Safety Culture Evaluation in the Metal Products Industry of Iran, European Journal of Social Sciences, *11*(1), 160-169.

Ooshaksaraie,M. Majid.A.Ab,Yasir.M.S, Yahaya.R, (2009b), The impact of companies' age on safety culture in the metal products industries, *American Journal of Engineering and Applied sciences*, *2*(4), 735-742.

Patankar, M. S. (2011). *Safety culture: Building and sustaining a cultural change in aviation and healthcare*. Burlington, VT: Ashgate Pub.

Perrow, C. (1984), *Normal accidents: Living with high-risk technologies*. Basic books, Inc. Publishers, New York.

Pidgeon, N. & O'Leary, M. (2000). Man-made disasters: why technology and organizations (sometimes) fail. *Safety Science*, *34*, pp15-30.

Pole, C., &Lampard , R. (2002). *Practical social investigation: Qualitative and quantitative methods in social research*. Essex: Prentice Hall.

Raizada, V. K. V. (1985). Industrial conflict resolution and socio-cultural values. *Journal of industrialr relations*,*21*(4), 73-85.

Reason, J. (1990). *Human error*. (2003 ed.). New York: Cambridge university press.

Reason, J. (1993) *Managing the management risk – New approaches to organizational safety*. in: Wilpert, B. and Qvale, T. (Ed s). *Reliability and Safety in Hazardous work systems: Approaches to Analysis and Design* (pp. 7-22). Hove (UK): Lawrence Erlbaum.

Salas, E., and Maurino, D. (2010). *Human factors in aviation*. (2 ed.). London, UK: Elsevier Science.

Scott, G. E. (1994). Ten principles for achieving a total safety culture. *Professional Safety*, *39*(9), 18-24.

Shahul, M. (2002). Country Report on the Trade Union Situation in Sri Lanka, Retrieved September 01, 2012 from the World Wide Web: http://library.fes.de/pdf-files/iez/01964.pdf

Shappell, S., &Wiegmann, D. (2004). *HFACS analysis of military and civilian aviation accidents: a north American comparison* . Australia.

Silva, K. M. D. (1981). *A history of srilanka*. Lomdon: C. Hurst and Company. Retrieved September 07, 2012 from the World Wide Webhttp://www.ucpress.edu/op.php?isbn=9780520043206

Smith, E. V. (1978). Four issues unique to socio-cultural indicators. *Social indicators reseach*, *5*(1), 111-120.

Smith, A. P., & Wadsworth, E. K. (2009). *Safety culture, advice and performance: The associations between safety culture and safety performance, health and wellbeing at an individual level, and safety culture, competent occupational safety and health advice, and safety performance at a corporate level* (Rep. No. 09.1). Leicestershire: IOSH.

Thaden, T.L. (2008). The Safety Culture Indicator Scale Measurement System (SCISMS), U.S. Department of Transportation. Federal Aviation Administration. Retrieved September 21, 2012 from the World Wide Web: http://www.tc.faa.gov/logistics/grants/pdf/2001/01-G-015.pdf

The gazette of the democratic socialist republic of Sri Lanka.An ordinance to make provision for the safety and welfare of workers in factories, no. 45 of 1942.

The gazette of the democratic socialist republic of Sri Lanka-No.1667/41. (2010). Employment of women, young persons and children act No. 47 of 1956-Friday.

The institute of engineering and technology.(2010). Safety culture. *Health & safety briefing*, (7), 1-4.

Thompson, R. C., Hilton, T. F., & Witt, L. A. (1988). Where the Safety Rubber Meets the Shop Floor: A Confirmatory Model of Management Influence on Workplace Safety. *Journal of Safety Research*, *29*(1), 15-24.

Wiegmann, D. A., H. Zhang, T. L. von Thaden, G. Sharma, and A. A. Mitchell. 2002. A Synthesis ofSafety Culture and Safety Climate Research. University of Illinois Aviation Research Lab Technical.Report ARL-02-03/FAA-02-2.

Wiegmann, D. A., &Shappell, S. A. (2003). *A human error approach to aviation accident analysis: The human factors analysis and classification system*. Aldershot, Hants, England: Ashgate.

