Occupational Safety & Health Management Issues of Small & Medium scale Industries in Manufacturing Sector

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Degree of Master of Science in
Occupational Safety and Health Management

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DECLARATION

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Dr. E.N.D. De Silva Date

Dissertation Supervisor

ABSTRACT

Occupational Safety & Health Management Issues of Small & Medium scale Industries in Manufacturing Sector

Small and medium scale industries(SMI's) play vital role in economic development of developing countries and also SMI's are labour intensive capital saving and capable of helping to create a large number of new job opportunities in worldwide as well as in Sri Lanka. However the employees of SMI's are lagging behind in providing OSH to workers. It may include manual material handling, lack of training, chemical handling and poor infrastructure facility etc. In the recent past, past traditional manufacturing process transformed and get in to use wide variety machines for the purpose of cutting, drilling, grinding and mixing etc., without considering OSH. Hence SMI's need to enhance OSH in management skills, finance, technology, commitment and understanding of loses due to injury and illness. This research was under taken to define appropriate framework to implement OSH practices improving OSH in SMI's.

The sample was selected considering different type of manufacturing industries to get better sample. Data collection of this research involves three phases such as pilot survey, main survey and expert interview. The pilot survey was conducted to validate the questionnaire developed based on literature findings for main survey. To collect data from SMI's a structured questionnaire was used among hundred and twenty employees who belongs to managers and other categories from the manufacturing sector SMI's. Relative important index (RII) was adopted to rank the critical OSH barriers (RII $\geq$ 4). For expert interviews were conducted to explore strategies to overcome critical OSH barriers. Content analysis was used to establish strategies to address the current issue of SMI's.

Based on the questionnaire survey it is identified that the use of management practices are poor in SMIs in availability and practice of safety policy, awareness & applicability of legal requirement. Similar poor situation was observed for use of safety system such as use of sign board, alarm system, machine guard, level of light & ventilation. Safety practices are also poor such as use of PPE, work permit, accident reporting & general register. Further it is identified barriers for OSH implementation and critically affected factors such as insufficient risk assessment & OSH audits, insufficient toolbox meeting, lack of safety training, lack of safety technology. Finally it has been identified strategies through experts to improve OSH practices and overcome management issues of SMI's such as establish regional safety centers to provide technological support, training, conduct safety promotional activities including risk assessment and OSH audit, As a second strategy Strengthen OSH legal frame work (Factory ordinance) by legalizing OSH management system, training and monitoring mechanism. As a third strategy expanding OSH educational system by introducing OSH as a compulsory subject for schools and other educational institutions and compulsory for employers and employees. As a fourth strategy national policy to get owners and managers commitment for OSH by introducing financial supportive projects such as low interest loan, tax concession for OSH projects. Compliance certification for OSH when market the product.

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ABBREVIATIONS

CBOs – Community Based Organizations
ILO – International Labour Organization
MNEs – Multi National enterprise
NGO – Non-Governmental Organization
NSDC – National SMI Development Council
OSH – Occupational Safety and Health
SMIs – Small & Medium scale Industries
MNEs – Multi National Enterprise
NGO – Non Governmental Organization
NSDC – National SMI Development Council
OSH – Occupational Safety and Health
PPE – Personal Protective Equipment
RII – Relative Important Index
SBIR – Small Business Innovation Research
SBTT – Small Business Technology Transfer
SHGs – Self Help Groups
SMIs – Small & Medium scale Industries

CHAPTER 01

INTRODUCTION TO THE RESEARCH

1.1 Background

Small and medium scale industries (SMIs) are mostly ranked as the engine of economic development in developing economies (Fabaya, 1989; Kombo, et al., 2011). They are labour intensive, capital saving and capable of helping to create a large number of new jobs opportunities in worldwide (Lalkaka, 1997). For instance, SMIs employ 22% of the adult population in developing countries (Fissaeha, 1991). As such, most of the developing countries use SMIs as a means of reducing unemployment and poverty. Further, economic development programs have been introduced in developing countries such as capital intensive and large scale industrial projects, focusing on export substitution to SMIs. These types of domestic linkages create sustainable industrial development in SMIs. In case of Sri Lanka, a rapid Growth of GDP has been identified during last few years from SMIs (Table 1.1). Apparently, employment of this sector has been increased in Sri Lanka as shown in Table 1.2.

Table 1.1: SMIs contributions to GDP in Sri Lanka

Year	2010	2011	2012- Up to 2014
GDP Contribution	40%	52%	70%

Source: Daily news, Saturday 27th September, 2014

Table1.2: Employment rate in SMIs (manufacturing)

Year	2011	2012	2013
% of total Employment	16.9%	19.7%	35%

Source: Central Bank of Sri Lanka, 2013

Therefore, It shows that SMIs are been contributed a larger portion of the economy in Sri Lanka. At Present, Overall SMIs generate 70% of Sri Lankan GDP and also35% of employment. Under this circumstance, it may increase Occupational Safety Health (OSH) issues within the industry due to its heavy dependency on the workforce. OSH issues have been reported due to sudden industrial development (Singh, 2013). Further Walter (2006) mentioned, Workers in SMIs are often exposed to dangerous situations such as work related injuries and illness compare with large industries. These injuries are mainly due to manual material handling and dealing with new machines without proper training (Singh, 2013). Thus owners of SMIs, face significant risk in their daily operations and bring up adverse impact to the business (Morillas, Romro and Fuertes, 2013). This situation may affect day to day operations and profits. (Luper, 2012).

Therefore, OSH in SMIs has to play a significant role. Since, SMIs are started with own capability of owners to make product or services and thus, knowledge, management skill, finance, technology that are required to enhance OSH are lacking (Hare and Cameron, 2011). On the other hand, these SMIs have been started with less infrastructure facility due to poor decision making skills (Agwu and Emeti, 2014). Therefore, SMIs owners are reluctant to spend additional money for OSH due to financial issue, as well as poor understanding of losses due to injuries and illnesses (Fabyo,J.A, 1989) This is a common fact in most of the developing countries that, lack of recognition towards OSH practices (Melissa,J. Perry, 2011). The present labor laws regarding OSH in Sri Lankan regulatory system is not full filled with necessary specific regulations to upgrade the OSH in SMIs (Factory Ordinance, 1942). Moreover, institutional and national researches focus on issues concerning OSH practices are also less than one percent (Barling & Zacharatos, 2000). Therefore, SMIs owners are far behind in implementation of OSH. Hence, mainstreaming OSH into national policy is an important consideration (Katsoulakos & Katsoulacos, 2007). Further accordingly, safety training and supervision; especially for young and part-time workers were highlighted to control peoples behaviors that can cause an unsafe act or accident (Agwu. and Emeti, 2014). In line with this need, the research focus to study adequacy of OSH in SMIs, aiming to fill the gaps in the OSH practices. SMIs are not strong and progressive enough to discuss

their issues with formal bodies like traditional universities, research institutes and funding bodies. So It is an essential need that relevant government institutions. R & D firms and universities move closer to SMIs for them to access new knowledge information and investment possibilities. The problem of many SMIs in Sri Lanka is not of their size, but being isolated and working in enclave nature; therefore, SMIs individually have little capacity to respond to competitive pressure and generate factors for expansion and innovation (R.N. Weerainghe, et.al). Only very few researches done in SMIs in Sri Lanka to identify the key issues of this sector (Daily news Saturday 27th September 2014).

1.2 Research Problem

Most of researches discussed OSH issues and their impact into the SMIs in the manufacturing sector (Lalkaka, R. 1007). SMIs in this sector are labour intensive and generating more employment in worldwide (Agwu, M.O. and Emeti, C.I., 2014). The employers of SMIs are lagging behind in providing OSH to the workers. Most of SMIs in manufacturing sector have been used manual material handling processes in in the past. However in the recent past years, This traditional manufacturing process of SMIs have being transformed to mechanized system that depend on large machines with technological changes. As a result of this transformation, the rate of injuries has been increased as no parallel improvements in OSH practices were taken placed. Thus, health and safety of workers has become a critical issue.

Thus, it has been highlighted requirement of enhancing OSH in SMIs. Further in line with International Labour Organisation decent work agenda and also globally accepted principle for well-being of occupants, improvement in OSH practices are required. Therefore, this research is carried out to identify OSH issues and strategies for enhance OSH in SMIs.

1.3 Aim of the study

Aim of the research focuses on improving occupational safety and health of SMIs in manufacturing sector by defining an appropriate framework to implement OSH practices.

1.4 Objectives of the study

- Study level of OSH practices in SMIs.
- Identify management issues of OSH implementation in SMIs.
- Identify barriers for implementing OSH
- Propose strategies to improve OSH practices of SMIs in manufacturing sector.
- Develop a framework for implementing OSH practices in SMIs.

1.5 Methodology

➢ **Literature survey and review**

A comprehensive literature survey was carried out to find definition for SMIs to discuss OSH, OSH issues, enhancing strategies such as government support, regulatory bodies enacted by Sri Lankan government. These were familiarized by referring related journals and books in Sri Lankan context as well in the international context.

➢ **Primary data collection**

The research conducted a pilot survey and a detailed survey to collect data from the industry as follows.

- **Pilot Survey**

  The pilot survey was conducted by getting help of selected OSH experts to validate literature findings and prepare the detailed questionnaire in a consistent manner to achieve objectives successfully.

- **Questioner survey**

  The detailed questionnaire survey was conducted to identify OSH management issue and identify effect of implementation barriers in SMIs in manufacturing sector. Questionnaire has been prepared with the guidance of pilot survey and distributed among the workers and management in separately.

- **Expert survey**

  The expert interviews were conducted to identify strategic solutions to overcome critical factors for poor OSH implementation found.

- **Data analysis**

  Statistical analysis were used to analyze the OSH practices, issues, content analysis was used to analyses expert opinion to establish enhancing OSH strategies in manufacturing SMIs.

1.6 Scope and Limitation

1.6.1. Scope

Scope of this research is the study SMIs and OSH practices and find out management issue of OSH in manufacturing sector SMIs as well as to establish strategies to improve OSH in SMIs.

1.6.2. Limitations

- Field survey was limited to number of factories within one industrial zone in Colombo district.
- Further accuracy of the findings will be subjected to the details provided by the managers and other workers. Hence the error potion could be there due to inappropriate details provided by the managers and other workers.

1.7 Chapter Breakdown

This dissertation report was comprised of five chapters.

Chapter One – Introduction to the research

This chapter provides with brief introduction to the research background, research problem, aim and objectives of this study, methodology, scope and limitations of this research and finally the organization of the report.

Chapter two – Literature review

This chapter mainly focuses on existing knowledge on SMIs and its OSH practices as well as OSH issues in manufacturing sector SMIs and enhancing strategies in other countries.

Chapter three – Research methodology

This chapter explains the research methodology framework adopted to carry out research.

Chapter four – Results and discussion

This chapter presents the findings of the study and critically analyzes and discusses the results.

Chapter five – Conclusions and recommendations

This chapter focuses on drawing out conclusions of the research with recommendation to enhance OSH in SMIs and it will include opportunities available for future research.

CHAPTER 02

LITERTURE REVIEW

2.1. Introduction

OSH agenda is a top priority in workplaces to encourage employers, employees, industries and also commitment to make necessary changes and ensure that OSH is forefront of everybody's mind (Abu Bakar 2004). SMIs use large number of various types of machine depending on manufacturing process or purpose of industry. Under this chapter the first part, discusses the overview of SMIs and its characteristics including general situation of global and existing situation of Sri Lankan SMIs and its nature of work. The latter part of this chapter describes the issues of OSH in SMIs, Possible strategies to enhance the OSH, Government support, Legislation, Training and workshop and available OSH precautions in this industry.