Wiegmann, D. A., Thaden, T. L., & Gibbons, A. M. (2007). A review of safety culture theory and its potential application to traffic safety. *AAA Foundation for Traffic Safety*, Retrieved on July 08, 2012 from the World Wide Web: http://www.aaafoundation.org/pdf/WiegmannVonThadenGibbons.pdf

Willig, C. (2008). *Introducing qualitative research in psychology: Adventures in theory and method*. Maidenhead: McGraw-Hill Open University Press.

Winbow, A. (2003). The Human Element. *Copenhagen Quality Shipping Conference, Session III* (pp. 1-5). Copenhagen: International Maritime Organization.

Wreathall, J. 1995. Organizational culture, behavior norms, and safety.*Proceedings of the International Topical Meeting on Safety Culture in Nuclear Installations*. pp. 24–28. Vienna, Austria.

Zinn, J. O. (2006). Recent developments in sociology of risk and uncertainty. *Historical social reseach*, *31*(2), 275-286.

APPENDICES A (Definitions for safety culture)

Source: Wiegmann&Thaden (2002)

Source/Industry	Definitions
(Carroll 1998) Nuclear power, US	Safety culture refers to a high value (priority) placed on worker safety and public (nuclear) safety by everyone in every group and at every level of the plant. It also refers to expectations that people will act to preserve and enhance safety, take personal responsibility for safety, and be rewarded consistent with these values.
(Ciavarelli and Figlock 1996) Naval aviation, US	Safety culture is defined as the shared values, beliefs, assumptions, and norms which may govern organizational decision making, as well as individual and group attitudes about safety.
(Cooper 2000) Theoretical	Safety culture is a sub-facet of organizational culture, which is thought to affect member's attitudes and behavior in relation to an organization's ongoing health and safety performance.
(Cox and Cox 1991) Industrial gases, European	Safety culture reflects attitudes, beliefs, perceptions, and values that employees share in relation to safety.
(Cox and Flin 1998) Theoretical (Lee 1998) Nuclear reprocessing, UK (Wilpert 2000) Theoretical in context of nuclear power	The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management.
(Eiff 1999) Aviation, US	A safety culture exists within an organization where each individual employee, regardless of their position, assumes an active role in error prevention and that role is supported by the organization.
(Flin, Mearns, Gordon, and Fleming 1998) Offshore oil and gas, UK	Safety Culture refers to entrenched attitudes and opinions which a group of people share with respect to safety. It is more stable [than safety climate] and resistant to change.
(Helmreich and Merritt 1998) Aviation, US	Safety culture (p 133): a group of individuals guided in their behavior by their joint belief in the importance of safety, and their shared understanding that every member willingly upholds the group's safety norms and will support other members to that common end.
(McDonald and Ryan 1992) Theoretical in context of road transportation (Mearns and Flin 1999) Theoretical (Pidgeon 1991) Theoretical (Pidgeon and Oleary 1994) Theoretical in context of aviation	Safety culture is defined as the set of beliefs, norms, attitudes, roles, and social and technical practices that are concerned with minimizing the exposure of employees, managers, customers, and members of the public to conditions considered dangerous or injurious.
(Mearns, Flin, Gordon, and Fleming 1998) Offshore oil and gas, UK	Safety culture is defined as the attitudes, values, norms and beliefs which a particular group of people share with respect to risk and safety.
(Meshkati 1997) Transportation industry, US	Safety culture is defined as that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance.
(Minerals Council of Australia 1999) Mineral industry, Australia	Safety culture refers to the formal safety issues in the company, dealing with perceptions of management, supervision, management systems, and perceptions of the organization.
(Pidgeon 2001) Theoretical in context of driver behavior	A safety culture is in turn the set of assumptions, and their associated practices, which permit beliefs about danger and safety to be constructed.

Source/Industry	Definitions
(BASI 1996) Civil aviation, Australia	The procedures and rules governing safety within an organization are a reflection of its safety climate, which is centered around employees perceptions of the importance of safety and how it is maintained within the workplace.
(Cheyne, Cox, Oliver, and Thomas 1998) Manufacturing, UK and France	Safety climate can be viewed as a temporal state measure of culture, which is reflected in the shared perceptions of the organization at a discrete point in time.
(Dedobbeleer and Beland 1991) Construction, US	Safety climate is viewed as an individual attribute, which is composed of two factors: management's commitment to safety and workers' involvement in safety.
(Flin, Mearns, Gordon, and Fleming 1998) Offshore oil and gas, UK	Safety Climate refers to the perceived state of safety of a particular place at a particular time. It is, therefore, relatively unstable and subject to change depending on features of the operating environment.
(Flin, Mearns, O'Connor, and Bryden 2000) Review of various industries, only one aviation related study	Safety climate is the surface features of the safety culture discerned from the workforce's attitudes and perceptions at a given point in time.
(Griffin and Neal 2000) Manufacturing and Mining, Australia	Safety climate should be conceptualized as a higher-order factor comprised of more specific first-order factors. First-order factors of safety climate should reflect perceptions of safety-related policies, procedures, and rewards. The higher order factor of safety climate should reflect the extent to which employees believe that safety is valued within the organization.
(Hofmann and Stezer 1996) Utilities, US)	Safety climate is operationalized as perceptions regarding management's commitment to safety and worker involvement in safety-related activities.
(Mearns, Whitaker, Flin, Gordon, and O'Connor 2000) Offshore oil, UK	Safety climate is defined as a "snapshot" of employees' perceptions of the current environment or prevailing conditions which impact upon safety.
(Minerals Council of Australia 1999) Minerals, Australia	Safety climate refers to the more intangible issues in the company, such as perceptions of safety systems, job factors, and individual factors.
(Yule, Flin, and Murdy 2001) Conventional power, UK	Safety climate is defined as the product of employee perception and attitudes about the current state of safety initiatives at their place of work.
(Zohar 1980) Manufacturing, including metal, food, chemical, and textile, Israel	Safety climate is a particular type of organizational climate, which reflects employees' perceptions about the relative importance of safe conduct in their occupational behavior. It can vary from highly positive to a neutral level, and its average level reflects the safety climate in a given company.
(Zohar 2000) Manufacturing, Israel	Group level safety climate refers to shared perceptions among group members with regard to supervisory practices.

APPENDICES B (Questionnaire – English)

Survey & Questioner on Safety Cultures in Sri Lankan Maritime Organizations

Research topic: a socio-cultural analysis of building and improving safety culture: case study of the maritime industry in Sri Lanka

Scale

Scale	1	2	3	4	5
	Extremely poor	Poor	Moderate	Good	Excellent

1. Evolution of safety culture in maritime industry in Sri Lanka

	Do you think that the safety of your organization had been improved during the last 20 years?	Y	N
	If yes, in which of the following area/s had been improved (please mark X)		
	Usage of Personal Protective Equipment		
	Procedures, policies and other safety related documentation		
	Employee's work pattern		
	Employees' knowledge on safety		
	Top management commitment		
	Employees' commitment		
	Trade union support		
	Any other reason, please specify;		
	If yes, according to your understanding, what are the factors that influenced these changes		
	Changes in top management		
	Increasing external pressure (public and institutional pressure)		
	Trade union demand for safety		
	Changes in national laws		
	Employees' knowledge		
	Demand of the customer		
	Any other reason, please specify;		
	If No, can you give any reasons?		

	How would you rate the employees' competency at present with the past, in relation to handling their job in safe manner?	1	2	3	4	5
	How would you rate the evolution of employees' attitude towards safe working environment over a period of time?	1	2	3	4	5
	How would you rate the evolution of management's attitude towards safe working environment over a period of time?	1	2	3	4	5
	In your understanding, what are the major social and/or cultural factors which influenced the changes in safety culture? Please give some examples if any.					

2. Socio-cultural dimensions:

	Description						
2.1	How would you rate your attitudes towards safety in your daily life?			1	2	3	4	5
2.2	How many times have you been charged/fined for breaking traffic rules?							
2.3	How would you rate the level of occupational safety-related knowledge you gained through formal education or training programmes before recruitment?			1	2	3	4	5
2.4	According to your perception, how is the academic background of your parents?			1	2	3	4	5
2.5	How would you rate your family income level before you joined this organization			1	2	3	4	5
2.6	What are your academic and technical qualifications at the time of recruitment?	Below GCE O/L	GCE O/L	GCE O/L + Technical qualification	GCE A/L	A/L + Technical qualification		
2.7	How would rate your commitment to improve your job related skills and knowledge?			1	2	3	4	5
2.8	According to your understanding what is the most important socio-cultural factor which could influence one's safe behavior?							