2.2. Overview SMIs and its Characteristics

There is no globally accepted definition for SMIs. This lack of consensus arises for a number of reasons. SMIs can be found across almost the entire business activity and hence it cannot be defined by industry wise such as manufacturing, retail or service etc. Further, some of them are single owner, partnership etc., (Bolton 1971). Therefore different countries have adopted their own definitions based on various criteria to recognize the SMIs (Table 2.1). In some countries SMIs are categorized into two sectors; manufacturing, manufacturing related services and agriculture industries; and services (including ICT) and primary agriculture.

In general practice, SMIs investors are performing industries in different levels and different types as well as they consider features like geographical locations. In Sri Lankan context SMIs defined by using various business related specific criteria depending on nature of each institutional business. This explanation appears due to wide variation of diversity such as various types of assets, employees, skills, capital,

turnover/revenue, sophistication, innovation, productivity and growth orientation, establishing a definition for SMIs has become a difficult task. The Tables 1 shows most popular definitions used for SMIs in Sri Lanka.

Table 2.1: Definition of small and medium scale industries

Institution	Criterion	Medium Scale	Small Scale
Sri Lanka Standards Institution (SLSI)	No. of Employees	Between 50 - 249	Less than 50
Industrial Development Board (IDB)	Value of Machinery	Between Rs.4 Million to 10 Million	Less than Rs.4 Million
Ministry of Industry, Tourism and Investment Promotion	Value of fixed assets other than land and buildings	Up to Rs.16 Million	Less than Rs.16 Millions
Federation of Chambers of Commerce and Industry of Sri Lanka	Capital employed	Between Rs.2 Million to 20 Million	Less than Rs.2 Million
Ministry of Small and Rural Industries	Total Investment	Between Rs.20 Million to 50 Million	Between Rs.1 Million to 20 Million
Ceylon National Chamber of Industries	i) Value of assets other than buildings and lands. ii) No. of employees	Between Rs.4 Million to Rs.20 Million Between 10 -50	Less than Rs.4 Million Less than 10
Sri Lanka Export Development Board (EDB)	i) Capital investment excluding lands and building ii) Annual export turnover	More than Rs.40 Million More than Rs.100 Million	Less than Rs.20 Million Less than Rs.100 Million
World Bank (for Sri Lankan country studies and loan programmers)	No. of employees	Between 50-99	Less than 1- 49
Dept. of Census and Statistics	No. of Employees	More than 25 (Year 2000) More than 10 (Year 2003/ 04)	Less than 25 (Year 2000) Less than 10 (Year 2003/04)
Task Force for SMEs Development in Sri Lanka (2002)	Asset Value excluding land and buildings value	Not exceeding more than Rs.50 Million	Not exceeding more than Rs.20 Million

Institution	Criterion	Medium Scale	Small Scale
Sri Lankan Apparel Industry, Task force on five year strategy (2002)	i) Export value ii) No. of Employees	Rs.101 Million to 250 Million 1 - 100	Rs. 0.25 Million to 100 Million 101 - 250
The Dept. of Small Industries	i) Capital investment ii) No. of Employees	Between Rs.25 – 5 million Between 100 - 50	Less than Rs. 5 Million Less than 50 employees

Source -: Dasanayaka. S., 2008; senses and statistic department of Sri Lanka - 2003

Most of these definitions are made according to organizational needs and purpose of interests about SMIs. Financial institutions, public sector authorities, non-governmental organizations (NGOs), trade and industry chambers, international organizations, researchers, SMIs service providers and consultancy firms have their own definitions based on their own criteria selection. (Dasanayaka.S., 2008; senses and statistic department on 2003). Table 2.2 illustrates these growths of industry & employed rate in SMIs.

Table 2.2: Growth of industry & Employed Rate in SMIs

Industry	**Type of industry %**		**Employment %**	
	1983	1996	1983	1996
Mining	11.6	12.5	9.0	6.9
Food, beverage, and tobacco products	35.5	33.7	36.8	38.4
Textile, apparel and leather products	19.8	19.3	23.4	24.2
Wood and Wood products	7.3	7.3	6.1	5.2
Paper and paper products	2.2	2.3	2.4	2.1
Chemical, petroleum, rubber & plastics	5.8	6.4	7.4	8.0
Non-metallic mineral products	12.1	12.3	8.9	9.2
Basic metal products	0.06	0.08	0.09	0.27

Source:- Dasanayaka.S., 2008; Senses and statistic department of Sri Lanka- 2003

At present era of mechanization, major changes have been seen in the nature of industrial work, consequently the manual work has been more replaced by machines. But still SMIs heavily rely on manual material handling work systems, transporting or supporting of a load by one or more works, including lifting, lowering, pulling, pushing, carrying, or moving of a load, while using very poor automation industrial setting. This has caused unfavorable ergonomic conditions like back injury to workers (Singh, 2013). On the other hand OSH problems are difficult to analyze in small industries because risk indicators do not depend on the size of the firm but number of accidents are also few due to small workforce. In case of constructions and transportation sectors, severity of accident appears to be influenced by the size of the firm. SMIs are facing for strongly high risk activities because of subcontracting work from large industries. The workforces are also mostly young, less educated and less experienced compared with the large industries. It causes to high severity of risk in SMIs (Champoux and Burn, 2003).

Most of managers and owners of SMIs are personally responsible for organizational functions. But most of the managers have poor knowledge on OSH. Hence there is no way to push the OSH in their workplace. Owners are reluctant to spend money on OSH. Because of poor understanding of long term benefit from OSH (Champoux. and Burn 2003). At present many injuries and illnesses were recorded in most of the SMI. For instance approximately 90% of the workers had suffered various degrees of lower back discomfort, and 80% had gone for medical treatment (Singh, 2013).

2.2.1. SMIs in Sri Lanka

SMIs play a large part of Sri Lanka's economy by contributing 80% of all businesses (NHREP, 2012). This industry has been established in all sectors of the economy such as agriculture, construction and boosting employment opportunities for people with different skills, such as skilled, semi-skilled and unskilled. As an example SMIs in the agri-business sector engaged in growing spices, fruits and vegetables (Gomes and Casseres, 1997). The same source further mentioned that the manufacturing sector is engaged in numerous industrial activities accounting for about 20% of

industrial establishments and SMIs accounts for more than 90% of business establishments (NHREP, 2012).

The focus on SMIs in policy discussions proceed from their role in developing entrepreneurial skills, innovation, promoting economic growth and those factors are useful in promoting social linkages. Though this is considered to be an important sector because, most entrepreneurs played lack of attention to provide training, safety, health and welfare facilities for employees due to the resulting increase of cost of production.

A common feature found in SMIs is the high degree of absenteeism among workers due to injury, illness and stress issue. It causes to loss of productivity and staff morale. (Kines, Spangen berg, Dyreborg, 2007). In Sri Lanka, Legal requirement for the OSH is given in factory Ordinance in 1942. However it does not specially focus on SMIs. This legal framework is also not sound enough to cover the working population in the country, because the factory ordinance can be applied only for the "factory" which is defined in factory ordinance (Factory ordinance, 1942 part one). Similarly, an accident reporting system is also lacking in the SMIs due to poor OSH management system, institutional capacity and lack of awareness in OSH (Hare and Cameron 2011). SMIs suffer lack of information exchange, leading to conflict, dissonance and other industrial relation issues. As an ILO member country, It is needed to provide extensive policy to fulfill the ILO requirement. Therefore this policy can be included criteria to protect workers from work related sickness, disease and injury. The ILO goal clearly mention about decent and productive working conditions freedom, equity, security and human dignity (ILO Decent work Agenda, 2010 to 2015).

There are several strategic measures to be taken for skill development, tax concessions, entrepreneurship development, sub-contracting, marketing and access to finance to promote OSH. SMIs are usually guided by their usefulness of increasing employment numbers as the capital investment needed in this sector. It is less adequate in providing additional workplace substantially to large enterprises. The

prevailing laws and practices governing recruitments are tend to deter to raise the number of persons employed in SMIs. Hence, it is needed to improve the quality of employment in this sector to increase the rate of earnings.

Overview of Occupational Safety and Health (OSH)

Occupational safety and health (OSH) is generally identified as the science of the anticipation, recognition, evolution and control of hazards arising in from the workplace that could o account taking impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment (ILO 2008).

Occupational safety and health (OSH) is a discipline dealing with the prevention of work related injuries and disease as well as the protection and promotion of the health workers. It aims at the improvement of working conditions and environment. Occupational health entails the promotion and maintenance of highest degree of physical and mental health and social well-being of workers in all occupations. In this context, the anticipation, recognition, evaluation, and control of hazards arising in or from the workplace that could impair the health and well-being of workers are the fundamental principles of the process governing occupational risk assessment and management. The possible impact on the surrounding communities and the general environment should also be taken into account.

Small scale enterprises which are usually short on resources can also carry out an effective risk assessment through simple measures, such as requiring safety data sheets prior to purchase of products and equipment, job hazard identification and adequate training. While the integration of OSH requirements in the business policies and participation mechanism of large enterprises, particularly multi nationals, in now an established trend, major efforts are still needed to assist small enterprises in implementing a practical, cost effective way of bringing some elements of OSH into their OSH practices.

For all areas of human activity, a balance has to be made between benefits and costs of risk taking. In the case of OSH, this complex balance is influenced by many factors such as rapid scientific and technological progress, a very diverse and continuously changing world of work, and economics. The fact that the application of the OSH principles implies the mobilization of all social and scientific disciplines is a clear measure of the complexity of this field.

Occupational safety and health is concerned with protecting safety health and welfare of people engaged in work or employment. The enjoyment of these standards at the highest level is a basic human right that should be accessible by each and every worker. Regardless of the nature of their work, workers should be able to carry out their responsibilities in a safe and secure working environment. Free from hazards. These rights are set out in legislation to ensure that clear about the obligation and the consequences for neglecting them.

2.3. Management Issues in OSH in SMIs

2.3.1. General

In case of SMIs, growth & expansion are obstructed by product, market and regulatory system related to the industry. These problems can be explained under sub topic such as finance, physical infrastructure regulatory frame work, technology, technological and management skill, information and advice, access to the market, service level business development, labour legislation, industrial relation, property right and environmental issues (Papaleo, Cangian and Calicchia, 2012). There are some other constraints like interest rate and internal setup of lending institutions affecting to SMIs (Agwu and Emetic, 2014). Some Other areas of weakness are lack of skill for product development, packaging, distributions and sale promotions, packaging (Koradeka and Dryzek, 2001). However, the market and information accessing is also not easy task (Agwu and Emetic, 2014). When it faces these difficulties, industrial cost increasing also create unnecessary hurdles. The existing labour laws are controlling micro enterprises becoming to small and also small scale becoming medium scale.

2.3.2. Lack of finance

The type of risks faced by SMIs is financial risk such as price of commodity, interest rate, liquidity, credit default, inflation, purchasing power, personal injuries, diseases and disabilities (Jopev and kwanum, 2012). The challenges facing by the SMIs are not only the source of funds, but also its accessibility (Koradeka and Dryzek, 2001). The problems identified inhibiting funds are stringent conditions set by the financial organization, lack of adequate collateral, cost of accessing funds and credit information (Addotei, 2012). SMIs in Asia saw, that the financial working capital was the major problem. The primary funding problem is due to behavior of banks and imperfection of capital markets, when they face this financial struggle. SMIs could not able to pay their attention to promote OSH (Agwu and Emeti, 2014). In case of SMIs, financial intuitions are facing very difficult problem of identification of financial position of firm from that of its owners. For example; personal vehicle and some other properties are used without any separation for both private use and business purposes. Most of business matters run on personal relationship between firm and stakeholders as well as owners and financial institutions. Hence Financial institutions shows some resistant to deal with SMIs. Because Financial institution dealing base on financial statement of firms. The relationship between financial institution and SMIs are lesser than large scale industries. SMIs are often obtaining funds from informal sources and also often use internally generated fund or loan from family and friends. It may badly effect for the SMIs create unnecessary financial issue for the same (Addotei, 2012)

2.3.3. Poor management practices

The technological skills are available in SMIs. But Most of these industries depend on the hand on skill of owners, and few others. This type of small skill group does not have capability to maintain operational pressure due to poor education. Hence these industries are playing role with limited funds as well as accepting poor working environment. Because of poor education and vulnerability position in labour market such as part time working, some of less than 25 year age group or more than 65 year age group (Perry, 2011).

The labour market, moreover, and in the majority of cases, seldom provides a direct and sufficient coverage of the technological skill gap that emerges from this situation. The result is a tangible level of technological stagnation reflected in poor to very poor product specifications, outmoded product designs, limited product range, inefficient manufacturing processes, loss in touch with the market etc.

Under the circumstances, working conditions of SMIs are far behind the standard and at least not reach to the ILO standard. Lack of labour standards have resulted in increasing poor work practices, absence of trade union, informal recruitment, irregular payment, sudden termination, wages, wage discrimination, excessive work, abusing child labour, suffering work related diseases, workplace accidents, fire and panic stampedes (Singh, L. 2013). Further, due to poor labour standard monitoring system, ineffective building codes, outdated labour laws and lack of enforcement and awareness of labour right among the workers.

This sector of workers are concerned with poor working conditions, wages and gender discrimination ,unsafe work environment, long working hours or double consecutive shift. It was highlighted in the literature as "employers treating for workers as slaves, to increase their profit margins" (Kumar, 2006). Overcrowd of the workplace causing occupational hazard such as musculoskeletal disorders and contagious diseases (Singh,L. 2013). Further, injuries, fatalities, disablement and death from fire and building collapses are frequent (Hare and Cameron, 2011).

Occupational stress and employee attitude are also major issues in small business organizations while the small business facing the severe challenge in global market (Ogechukwu, Oboreh., Umukoro & Uche, 2013). Small businesses face many stressful problems including: bankruptcy or loss of credit, dissolving to prevent future losses, inter-management problems, employee disability and top management often decision making approaches (Walter, 2006).

Another major challenge faced by the SMIs is shortage of trained man power and lack of management skill (Hare and Cameron, 2011). Most of business failures are

shown due to lack of experience, lack of competence and inefficiency in overall management such as poor record keeping, technical problems, lack of expertise in production, procurement, maintenance, marketing and finance, fund misapplication, costly and wrong decision making. Poor accounting system, multiple taxation, lack of standard and lack of proper assessment create opportunity for mismanagement of SMIs (Agwu and Emeti. 2014). Night work causes a mismatch the body clock (between the light / dark sleep / wake cycles) and it can cause to disturb the normal circadian rhythms of psycho-physiological functions (Minors and waterhouse, 1986). Similarly the major conflict of shift worker will experience is that between the role of work and the family. This conflict can't be limited to shift workers. It has repeatedly and clearly been linked to time issues. The conflict between work and family has been started and reciprocally linked together. Development and structure of families are increasingly recognized as having an impact on work behavior. It causes to create stress and the result will be an injury or an illness (Katsoulakos & Katsoulacos, (2007)). A clear focus on relevance of Shift worker's educational programs to the employee situation has repeatedly been found to have a positive impact on acceptance of message (Carlson, 1991).

It is also found positive relationship between job stress and occupational injury (Nakata, Lekda, Takahashi, Haratani, Hojou, Fujioka, Swanson and Araki, 2006). Injuries are associated typical psychosocial factors such as high job demand, low job control, low core worker support, poor interpersonal relationship as well as reduced risk perception induce excess fatigue and muscular skeletal disorder. American studies have revealed occupational injury rate in SMIs is 17 times greater than the large firms (Nakata, Ikeda, 2006). This relationship can be verified through NIOSH job stress model shown in Figure 2.1.

The foremost condition for good management is to eliminate risk and loss factors from the basic resources, including man power, machine and materials in order to secure safety and health function to maximize effectiveness and ensure continuous flow of work. Business management pursues maximization of profit while safety and health management pursues prevention of losses. For instance, safe maintenance of

machinery, equipment and facilities lead to their maximum usage and minimum downtime. Safe work activities result in labour efficiency and labour productivity enhancement. Further, machines, facilities and workers are the direct causes for accidents. Therefore potential accident casual risk factors should be eliminated in advance to increase labour efficiency and productivity. Otherwise the management's goal of obtaining maximum output will not be achievable. It could be seen as OSH issue for SMIs (Agwu, and Emeti, 2014).

SMIs are facing major marketing problems due to poor understanding of marketing concept to apply for their industry. They are lack of knowledge and skills for basic marketing planning, control and segmentation. It causes to produce law quality product, poor pricing, poor distribution. The ultimate result may be low profit and tendency lack of attention on OSH (Ogechukwu, Oboreh, Umukoro., & Uche, 2013).

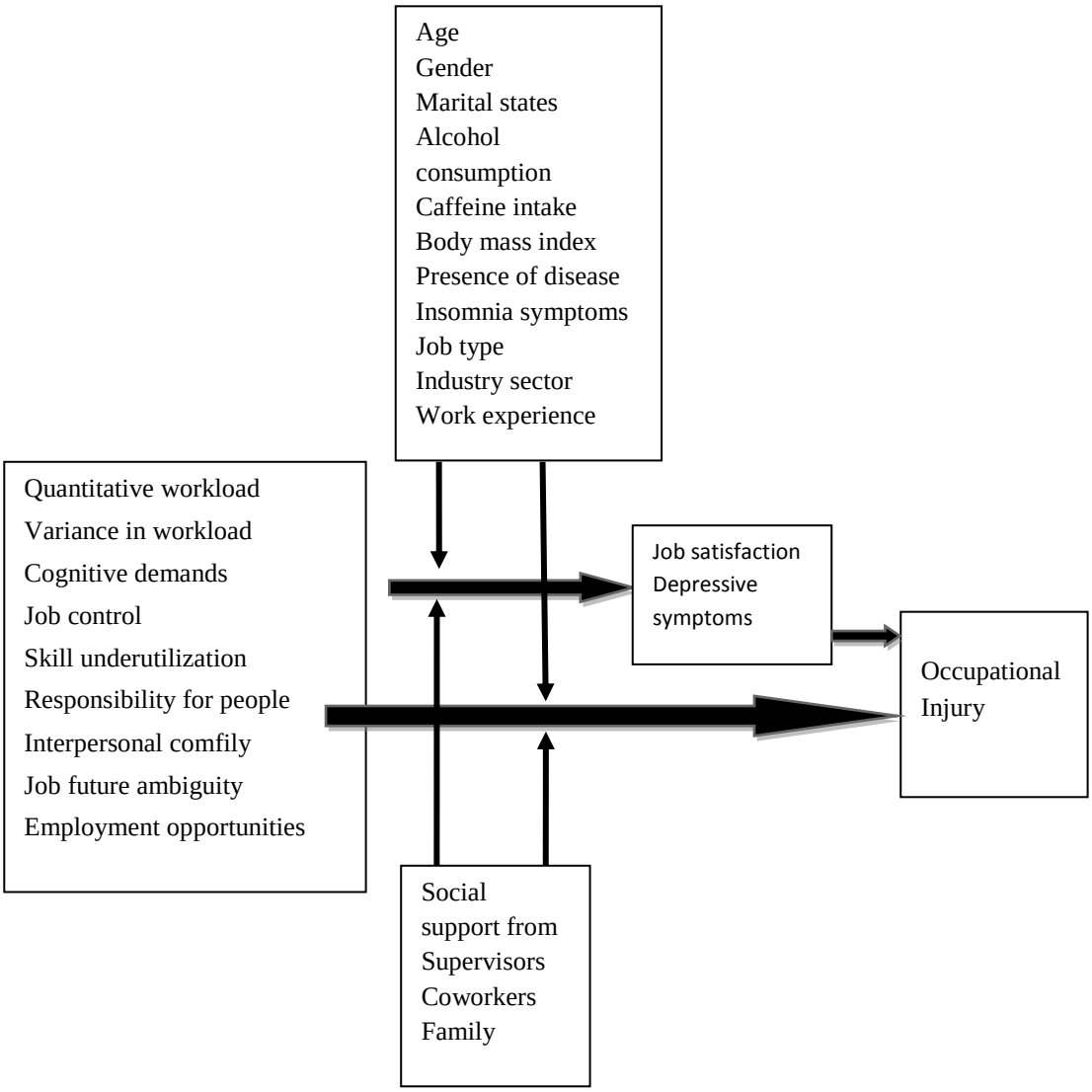


Figure 2.1; NIOSH Job stress model, Hypothesized associations between job stress and occupational injury

Source; Hurrell and McLaney, 1988

2.3.4. Planning and infrastructure issue

Insufficient infrastructure planning is also major problem faced by the SMIs such as shortage of water supply, inadequate transport system, lack of electricity, improper waste management system, Most of developing countries do not have investment culture and attitude of invest today and reap tomorrow (Agwu and Emeti, 2014).

Some of investors may lead to diversion of valuable funds and energy from business to social waste and reluctant to use local goods high propensity for the consumption of foreign goods. The unstable government policies cause to collapse the SMIs. It represents serious financial pressure on any economy and also for valuable resources. SMIs face for challenging situations and are prepared to meet them with pre-planned strategies (Angelica and Sadus, 2004).

Experience of a large number of countries is shown that SMIs usually needs a strong infrastructural base. However, this may need to vary according to the size and nature of industry (Agwu and Emeti, 2014). Some SMIs are used their own power (mechanical, hand or generator) without necessary skills and it may cause injuries or some other OSH problems (Ogechukwu, Oboreh, Umukoro & Uche, 2013).

The SMIs are very much dependent on the existence of the facilities usually contained within an industrial estate. Those could be technically oriented services as central repair workshops, facilities for the bulk purchase of raw material and warehousing facilities or common facilities such as foundries, electroplating shops, tool and die shops, heat treatment shops, woodworking shops, a quality control laboratory and a special machine shops. Industrial estates are usually provided with all these facilities, the effectiveness of industrial estate. Development has revealed some help to reduce the issues on OSH. However, it is identified that the industrial estates concept is successful for technological growth, infrastructure development and training on OSH (Agwu and Emeti, 2014).

SMIs in developing countries, provide and demonstrate stark deficiencies related to basic production management techniques as plant layout, material flow, production planning, physical distribution, quality control, product and process design etc. The same plants also protect from adverse working conditions that undermine productivity and safety. Adverse working condition contributed factors are Inferior technology, deficient raw material, incomplete infrastructure, irregular supply of energy, inappropriate equipment (Kombo, .et al., 2011). Most of SMIs entrepreneurs are first exposure to ill-fit environments for manufacturing and do not have a sound

comparative base to guide them. Information on safety and the working environment rarely reaches the small enterprise. Knowledge of what may be considered proper working conditions is scarce, limited and little professional advice is sought in this regard. The results are high accident rate, poor work attitudes and, ultimately, lower productivity. (Louzine, 1982).

2.4. **Possible strategies for enhancing OSH**

2.4.1. **Management commitment**

This can be explained how management involves and Joins with activities of OSH to achieve the organizational goal. Management commitment is very important in various ways such as providing safety education, training, giving rewards and empowerment of employees to make decisions. Safety education and training provide to gain the necessary safety knowledge and help to work safely. Further Providing safety rewards to employees that cause to report unsafe behavior of core workers during working is necessary. That is also an important step for successful implementation of OSH (Lilis, Khoo, and Daisy, 2011).

All the measures for implementation require considerable amount of financial support. As example, Organization needs to provide training for employees. The management should be committed to spend money for effective implementation of OSH. Similarly consider the use of personal protective equipment. Two way communications between managers and employees are also needed to successful implementation of OSH. Management of SMIs has to spend little time on OSH matters. Because providing separate person means additional cost for SMIs (Vassie & Oliver, 2000).