3. Top management commitment:

3.1	Do you think that the present top management is committed enough to create a safe working environment in the organization?					Y	N
3.2	How do you rate the allocation of money/resources by the top management for improvement of safety?	1	2	3	4	5	
3.2	How would you rate the workplace tidiness and housekeeping?	1	2	3	4	5	
3.3	How would you rate the status and credibility of safety officer/manager?	1	2	3	4	5	
3.4	How would you rate the effectiveness of safety committee?	1	2	3	4	5	
3.5	According to your understanding, what is the most important role of the top management to create safe working environment in the organization?						

4. Employee involvement & Empowerment:

4.1	Do you think that the employees are adequately involved in solving safety related issues?					Y	N
4.2	How would you rate the employees' empowerment in safety related decision making?	1	2	3	4	5	
4.3	How would you rate the pre-planning and safety related instructions you received before you attend to your work?	1	2	3	4	5	
4.4	What is your estimation of your level of knowledge and skill to perform you daily work?	1	2	3	4	5	
4.5	Do you know your responsibility assigned by the organization with regard to safety of work?					Y	N
4.5a	How best are you fulfilling those assigned responsibilities?	1	2	3	4	5	

4.5b	If No What are the strategies that the organization should adopt to get more support/involvement of the employees?					
4.6	According to your understanding, do you think that the trade unions exerting positive influence in creating safe working environment?					
4.6a	If yes rate the influence	1	2	3	4	5
	If no, how does it make negative influence?					

5. Risk Communication

5.1	Do you think that you receive important organizational safety related information in time?				Y	N
5.2	How would you rate the communication mechanism of the organization with respect to the flow of important safety related information across the organization?	1	2	3	4	5
5.3	Are you aware of the safety rules and procedures in force related to your area of work?				Y	N
5.3a	**If yes** rate your level of compliance to those safety requirements?	1	2	3	4	5
5.3b	**If not** can you explain the reason for that?					
5.4a	If you come across any incident/near miss, would you prefer to report the incident to the safety department/higher authority?				Y	N
5.4b	Can you give reasons for above answer?					
5.5	What are your suggestions to improve risk-communication in the organization?					

6. Attitudes and behaviors

6.1	Are you taking risks while performing your duties (eg. working without personal protective equipment)?				Y	N
6.1a	What are the reasons for taking such risks? (please put "X" in appropriate box/es)					
	Work pressure from the supervisor/engineer					
	To finish the job early and enjoy the remaining time					
	To satisfy the customer by meeting time target (without pressure from superior)					
	As a practice, this is the way I have been doing for many years					
	For convenience/pride					
	Lack of knowledge about the possible negative consequences					
6.1b	If due to other reasons please specify					
6.2	Do you think that you are doing your best to make the working environment safer?				Y	N
6.2a	If **yes** please give an example: If **No** please give reasons:					
6.3	How would you rate the flexibility of organizational customs and practices when dealing with safety related issues?	1	2	3	4	5
6.4	How do you rate your attitude towards hazards (level of risk acceptance without any influence)?	1	2	3	4	5
6.5	How do rate the influence of peer pressure to prevent unsafe work practices?	1	2	3	4	5

My GRATITUDE to you for your cooperation and assistance is beyond reckoning!

APPENDICES C (Questionnaire – Sinhala)