It is important to keep employees focused in a positive and proactive manner. Effective communication is maximizing the impact of health and safety promotions, and also to make oneself ensured, a desired message is conveyed (Bolton, 1971). When developing OHS promotional campaigns, the program should be given to identify the target audience and the objective of the campaign. The challenge is to

promote health and safety throughout the organization, and to find effective strategies such as published materials, displays, media, training and the Internet, to gain management commitment and employee involvement in the decision-making and problem-solving processes. These are essential to create positive safety culture. It is not only lowering the lost time injury rate, but also includes economic and social gains. (Angelica, sadus,. 2004)

OSH professionals usually associates ergonomics with occupational health and safety and related legislation, SMIs seem not to be positively motivated to apply ergonomics for improving health and safety. Strategies should be implemented for SMIs to achieve business goals by improving management commitment.

2.4.2. Government support

The national Development programs are established to prepare strategic plans for continuous attention for SMIs. That also guides overseas SMIs development initiatives to improve the effectiveness. The government controlling agencies, ministries and banking institutions can be promoted to give financial assistance such as soft loans, Grants, equity financing, venture capital, guarantee scheme and tax incentives. The governments can introduce supplementary incentive scheme and grant for import duty exemption, sales tax exemption eligibility for local manufacturing equipment, and management support for SMIs. The government promotes to start industrial centre by developing infrastructure for premises such as manufacturing, packaging, distribution, and marketing of agriculture product (Mohd. 2010).

Action can be taken to address the OSH and labour skill constraints faced by SMIs because of high turn-over and some specific organizational factor. Measures will be devised to enable SMIs to hire appropriate workmen in terms of skills by working toward building up a pool of suitably-skilled and suitably-motivated workers in the country. The Governments can take actions to invest sufficiently in the country's science base. Employee selection criteria should be promoted to do in a very

professional manner and give up their informal systems of recruitment and the selection of personnel on personal considerations ignoring required skills and talents. Policy measures have to be taken to establish safe work practices, correct skills, positive attitude and social protection of SMIs sector. By this way, SMIs could be empowered with information technology capabilities to network and to improve efficiency and productivity of their businesses.

As proposed in Science, Technology & Innovation Strategy for Sri Lanka (2011 – 2015), mechanism should be introduced to promote to OSH innovation and transfer technologies in SMIs. Small Business Innovation Research (SBIR) and Small Business Technology Transfer (SBTT) schemes should be promoted giving priority in OSH for SMIs. Comprehensive web-based information and basic advice on IT related services could be provided with general public as well as formal and informal civil society and institutions such as business and industry associations to encourage safety culture and increase the knowledge of OSH in SMI.

After considering the complaints of SMIs about the compliance (accident, ill health and other OSH related issue) with rules and regulations, the actions can be taken to reduce the unnecessary and burdensome red tape harms job creation and productivity. This type of actions will effect to create job opportunities as well as reduce the stress through flexibility. The disciplinary and dismissal procedures relating to errant and underperforming staff will also be streamlined.

There should be specific promoting mechanism for SMIs such as credit supporting, technology and marketing etc. to enhance OSH (Central Bank report, 2013). Education and training play an essential role in a knowledge-based economy as they support growth and employment by encouraging the emergence of a qualified and adaptable population. More flexible new training methods and settings should be adopted by SMIs in place of the traditional models of training. There should be a proper mechanism to identify the skill gap in entrepreneurs as well as skill promoting mechanism. Existing entrepreneurship development programs have not brought out the expected economic changes in empowering rural women, establishment of

Community Based Organizations through Self Help Groups (Papaleo, Cangiano, and Calicchia, 2012). Hence, there is a need to review and revisit strategies advocated in entrepreneurship development programs and introduce new strategies such as OSH and welfare. Some countries have introduced national qualification frame work for safety training which can be used as ranking system for safety qualification. The facilities have been provided to get short term courses as vocational forms and also full time courses for higher educational qualification in safety through separate institution (Hare. and Cameron. 2011)

2.4.3. Regulatory body

Labour unrest in SMIs is common. More often, employers pay less attention on employees' rights and labour standard. Further, it was evented that forming of trade union has been controlled by threatening through hired hooligans, in developing countries (Lilis, Khoo and Daisy, 2011). However, this can be considered as a violation of international labour standard, labour code of conduct (ILO, 2003).

In some organizations that trade unions act strongly, act as the mediator between workers and factory owners to settle disputes (Morshed, 2007).This is meant avoid unrest of employees compliance issues and labour standard to improve wages, working hours, job security, social security and occupational health and safety (Raman S., 2004). Statutory bodies are established good legal framework. But the enforcement is not up to the stranded in safety SMIs. Thus, the government has the responsibility for establishing effective monitoring mechanism. As an example, some countries have established extremely progressive national labour law and has adopted a new labour code which is arranged to regulate the working conditions and try to enforce the laws effectively (Nelson, Justice and Skuba, 2006; Ahamed, 2011).

In some countries, rate of accidents are maintained as lowest through training of workers on safe work practices as well as strict enforcement of safety stranded (Papaleo, Cangiano, and Calicchia S., 2012). The factory Acts encourage and focus to provide safety and health of workers. Employers are responsible in providing safe

working environment. The number of workplace inspections are made by regulatory body, managed to reduce workplace accidents. SMIs are lack of both resources and motivation to deal with OSH issues and may not be self-motivated to enforce safety regulation. Majority of SMIs are facing difficulty of implementing OSH due to lack of expertise, resources, or manpower. Legislative bodies are overseeing the implementation of OSH administrative system but it seems to be as additional cost. Legislation enforcing is possible due to legislation written support of action (Lilis, Khoo and Daisy, 2011).

Legislation is enacted to prevent workers being harmed by the work they are expected to perform. However Legislation alone cannot keep pace with technological progress and competitive pressures which bring about rapid changes in working conditions, work processes and organizations. In order to eliminate, or reduce the gap; Employers must be capable enough to tackle OSH issue. Otherwise it is a difficult task to eliminate or reduce the gap. OSH laws are focused on the OSH professionals and it is mentioned OSH professional must receive specific training. OSH professionals have to play a vital role in health and safety in various levels such as health surveillance, technical aspects of safety, safety regulations and legal requirement (Papale, Cangiano and Calicchia 2012) .

2.4.4. Workshop & training programs

Some countries such as Singapore, Japan have started several capacity development program focus on entrepreneurship, human capital development, Technology (it means including Safety), productivity improvement. Experts' services are provided for SMIs to transfer their technology, know-how and industry experience (Mohd, 2010). There are so many arguments highlighting real effectiveness of safety training at workplace. But it plays a major management role to control occupational risk. It is caused to background factors of SMIs employees and employers. However OSH professional play a vital role in health and safety questions at work on various levels, workers health surveillance, technical aspects of safety in the workplace and safety regulations with legal requirements (Berge, 2008).

2.5. Summary

Researchers became to know that there is no globally accepted unique definition for SMIs. Therefore, they carried out a study to find out on what basis the SMIs have been defined and they found that the definitions are based on their organizational requirements, purpose and interests. OSH rules and regulations have been laid down very commonly for all industries. It is not given priority for SMIs. Although It gives high contribution for employment and economy. Hence, management issues of OSH in SMIs have gone up. It has been noticed that similar situation exists in Sri Lanka as well.

As indicated in table 2.1, different definitions have been given by various SMIs in Sri Lanka based on their organizational requirements and purpose and interests. The OSH issues are mostly related to human and therefore, it has been considered that the definition given by the Sri Lanka Standard Institution is more appropriate for this study on OSH issues in SMIS.

.Research studies in other countries revealed that OSH management issues in SMIs have not been given serious consideration for financial, management, technological, planning and infrastructure issues. In case of financial problem mainly due to stringent conditions set by the financial organization as well as some other group face capital problem. Similarly poor accounting procedure, lack of management skills are also identified as major barriers to the SMIs. However Resultant effect was less priority given for OSH. In addition to that, planning for infrastructure are highlighted as major cost factor s for SMIs. But Government support & Regulatory bodies do not sufficiently supported to fulfill the requirement .Hence It has caused to less attention for OSH. Further, studies have been carried out to find what steps have been taken by relevant authorities to enhance OSH matters, such as management involvement and commitment, government support and involvement of trade union and regulatory bodies, training and awareness. Therefore, it has been realized that there should be a legalized system coincide with employer and employee commitment to achieve the OSH objectives of SMIs to minimize their problems.

CHAPTER 03

RESEARCH METHOLDOLOGY

3.1. Introduction

A comprehensive literature review and identification of research question is carried out in chapter two. Similarly, the Methodology Chapter essentially map-out the method utilized in the research. The research was designed to reach the objectives by analyzing and selecting the research philosophy, research approach and research technique match with the limitation of study. Sampling, data collection and data analyzing method were described.

3.2. Research Design

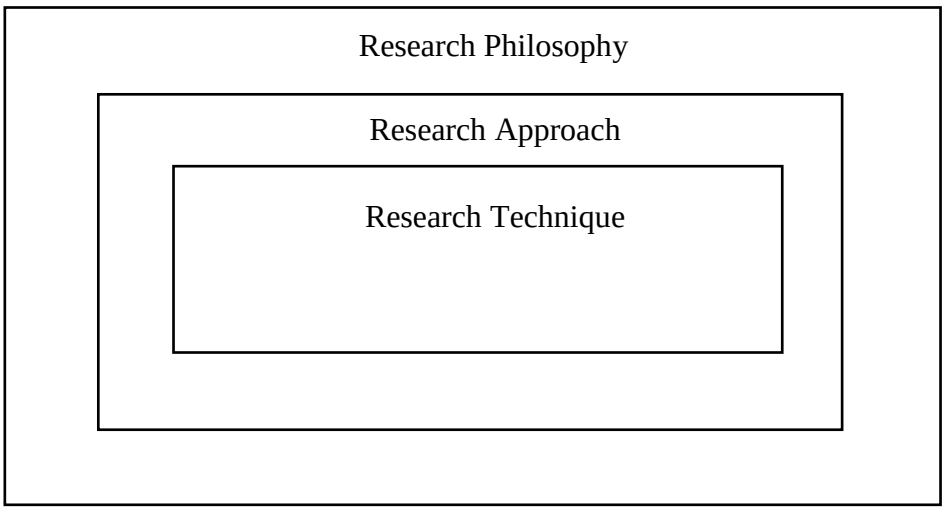


Figure 3.1; Nested research Methodology

Source: Adopted from Kagioglou et al., 1998 cited Senarathne, 2005

In this study, the "nested" research model (Kagioglou et. al., 1998) was adapted. In this method, three steps as shown in Figure 3.1 has to be identified. Any type of research consist of identifying the above three main factors such as research philosophy, research approach and research technique.

3.2.1. Research philosophy

When designing a research, Research philosophy was considered as starting issue. Easter by Smith et al. (2002) emphasized the significance of research philosophy with three reasons. Such as initially, the researcher needs to understand the research design and research philosophy. Secondly, research philosophy helps in identifying the circumstances on which the research design functions. Thirdly, it helps the researcher to identify and develop research designs which may be beyond his past experience. In this research, epistemology philosophy was, as the research problem is answered based on available theories and accepted practices.

3.2.2. Research approach

After defining research philosophy, research approach had to be selected. It may be defined as the plan for research question to the conclusion (Tan, 2002). Further Easter by-Smith et al. (2002) mentioned that the research approaches helped to arrange research activities, including data collection, in ways that are likely to achieve aim of the research.

Research approaches were classified in to five different types to adapted to a research such as experiment, survey, archival analysis, case study and history (yin, 1994). Questionnaire survey researches and interview researches are basically coming under quantitative approaches (Kraemer, 2002). In the view of Yin (1994), by using an survey research approach the researcher would study the whole population as individuals or groups. It could be able to identify understandings, opinions and views of peoples. Hence, considering objectives of the research quantitative survey approach was undertaken to ultimately decision making. Research approach was questioner survey and interviews.

3.2.3. Research techniques

Once the research approach is selected suitable research technique should be identified to operate the research. Research activities are organized by research approach; including the collection of data in ways that are most likely to achieve the

research aims. The method of data analysis is also important because it act as the media to interpret the data and give the conclusion the data analysis technique, content analysis, pattern-matching and cognitive mapping are the commonly used techniques in data analysis. In order to complete the objectives statistical analysis and descriptive analysis were adapted for data analysis. Therefore questioner surveys and interviews were used to collect relevant data as discussed.

3.3. Research process

Design of research process is very important tool to solve the research problem. Research design has been defined as the method of carrying the research problem to the conclusion (Tang, 2002). This can be illustrated as follows in Figure 3.2.

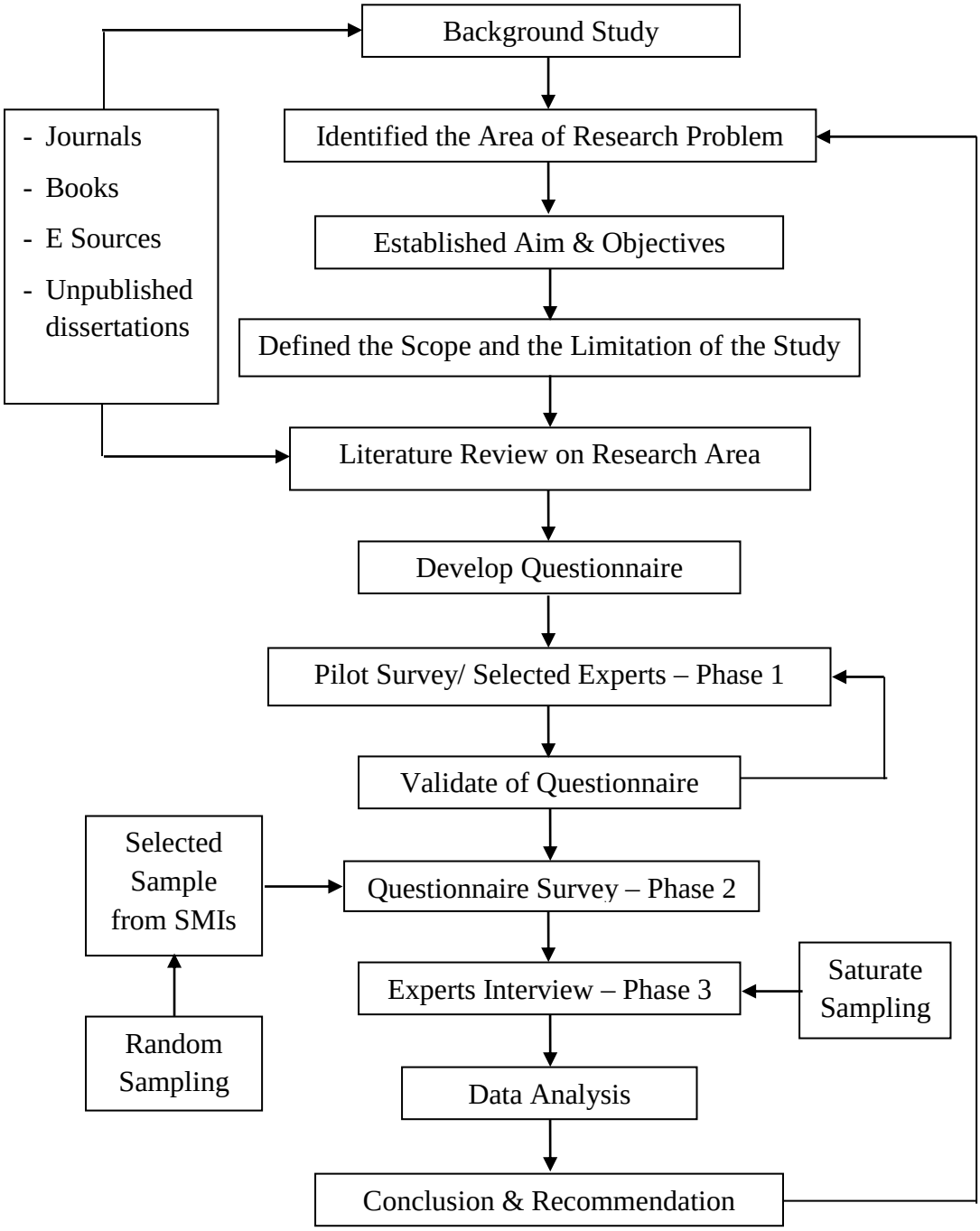


Figure 3.2; Research Process

Once the research design has been completed, appropriate research approach has to be selected. Research approaches are categorized in to two such as quantitative and qualitative. Quantitative approach based on the idea information, observations that social phenomena can be quantified, measured, classified and expressed numerically

numbers, deductive reasoning and cause & effect relationship by objective measure. Qualitative approach is all about exploring issues, understanding phenomena answering question can be explained through word, inductive reasoning and describing meaning in subjective manner.

This research is focus to identify the issues related to OSH in manufacturing sector SMIs and introduced precaution to enhance the OSH in SMIs. Among the existing research approach as survey method, case study and experimental method etc., the survey method was selected by considering feature of study. Survey method is best appropriate approach to identify the issues related OSH in SMIs and get opinion from experts as well as Manager and employees in this sector.

3.4. Data Collection

As describe by the Tan (2002), Data collection techniques are interviews, questionnaires, document survey, observation and participation. Data collection of this research involves three phases including pilot survey, main survey and expert survey. The objective of the pilot survey was conducted to validate the question and further used as the test run to identify any practical problems that may arise during the main survey. Two experts were selected from the department of labour for necessary guidance to prepare questionnaire and to conduct pilot survey. The questionnaires were prepared to identify issues related to OSH in SMIs.

3.4.1. Phase 1; pilot survey

The pilot survey was conducted to validate and prepare the detailed questionnaire in a consistent manner to achieve objectives successfully. Trial questionnaires were distributed among selected five managers and five workers. Then, necessary adjustment was made for questionnaires to validate it for main survey by help of selected expert from the OSH field such as department of labour and Ministry of labour.

3.4.2. Phase 2; Questionnaire survey

Detail questionnaire has been prepared with guidance of pilot survey. Same set of questionnaire were distributed among randomly selected two manages and two other workers from each SMIs in manufacturing sector factory. Initially, introduction was given for selected group about the research and allowed to freely answer the questionnaire and collected personally within one week. This method was continued up to cover thirty factories in one industrial estate in Colombo district.

3.4.3. Phase 3; Experts interviews

The interview guidelines were prepared based on the initial significant of findings from questionnaire survey to address the current issue of SMIs. It is further considered critically and extremely critical factors (4 < RII according to the scale provided) affect to implement OSH practices. The intention of interviews was focused to find strategies to overcome the issues found from questionnaire survey. Experts interviews were carried out until Saturation point reached in answers provided. Expert sample was saturated with nine experts. Interviewers were selected from relevant authorities that can contribute towards enhancing OSH in SMIs. These expatriates were selected from Ministry of labour, Department of Labour, National institute of occupational safety and health, occupational hygiene, Insurance Firms and Board of Investment as shown in table 3.1.

Table 3.1: List of experts represent institutions

Experts represented institutions	Number of Experts
Industrial safety division / Department of Labour	03 (A,B,C)
Occupational Hygiene / Department of Labour	02 (D, E)
Board of investment	03 (F, G , H)
Insurance	01 (I)

3.5. Questionnaire Design

Questionnaires were designed to collect the relevant information from the industry to identify the real problem behind the management issues in SMIs. Basically

Questionnaires set up was arranged in to four major categories such as basic information of respondent & his/her organization, OSH Management detail of respondent organization, Safety system and practices, and other set to find the factors affected to OSH poor implementation. Second category was given concentration on safety policy and law, third for level of safety system and practices and fourth set to find the level of critical affected factors for poor implementation of OSH.

3.6. Sampling

Sampling can be defined as the method of selecting data collecting group from the population. This sample should be appropriated. Selecting an appropriate sample for the study is quite difficult (Tan, 2002). In this research study was focused on SMIs in manufacturing sector and considers to representing the different type of manufacturing industries to get better sample. The most of industrial establishment are spreads in western province specially in Colombo and Gampaha, such as 82% of large scale, 52% of medium scale and 28% of small scale (Central Bank Report, 2010). Further this can be focused on SMIs density to select appropriate sample. It can be seen that the 70% of medium scale and 50% of small scale industries are in western and central province covering 6 districts out of 25. Moreover, Colombo, Gampaha and Kandy District cover 55% of medium scale and 37% of small scale (Ministry of finance and planning in 2010 in its report "Crisis Response SMIs Development facility). Hence this data collection was limited to one of industrial zone in Colombo District because large number factories are SMIs in this zone. 30 factories will be randomly selected for the questionnaire. Two survey respondent categories; managers and other employees (supervisors and workers) from each factories were considered for the questioners' survey. Sample size for each factory were randomly selected so that each factory represented two manager and two other employees as 4 (four) shown in Table 3.1. Total 60 experience managers and 60 employees were selected for the main survey from 30 selected factories. Questionnaires were distributed among participants and given some introduction to randomly selected participant to aware the questionnaires. Filled questionnaires were collected by-hand.

Table 3.2: Sample Distribution

Respondent Category	Number of Respondents	Number of Factories	Total
Managers	02	30	60
Other employees (supervisors & workers)	02	30	60
Total number of respondents			120

3.7. Data Analysis

In all questionnaires were given to manager and other employees. Responded population was hundred percent of target population to the item on questionnaire satisfactorily.

The data gathered were edited before the analysis. The questionnaires retrieved from the respondents were serially numbered to facilitate identification. The respondents were grouped such as managers and other employees. Data are presented in the form of tables, frequencies and percentages.

Percentage calculation is the most appropriate method for analyzing the current OSH practices. Most of the past researchers Calvin & Josph, 2009; Maclean,1999; Phornnthip,2004; Phalihawadana, 2009 used percentage calculation for analyze the OSH. Identified current OSH systems and practices are analyzed as a percentage using the following equation.

$$\text{OSH safety practices \%} = \frac{\text{No of received positive responds}}{\text{Total number of responds}} x\ 100$$

$$\text{Relative importance index} = \frac{\sum_{i=1}^{5} Wi\ Xi}{\sum_{i=1}^{5} Xi}$$

Wi :- weight assigned to i^{th} response; wi= 1,2,3,4, and 5 for i = 1,2,3,4, and 5 respectively

Xi ;- frequency of the i^{th} response

I :- response category index = 1,2,3,4 and 5 for not affected, neutral, low affected, moderately affected, strongly affected respectively.

Relative important index (RII) was applied to the rank the data which were created according to the specified scale, as similar to many other researchers such as Dissanayaka, 2006; Sivamainthan, 2007; Rathnayake, 2009.

In this research identified causes were ranked with specified scale for 1 to 5. Five (5) is represented the extremely critically affected, 4 as critical affected, 3 as moderately affected, 2 as fairly affected, 1 as not at all affected The significant barriers which RII $\geq$ 4 were selected as critical OSH barrier. The content analysis was carried out manually to identify possible strategies to enhance current OSH practices.

The significant of finding strategies could be verified from content analysis through experts from relevant government agencies such as Industrial safety division and Occupational hygiene division of Department of Labour, National Institute of Occupational Safety and Health, Insurance Company and Board Of Investment.

3.8. Summary

This chapter discussed the methodology of research. It described about the research process including sample data collection and data analyze. Further survey approach figure out as a most applicable method and questionnaire survey were selected as the research technique for collected data for the research. Data presenting techniques, published method were used to present and analyze the collected data and make the conclusion upon such analyzing.