පරිමාන

පරිමාන	01	02	03	04	05
	ඉතා හොඳයි	දුර්වලයි	සාමාන්‍ය	හොඳයි	විශිෂ්ටයි

01. ශ්‍රී ලංකාවේ නාවික කර්මාන්තයේ ආරක්ෂාව පිළිබඳ නිපුනතාවය

1.1	පසුගිය වසර 20 තුළ ඔබගේ ආයතනයේ ආරක්ෂිත භාවය දියුණුවූවාදැයි ඔබ සිතනවාද?					ඔව්	නැත
	ඔව් නම් පහත සඳහන් කිනම් අංශය/අංශයන් දියුණුවී ඇත්තේ ද (කරුණාකර X ලකුණ යොදන්න.)						
	පුද්ගලික ආරක්ෂක උපකරණ පාවිච්චි						
	ක්‍රියාමාර්ග, ප්‍රතිපත්ති සහ වෙනත් ආරක්ෂාව පිළිබඳ වාර්තා						
	සේවකයාගේ ක්‍රියාදාමයන්						
	ආරක්ෂාව පිළිබඳ සේවකයාගේ දැනුම						
	ජ්‍යෙෂ්ඨ පරිපාලකයින්ගේ කැපවීම						
	සේවකයින්ගේ කාර්මික ආරක්ෂාව පිළිබඳ උනන්දුව						
	වෘත්තීය සමිති සහයෝගය						
	වෙනත් කරුණු නිමේනම් කරුණාකර විස්තර කරන්න.						
1.2	**ඔව් නම්** ඔබගේ දැනුම පරිදි මෙම වෙනස්වීමට බලපෑ කරුණු මොනවාද?						
	කළමණාකාරිත්වයේ වෙනස්කම්						
	පිටස්තර බලපෑම් අධිකවීම (පොදු සහ ආයතනික බලපෑම්)						
	ආරක්ෂාව සඳහා වෘත්තීය සමිති බලපෑම්						
	ජාතික නීති රෙගුලාසිවල වෙනස්කම්						
	සේවකයන්ගේ දැනුම						
	පාරිභෝගික ඉල්ලුම්						
	වෙනත් කරුණු කරුණාකර පැහැදිලි කරන්න.						
	නැතිනම් ඒ පිළිබඳ ඔබට දැක්විය හැකි ද?						
1.3	අතීතයට වඩා වර්තමානයේ කාර්මික ආරක්ෂාව පිළිබඳ සේවකයින්ගේ දැනුවත් බව හා කුසලතාවයන් ඔබ ගණනය කරන්නේ කෙසේද?	1	2	3	4	5	
1.4	සේවකයන් තුළ කාර්මික ආරක්ෂාව පිළිබඳ ඇති වී යහපත් ආකල්පමය වෙනස ඔබ තක්සේරු කරන්නේ කෙසේද?	1	2	3	4	5	
1.5	ඉහළ කළමණාකාරිත්වය තුළ ආරක්ෂාව ආකල්පයම වෙනස ඔබ තක්සේරු කරන්නේ කෙසේද?	1	2	3	4	5	
	ඔබට හැගෙන පරිදි ආරක්ෂිතභාවය සඳහා සමාජීය සහ හෝ සංස්කෘතික වශයෙන් වැඩිපුර බලපාන්නේ කවර කරුණුද? නිමේනම් උදාහරණ කිපයක් ඉදිරිපත් කරන්න.						

02. සාමාජික සංස්කෘතික පරිමානයන්

	විස්තර					
2.1	ඔබගේ දෛනික ජීවිතයේ ආරක්ෂාව ගැන ඔබ ඇතිවන සැලකිල්ල කොපමණද?	1	2	3	4	5
2.2	මාර්ග නීති උල්ලංගණය කිරීම පිලිබඳ අවස්ථා කීපයක් දඩුවම් විද/දඩ මුදල් ගෙවා ඇත්ද?					
2.3	රැකියාවට සම්බන්ධ වීමට ප්‍රථම විධිමත් අධ්‍යාපනයකින් හෝ පුහුණුවීමේ වැඩසටහන් වලින් කාර්මික ආරක්ෂාව පිලිබඳ ඔබ ලැබූ දැනුම තක්සේරු කරන්න.	1	2	3	4	5
2.4	ඔබගේ දැනුම අවුන ඔබගේ දෙමව්පියන්ගේ අධ්‍යාපනික පසුබිම කෙසේ ද?	1	2	3	4	5
2.5	ආයතනයකට බැඳීමට පෙර ඔබගේ පවුලේ ආදායම කෙසේදැයි ඔබ ගණනය කරන්නේ ද?	1	2	3	4	5
2.6	ඔබ සේවයට බැඳෙනවිට ඔබගේ අධ්‍යාපනික සහ වෘත්තීය පුහුණුකම් කවරේද?	අ.පො.ස. සාමාන්‍ය පෙළ නැත	අ.පො.ස. සා. පෙළ	අ.පො.ස. සා.පෙළ + වෘත්තීය පුහුණුව	අ.පො.ස. උ. පෙළ	උසස් පෙළ වෘත්තීය පුහුණුව
2.7	ඔබගේ රැකියාවට අදාළව කුසලතා සහ වර්ධනය කර ගැනීමට ඔබ දරණ උත්සහ ගණනය කරන්නේ කෙසේද?					
2.8	ඔබගේ දැනුම අනුව ආරක්ෂිත ක්‍රමයේ හැසිරීමට වඩාත් හේතුවන සාමාජික සංස්කෘතික කරුණු කවරේද?					