CHAPTER 04

RESEARCH FINDINGS AND ANALYSIS

4.1. Introduction

The methodology of the research is explained in chapter these. The data requires of the research have been analyses and submitted. Moreover, the information which was abstained by the questionnaire has clearly been explained separately. The data which were obtained have been forwarded for further clarification.

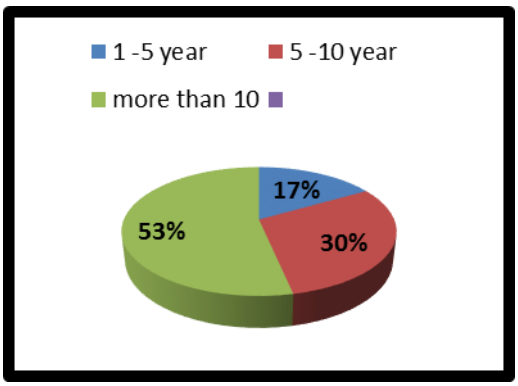
A convenient system had been traduced to identify the data wanting when submitting data, which were abstained by the questionnaire considering the information given by the management and the staff, and also compared separately and specially discussed for a further situation. If required. Selecting a zonal industry the research father considers, the SMIS face such barricades an legislating in nature management, understanding security systems and its manipulation, occupational stateliness and health hazards was brought up for consideration mainly.

Considering the above facts seriously the research had abstained the probations and advice in analyzing the study severally.

4.2. Respondent Rate and the Characteristic of the Sample

The Production team of the research carried out a random selected SMI s of a zonal industry also choosing 30 industries randomly for each sample. At the random selection they were divided into two main sections a top management level and ordinary superiors and staff of four and were around 60-60 of a total 120.

During the random questionnaire, the group had been briefed and the response was 100% and the completed papers were handed to me.



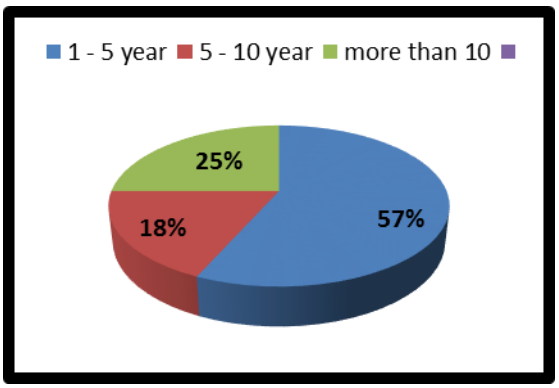
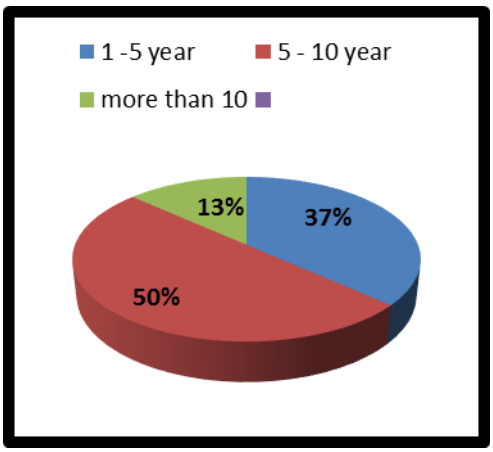


Figure. 4.1a; Total experience

Figure. 4.1b; Present workplace experience

Figure 4.1; Experience of managers

Figure 4.1a shows total experience of the respondent and Figure. 4.1b shows present work place experience of the managers. The largest total experienced group is more than 10 years, (53%) followed by 5-10 years (30%) and 1-5 years (17%). Similarly the maximum experience at the present work place is 1-5 years (57%), more than 10 years (25%) and 5-10 years (18%). Therefore the obtained results were shown most of experienced manager's reluctant stay in SMI's.



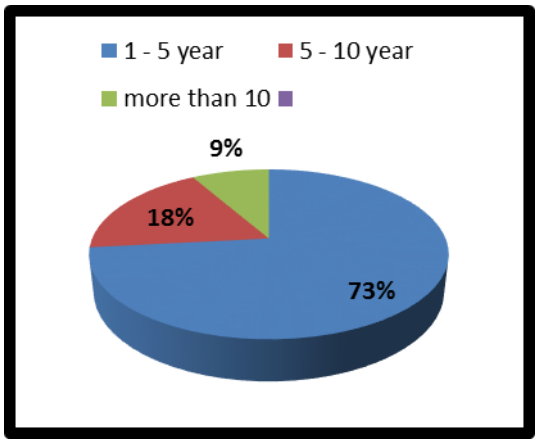


Figure 4.2a; Total experience

Figure 4.2b; Present workplace experience

Figure 4.2; Experience of supervisors and workers

Total experience and the current work place experience of the worker who have been participated in the survey were shown in Figure 4.2.a and 4.2.b. representatively. The total of the highest experienced group is 5-10 years (50%) followed by 1-5 years (37%) and more than 10 (13%). Similarly the maximum experience at the present workplace 1-5 years (73%), 5-10 years (18%) and more than 10 years (9%). Therefore the obtained results were shown most of workers have less experience in their present work place.

4.3. Type of market in SMI's

The verification of the following figure 4.3 shows the nature of the market place of SMIs. The main shareholders of SMI's are top companies which supply products to the export market and to the local market of a mix supplement directly to the foreign market of 23% and to the local market of 27%. This shows that the market for SMI's are mainly affected in the local market.

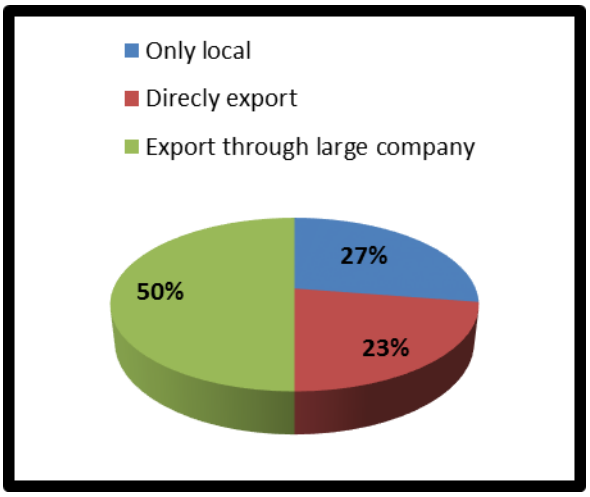


Figure 4.3; Distribution of market share in SMIs

4.4. Current OSH management practices in SMIs

4.4.1. Safety policy and law

When compare with other sectors, a large number of people are working in SMIs providing major contribution to the country's economy. Hence the requirement of OSH is also important factors such as safety policy and law. There should be a specific safety policy for each and every organization to improve their level of OSH.

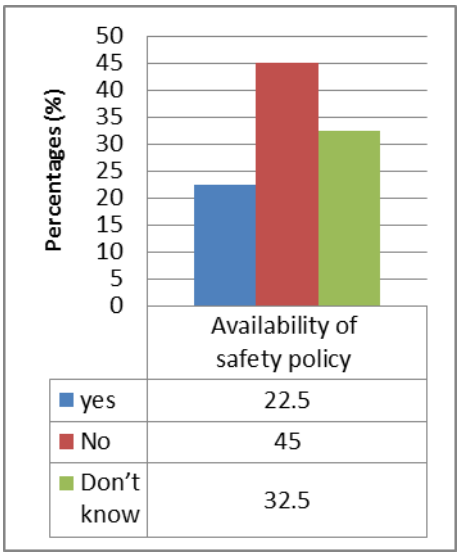


Figure 4.4a :
Availability of safety policy

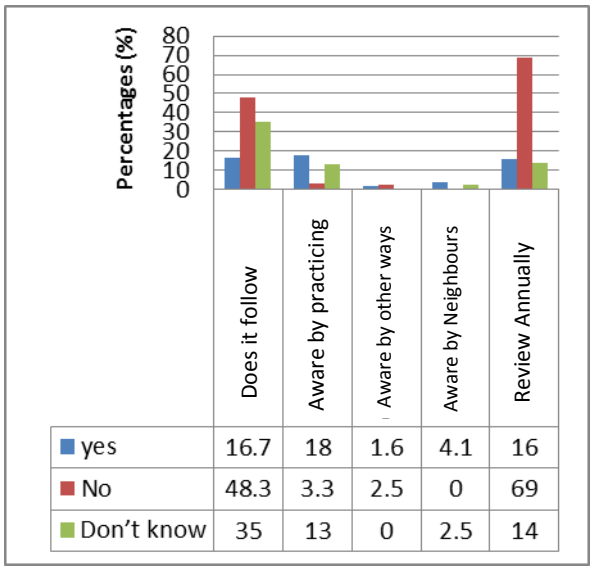


Figure 4.4b :
Implementation of safety policy

Figure 4.4: safety policy

According to the above results only 22.5% shows the significant stability in safety policy and thus 77.5% may not maintain a policy at all. Further 32.25% has no idea of such policy.

SMI's which has safety policy, only 16.7% maintain and review only 16%. The 18% of employees in SMIs aware a safety policy by internal practice knowledge, 1.6% from nearby factories and 4.1% from elsewhere.

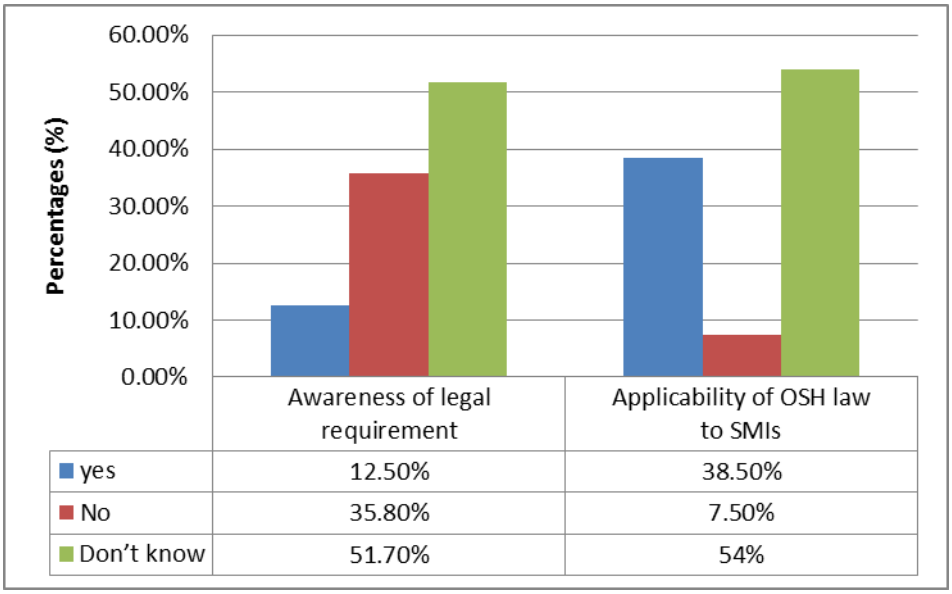


Figure 4.5: Legal requirement

The figure 4.5 shows the aware of legal requirement and its applicability to SMIs. Aware of legal requirement is 12.5% and 87.5% is unknown. By this reveal, SMIs do not comply with the OSH legal requirement.

But 38.5% is to accept and implement OSH law in SMI's and 7.5% not implement such safety, and 54% hasn't even known such implementations. Industries which maintain safety policies don't even know that there is such OSH legal requirement.

4.4.2. Safety Systems and Practices

SMI'S employees mostly perform in multi tasks in their production process such as machine operations, welding and cutting operations, manual handling of hand tools, housekeeping etc. Some of these employees start their occupation within these industries because it is easy to join with their level of educational background and lack of skill. According to one manager, some people have joined for SMI'S for a short period until finding another job from a large company. Hence they have not given much effort to develop or change the behavior employees in SMI'S. That also badly effect for the safety system and practices as shown in figure 4.6.

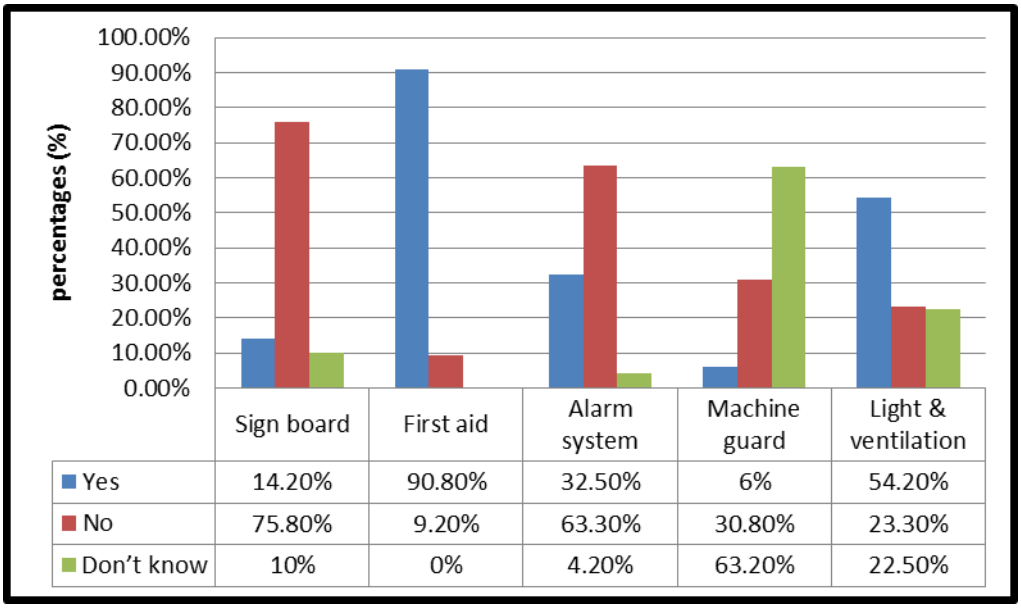


Figure 4.6: Safety System in SMI's

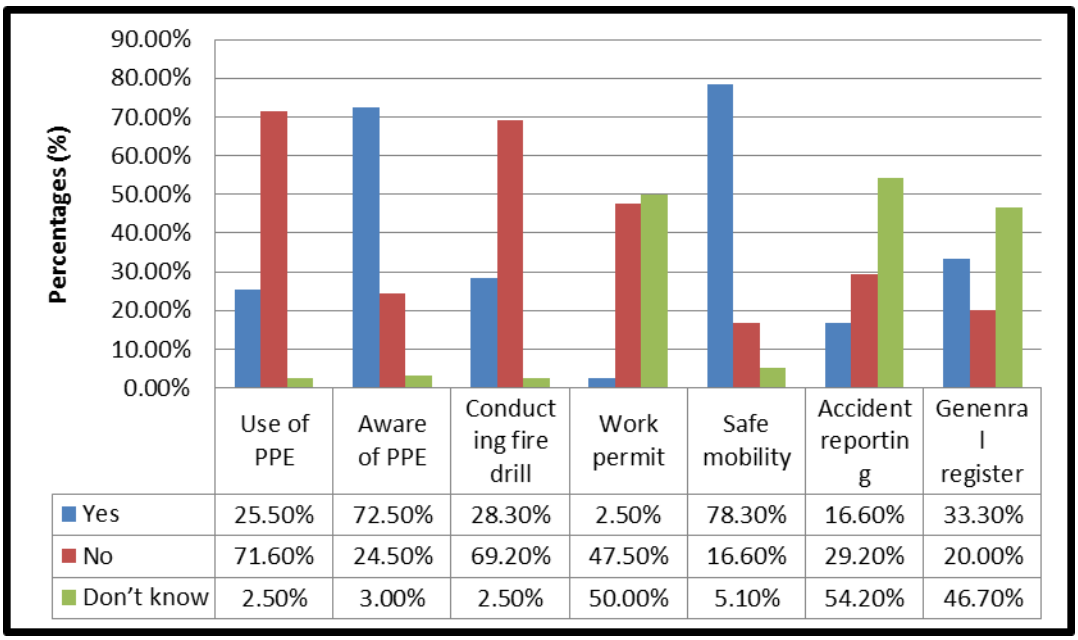
As per some managers, maintaining safety systems are very vital for any industry. But some industries which fail to maintain higher standards of OSH. It has been further verified. In case of an emergency, disaster situations becomes serious due to mismanagement or even at improper work carried out by the staff. During such situation the communication among staff is appalling due to lack of knowledge and awareness. Although communication is important, Use of sign board in SMIs are only 14.2% and non-usage is 75.8%. Rest of 10% is even unaware. Sign boards alert people, who are less in literacy, or uneducated to follow up but the attention for this has become a failure.

Interestingly use of first aid is high as 90.8%. Whereas 9.2% is unknown. According to findings of the research most companies, do not consider "Prevention is better than cure "alertness. However most of them do not have knowledge of first aid requirement and its purpose. Hence employees in SMIs satisfy with medicine for small injury.

Emergency response regarding the fire alarm procedure only a minimum of 32.5% knows if and practices, whereas 63.3% doesn't and 4.2% hasn't even had a clue. It cause to poor knowledge of emergency response.

In SMIS machine guard safety is 6% whereas 30.8% doesn't use such safety and 63.2% is unaware. In SMIS, various tools are being utilized and the risk is obviously inviting. According to many managers of SMIs mention that most machines are old and locally manufactured, machine guards are not designed originally. Also few mentioned, machine guard are available some people poor attention to fix the machine guard after repair due to poor knowledge of maintenance and risk of machine.

Performance of working environment is also dependable factor for OSH such as dust noise, light, heat, vibration and ventilation. This type of hazards create health problem in long run. But It is not react as acute effect. Hence Response of light and ventilation is very poor in SMIs. Staff when they work in high positions and welding places it needs bright light and proper ventilation but such facilities are adequate only of 54.2% and 23.3% has inadequate facilities and 22.5% maintains very poor standards revealed at SMIs and the luckiness to such incompliance and knowledge paves the way to less productivity and staff facing to purplish illnesses.



	Use of PPE	Aware of PPE	Conducting fire drill	Work permit	Safe mobility	Accident reporting	Genenral register
Yes	25.50%	72.50%	28.30%	2.50%	78.30%	16.60%	33.30%
No	71.60%	24.50%	69.20%	47.50%	16.60%	29.20%	20.00%
Don't know	2.50%	3.00%	2.50%	50.00%	5.10%	54.20%	46.70%

Figure 4.7: Safety Practice in SMI's

During work, the staff should have the knowledge of the environment that they are working with various types of tools, handling materials, exposing chemicals. Hence personal protective equipment has to be used to protect from their hazards. But in SMIs 25.5% uses PPE 71.6% doesn't use and 2.5% does not even know.

The knowledge of P.P.F. in SMIs is 72.5% where as 24.5% shows unawareness. It is relieved that. Though the staffs are aware of such safety, SMIs are not interested in providing training and facilities owing to such blackness's. SMIs safety procedures are minimal.

In an emergency or at a crisis the staff should be well trained of an evacuation system, if not, at such crisis, the damages and injuries may rise or even be fatal. The fire drill training is maintained as 28.37% in SMIs and 59.2% doesn't and 2.5% doesn't even consider such safety procedures and they are unaware of their lives in peril.

When getting into confine space such as tanks and pits as well as hot work. Staff should have work permit which is allowed only for skilled workers with necessary safety measures. But in some SMIs only 2.5 % uses if 47.5% doesn't use and 50% is totally unaware. By this, it shows that in SMIs the risks are not identified eventually or haven't considered seriously about the staff safety.

The safe mobility facility in SMIs is only considered and maintained only 78.317% and 16.6% doesn't. Rest of 5.1% is even not aware. Safe mobility is provided up to certain extend by SMIs. Although conducting fire drill is poor as mention above.

When working in SMIs, the accident resister or the general register has to be maintained but 33.3% does maintain. 20% doesn't maintain and 46.7% even doesn't know. In SMIs, records of accidents have to be recorded and maintained Properly which are legitimate standards, and only 16.6%, accident reporting system maintains correctly. 29.2% doesn't it satisfactorily and 54% is unknown. By this. It is clearly shown that SMIs do not consider the safety of their staff.

4.5. Infrastructure and Welfare

	Utility service	Welfare facility	Resting period
Yes	43.30%	72.50%	85%
No	55.80%	24.20%	10.80%
Don't know	0.88%	1.60%	4.20%

Figure 4.8: Infrastructure in SMI's

Infra-structure facilities of any organization affect the level of worker safety. In this regard utility services, Welfare Facilities and Resting Opportunities were analyzed and found satisfaction level for utility services are identified as 43.3% in SMIs 55.8% doesn't satisfy.

Owing to power failures which frequently occur face production shortage and raw material wastage and wasting man days. To recover such losses in most SMIs tend to allocate staff to work over time for urgent production, putting them at risk.

When there is welfare for the staff, they care definitely for the workplace. Because most of the staffs have less of literacy knowledge and they are reluctant to correspond with banks and financial sectors. Therefore they tend to obtain such financial requirements from the company.

4.6. Barriers for OSH implementation in SMI's

SMI's like other industries are facing various barriers to implement OSH. These barriers exist in many ways. Workers view & managers' views were analyzed to identify these barriers. OSH is a condition to reach the efficient and effective way of better output by maintaining at most level of health and mental status. The survey obtained such problems that affect the OSH in SMI's.

Table 4.1: OSH barriers in SMI's – Workers perspective

No	Critical barriers for poor implementation of OSH	Relative important index	Rank
1	Insufficient risk assessment and OSH audits	4.8333	01
2	Insufficient tool box meeting	4.4667	02
3	Lack of OSH training	4.3167	03
4	Lack of safety technology	4.1833	04
5	Lack of support from regulators body	3.8333	05
6	Extend of existing OSH monitoring	3.8000	06
7	Poor financial support through bank loan	3.6333	07
8	Poor attendance of OSH of workers	3.5500	08
9	Lack of provision of supervisory guidance	3.5000	09
10	Insufficient financial allocation for OSH	3.3500	10
11	Insufficient fire training	3.3167	11
12	Insufficient first aid training	2.6500	12

Table 4.2: OSH barriers in SMI's – Managers' Perspective

No	Critical Factors For Poor implementation of OSH	Relative important index	Rank
1	Insufficient risk assessment and OSH audits	4.5167	01
2	Insufficient tool box meeting	3.9500	02
3	Lack of safety technology	3.9000	03
4	Lack of OSH training	3.7667	04
5	Lack of support from regulators body	3.6667	05
6	Extend of existing OSH monitoring	3.6500	06
7	Poor attendance of OSH of workers	3.6441	07
8	Insufficient financial allocation for OSH	3.5167	08
9	Insufficient fire training	3.1017	09
10	Poor financial support through bank loan	3.0333	10
11	Insufficient first aid training	2.9833	11
12	Lack of provision of supervisory guidance	2.9333	12

In the above table 4.1 and table 4.2 presents the mostly affected causes for safety and health in SMI's. These causes are ranked according to the workers and managers views. All of the above causes are affected to OSH. However the factors are ranked to identify the causes that are affected critically.

- Insufficient risk assessment and OSH audits

According to critical affected factors for poor implementation, insufficient risk assessment is always and mostly affected for OSH. Most of employees told that lack of risk assessment is the major problem to OSH in SMI's. Lack of education, job security and poor financial ability is caused in insufficient risk assessment. Mostly affected factor is interrelated in the field of OSH as hazard identification and risk assessment.

- Insufficient tool box meeting

Next, mostly affected fact is insufficient tool box meeting. It shows the poor in management commitment regarding OSH. According to the information from the workers, the lack of training is come as the next cause of barrier for the implementation of OSH. Poor education and attitude of the owner is cause for lack of training. Although the training is provided, as per the workers' view the quality of training programs is not sufficient.