03. ජ්‍යෙෂ්ඨ කළමණාකරණයේ වගකීම

3.1	වර්තමාන ජ්‍යෙෂ්ඨ පාලන අධිකාරිය ආරක්ෂිතව සේවය කිරීමට සුදුසු වාතාවරණයක් සකසා ඇති දැයි ඔබ සිතනවාද?				ඔව්	නැත
3.2	ආරක්ෂාව දියුණු කිරීම සඳහා ජ්‍යෙෂ්ඨ පාලන අධිකාරිය විසින් වෙන්කර ඇති මුදල සම්පත් ගැන ඔබගේ නිරීක්ෂණය	1	2	3	4	5
3.3	වැඩ භූමියේ පිරිසිදුභාවය සහ ගෘහ පාලනය පිළිබඳ ඔබගේ තක්සේරුව කවරේද?	1	2	3	4	5
3.4	ආරක්ෂක නිලධාරී/කළමණාකරුගේ තත්ත්වට සහ විශ්වාසනීත්වය පිළිබඳ ඔබගේ තක්සේරුව කවරේද?	1	2	3	4	5
3.5	ආරක්ෂිත කමිටු රැස්වීම්වල ක්‍රියාකාරීත්වය පිළිබඳ ඔබගේ තක්සේරුව කවරේද?	1	2	3	4	5
3.6	ඔබගේ දැනුම අනුව ආයතනයේ වඩා යහපත් ආරක්ෂාව පිළිබඳ ජ්‍යෙෂ්ඨ පරිපාලනය විසින් ගත යුතු ක්‍රියා මාර්ග මොනවාද?					

04. සේවකයාගේ බැඳීම් හා බලය පැවරීම්

4.1	ආරක්ෂාව පිළිබඳ තීරණ ගැනීමේ දී අවශ්‍ය පරිදි සේවකයා සම්බන්ධ වී ඇති දැයි ඔබ සිතනවාද?				ඔව්	නැත
4.2	ආරක්ෂා පිළිබඳව තීරණ ගැනීමේ දී සේවකයාට පවරා ඇති බලය පිළිබඳ ඔබ ගණනය කරන්නේ කෙසේ ද?	1	2	3	4	5
4.3	සේවය ඇරඹීමට පෙර ඔබට ලැබුණ පෙර සැලැස්ම සහ ආරක්ෂාව පිළිබඳ ඔබගේ ගණනය කෙසේද?	1	2	3	4	5
4.4	දෛනික සේවය යෙදීමේ දී ඔබගේ දැනුම සහ නිපුනතාවට පිළිබඳ ඔබගේ තක්සේරුව කෙසේ ද?	1	2	3	4	5
4.5	ඔබගේ ආයතනයේ ආරක්ෂාව පිළිබඳව ඔබට පවරා ඇති වගකීම් පිළිබඳව ඔබ දැනුවත් ද?				Y	N

4.5a	ඔබට පවරා ඇති වගකීම් කොතෙක් දුරට ඉෂ්ට කරනවාද?	1	2	3	4	5
	නැති නම් සේවකයින් සහයෝගය සහ සහභාගීත්වය ලබා ගැනීම සඳහා කිනම් උපාය මාර්ග අයතනය විසින් හඳුන්වා දිය යුතුද?					
4.6	ඔබගේ දැනුම පරිදි වෘත්තීය සමිති ආයතනයේ ආරක්ෂාව සඳහා යහපත් බලපෑම් කරන්නේ ද?				ඔව්	නැත
4.6a	**ඔව් නම්** බලපෑමේ ප්‍රමාණය තක්සේරු කරන්න.	1	2	3	4	5
4.6a	නැති නම් වැලකීම සඳහා කරන බලපෑම් කවරේද?					

05. අනතුරු සංවේදනය

5.1	ආයතනයේ ආරක්ෂාව හා කාර්මික අනතුරු පිළිබඳ වැදගත් තොරතුරු ඔබට නිසි කලට ලැබෙන්නේ ද?				ඔව්	නැත
5.2	අත්‍යවශ්‍ය ආරක්ෂිත තත්ත්වය පිළිබඳ නිවේදන ආයතනය හරහා ගලා එන ක්‍රමවේදය පිළිබඳ ඔබ ගණනය කරන්නේ කෙසේද?	1	2	3	4	5
5.3	ඔබගේ රැකියාවට අදාළව ආයතනයේ පවත්නා ආරක්ෂක නීති සහ ක්‍රමවේද පිළිබඳව ඔබ දනුවත් ද?				ඔව්	නැත
5.3a	ඔව් නම් ඊට කොතරම් අනුකූලව ඔබ ක්‍රියාකරන්නේද?	1	2	3	4	5
5.3b	නැති නම් එසේ වීමට කරුණු දක්විය හැකි ද?					
5.4	කිසියම් හදිසි හෝ ආසන්න සිදුවීමක් ඔබට පෙනීගිය හොත් එම සිද්ධිය ආරක්ෂක දෙපාර්තමේන්තුවට/ නිලධාරීන්ට දන්වීමට කටයුතු සලසනවාද?				ඔව්	නැත
5.5	ඉහත දක්වවූ උත්තරයට කරුණු ඉදිරිපත් කළ හැකිද?					
5.6	අනතුරු සන්නිවේදනය වැඩි දියුණු කිරීමට ඔබගේ යෝජනා කවරේද?					

06. ආකල්ප හා හැසිරීම්

	ඔබ සේවයේ යෙදී සිටින විටදී අවධානම් දේවල්වල යෙදෙනවා ද? (පුද්ගලික ආරක්ෂිත උපකරණ රහිතව සේවයේ යෙදීම වශයෙන්)					
	එවැනි අවදානමක් ගැනීමට හේතු කවරේද? X ලකුණු සටහන් කරන්න.					
	පරිපාලන නිලධාරියාගේ/ ඉංජිනේරුවරයාගේ සේවය සඳහා වූ බලපෑම්					
	සේවය ඉක්මනින් ඉවර කර ඉහිරි කාලය විනෝදයෙන් සිටීමට					
	නියමිත කාලයට අවසන් කර පාරිභෝගිකයා සතුටු කිරීම. (පාලන නිලධාරීන්ගේ බලපෑම් රහිතව)					
	පුරුද්දක් වශයෙන් මාස ගණනක සිට මා සේවය කරන්නේ මෙසේය.					
	උද්දාමය සඳහා					
	ප්‍රතිවිරුද්ධ ප්‍රතිපලවල විපාක නොදක්නාකම					
	වෙනත් කරුණු නිසානම් එය සඳහන් කරන්න.					
	ඔබ රාජකාරී කරන ස්ථානය අවට ආරක්ෂිතව තබා ගැනීමට උපරිමයෙන් කටයුතු කරනවාද?					
	ඔව් නම් උදාහරණයක් දෙන්න. නැතිනම් එයට හේතු දක්වන්න.					
	ආරක්ෂිත කටයුතු සැලකීමේ දී කොපමණ දුරට අයතනික සිරිත් සහ පුරුදුවල					
	නවත්තාවයක් තිබේදැයි ගණනය කරන්නේ ද?	1	2	3	4	5
	රැකියාවේ දී ඔබ කෙතරම් දුරට අවදානමක් ගන්නේ යයි ඔබ සිතන්නේ ද? (අන් අයගේ බලපෑමකින් තොරව)	1	2	3	4	5
	ඔබ අනාරක්ෂිත ක්‍රියාවක යෙදුණු විට එය වැළැක්වීමට ඔබේ සහෝදර සේවකයින්ගෙන් එල්ලවන බලපෑම් කොපමණද?	1	2	3	4	5