- Lack of safety technology

According to the managers, next major affected causes as per given ranking lack of safety technology. It may be due to poor in new OSH management technology and machinery. Also poorly designed equipment and machineries caused to safety and health hazard to the workers. Some time it comes as ergonomics problems. But Workers perspective is somewhat different than managers' view. It shows training gives more impact on OSH than technology.

- Lack of OSH training

Next impact on OSH is training. Manager's point of view is not more critical than technology. However both groups were given almost similar impact from technology

and training. Managers mention that these two has to be operated together. But providing training facilities are poor in SMIs due to poor commitment of owners and managers due to lack of knowledge in OSH and also lack of OSH expert.

- Lack of support from regulators body

Lack of support from regulatory bodies is also affected. Managers reveal that the number of visit to the SMIs is very law by regulatory bodies. Hence Priority is not given to comply with safety due to poor knowledge of legal requirement and its effect. It may be due to poor in resources in regulatory bodies for frequent visit.

- Extend of existing OSH monitoring

OSH monitoring system is also affected as per workers' perspective and managers' perspective. Some mangers mention that most of SMIs are not performing proper monitoring mechanism due to lack of awareness and also it is accepted by workers. Poor OSH monitoring is caused to lack of safety practices and poor in use of PPE.

- Poor financial support through bank loan

It is realized commitment and condition of internal level of OSH and requirement of management system in SMI's is an essential need financial intuitions are also expanding their business increasing their profit. Therefore banks which are to take risks of SMI's without clear past financial reports fear to provide for bank loans. This sector mostly does own business without getting external support of relevant institution to systematic the business due to poor knowledge and skills. The cost benefit analyses are also not done for OSH to understand return from OSH. Hence providing financial allocation is also poor to implement OSH. It shows the commitment of management and result appears as poor workers participation.

- Poor attendance of OSH of workers

Attending OSH activities are also poor in SMIs and its impact to the OSH implementation. Employees of SMIs do not understand the return of OSH due to lack of knowledge for owners and other staff regarding OSH. Managers mention , Some owner predicting OSH as additional burden to the organization.

- Lack of provision for supervisory guidance,

Supervisory guidance is also very important factory to implement OSH. It is also very poor. It shows the weakness of safety management system and procedures for work and it realizes the requirement of management system. Further it is affected from fire training and first aid training. But these are less affected to implement of OSH comparing to other factors as per workers' views.

In the above table 4.2 Shows mostly, affected factors for OSH implementation in management perspective. According to their views, insufficient risk assessment is the extremely critical factor for OSH implementation. Next critical factors in ranks as per managers views insufficient OSH audits, lack of tool box meeting. According to the data collected from managers' and workers, similar ranking order comes for first factors. That means management is accepting that the workers highlighted factors affected factor is ranked as lack of safety technology and lack of training. But workers' views on these two are in the opposite way. However, Lack of technology means broad views of these. Hence, workers and managers are in mostly in similar ideas in affected factors for poor implementation of OSH in SMI's. Regulatory body support and extending existing monitoring next ranking order also provide similar facts accepting worker views. This may cause to frequent change of employees. Although try to implement monitoring system. Similar argument raised by managers for next rank given as poor attendance of worker for OSH. In addition, Next rank has given for insufficient financial allocation. The demand for OSH is very poor among local market buyers. Hence priority in OSH is less. Because, most of SMI's are in local market. Some of SMI's are manufacturing goods for export market but it is supplied though major suppliers. Hence it is not the major compliance impact on SMI's. The bank loan issue is in similar concept workers. However, nowadays management is trying to establish good relationship with banks and take benefits from banks. Training is also seen as critically affected factor with the views of managers such as fire and first aid training. Nowadays it is being provided but the problem is the quality of training and training monitoring system. The other problem is lack of recognized training institutions for OSH and also qualified trainers in this field. Other affected factor as per the above rank base on managers' views lack of

provision for supervisory guidelines. Though supervisory guidelines are prepared but they are not systematic and not based on job safety analysis. Therefore, it is not much productive. Hence this is essential requirement of the management system for OSH in SMI's.

4.7. Expert views to overcome existing OSH Barriers

According to the observation made through ranking order, It is summarized and listed critically for affected factors which are given by the expertise idea such as insufficient risk assessment & OSH audits, Insufficient tool box meeting, Lack of safety technology.

The level of current OSH barriers were identified and it was further verified from managers and other workers by providing highest ranking by RII for insufficient risk assessment and OSH audits in this situation question from local experts to find the better solution and overcome the OSH problems in SMI's. Most of experts (100%) are given similar recommendation such as government support compulsory periodical training program. Similar way compulsory OSH training modular has to be prepared by consulting regulatory body for schools, technical colleges and universities.

Second highest RII ranking was identified for insufficient tool box meeting. This situation was accepted by employees in SMI's. This can be further verified by highlighting use of PPE (25.8%). In this problem directed to the local experts to find the solution and overcome the problems as in above. Experts' views were given such as introduce government monitoring mechanism to monitor internal OSH management system through government prepared OSH management model for internal operation and control, safety awards. This can be extended to monitor training, OSH promotion schemes like poster competition, safety awards. This can be legalized to create mechanism to training certification linkage with OSH regulatory body. The facility should be decentralized to regional level with easy access to the SMI's without much cost. Further it is highlighted impact to the efficiency and

effectiveness of economic growth in SMI's by improving OSH. Experts were highlighted that total cost of accident is very high and serious negative impact to the SMI's from workday lost due to fatality and non-fatality.

Third highest RII ranking was identified as lack of OSH training. This was already seen during questionnaire survey such as knowledge of OSH legal requirement is 12.5% only. This has been further verified and following recommendations were given to overcome the problems. The availability of training facilities should be increased to the industry by introducing well equipped regional training centers with resources, persons without burden to SMI's. Training requirement should be legalized and it should be linked with OSH regulatory body in Ministry of Labour to conduct and monitor the training. This center should be strengthen to organize safety promotional activities, Knowledge sharing activities locally as well as internationally. This should be expanded to schools, technical colleges and other vocational training centers similar to the job world in Korea. Further it was found lack of experts in this field for poor in training. Hence Experts were recommended to start programs for generating OSH professional from academic institutions and also trainers training program for the industry.

Fourth highest RII ranking was identified as lack of safety technology. Questionnaire survey was found following lack of safety technology such as poor satisfaction of machine-guard etc. During the expert survey, Explanations were given. Technology was viewed within this contest as soft component and hard component. The soft component relate to the human capability generation process linked to the absorption and management technology. The hard components were focused on the essential technological processes and equipment utilized in the problem. Technological transfer mechanism has to be started in both ways soft and hard by the government system. Similarly hard component can be improved by introducing consultancy, cum training model with support of local and international experts. The government support has to be introduced by policy wise such as low interest loan scheme to update the system.

4.8. Strategies to overcome existing OSH barriers

Based on the content analysis answered provided by experts four strategies were established as follows

- Strategies 1; Establish regional safety centers administrated by OSH regulatory body (Existing regional District factory inspecting Engineers office) for safety technology (soft component and hard component) development including training and safety promotional activities among the SMIs linkage with Other industries and general public.
    - Knowledge sharing programs for SMIs with other industries
    - Introduce and operate OSH technology transfer mechanism in locally and internationally.
    - OSH training facility and OSH consultation facility for SMIs.
    - Compliance audit certifications including risk assessment and OSH audits.
    - Display models with operational level for better understanding.
    - Vocational and part time training facility for school leavers on OSH.

- Strategies 2; OSH is one of the major factor to impact to the growth of SMIs and also efficiency and effectiveness of the sector. Existing OSH legal frame work (Factory ordinance) should be strengthened specially considering following areas
    - Legalize OSH management system to match with ILO guide lines and local requirement of industry for continual improvement.
    - Legalize minimum OSH standard and compulsory training levels and its certification to run the industry.
    - Legalize monitoring mechanism to measure the performance OSH including risk assessment, OSH audit, tool box meeting and management review.
- Strategies 3; OSH education is very important for any industry to reduce the unnecessary hidden losses and understand the level of impact to the growth of industry. Following strategic decisions should be taken to aware the subject among the society.

- OSH as a subject of the school syllabus from primary education.
- OSH as a compulsory subject for technical institutions.
- OSH education should be done as a compulsory training for industrial employees.
- Develop government academic institutional capacities to generate OSH professionals to industry by introducing OSH courses.

- Strategies 4; Management commitment is very important factor for OSH implementation in SMIs. Hence Strategies should be proposed to get interest of owners and managers regarding OSH. Following elements are the important components for management commitments.
    - Financial support should be provided for OSH projects such as law interest loan from banks, tax concession for PPE and other OSH related purchase.
    - National recognition for OSH standard for market the products similar to quality standard

Easily available government support technological (soft component and hard component) consulting services to the SMIs.

4.9. Implementation framework for OSH in SMIs

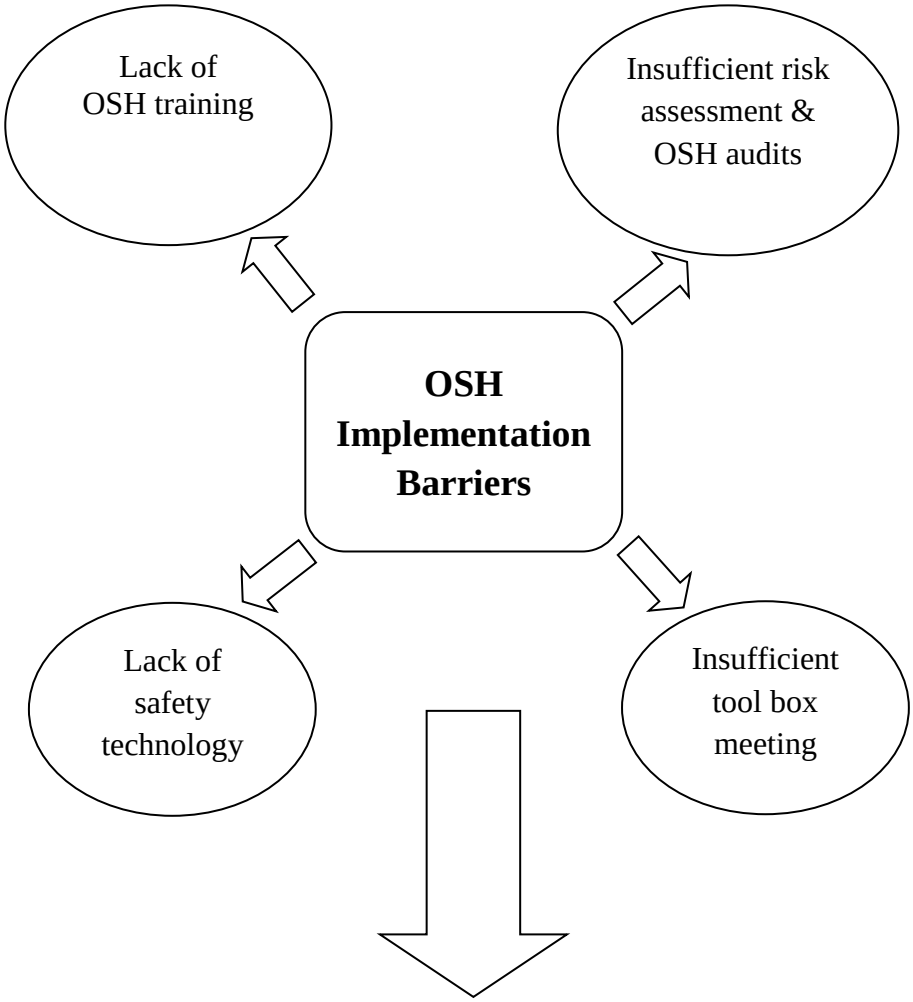


Figure 4.9: Identified critical major factors for poor implementation of OSH;

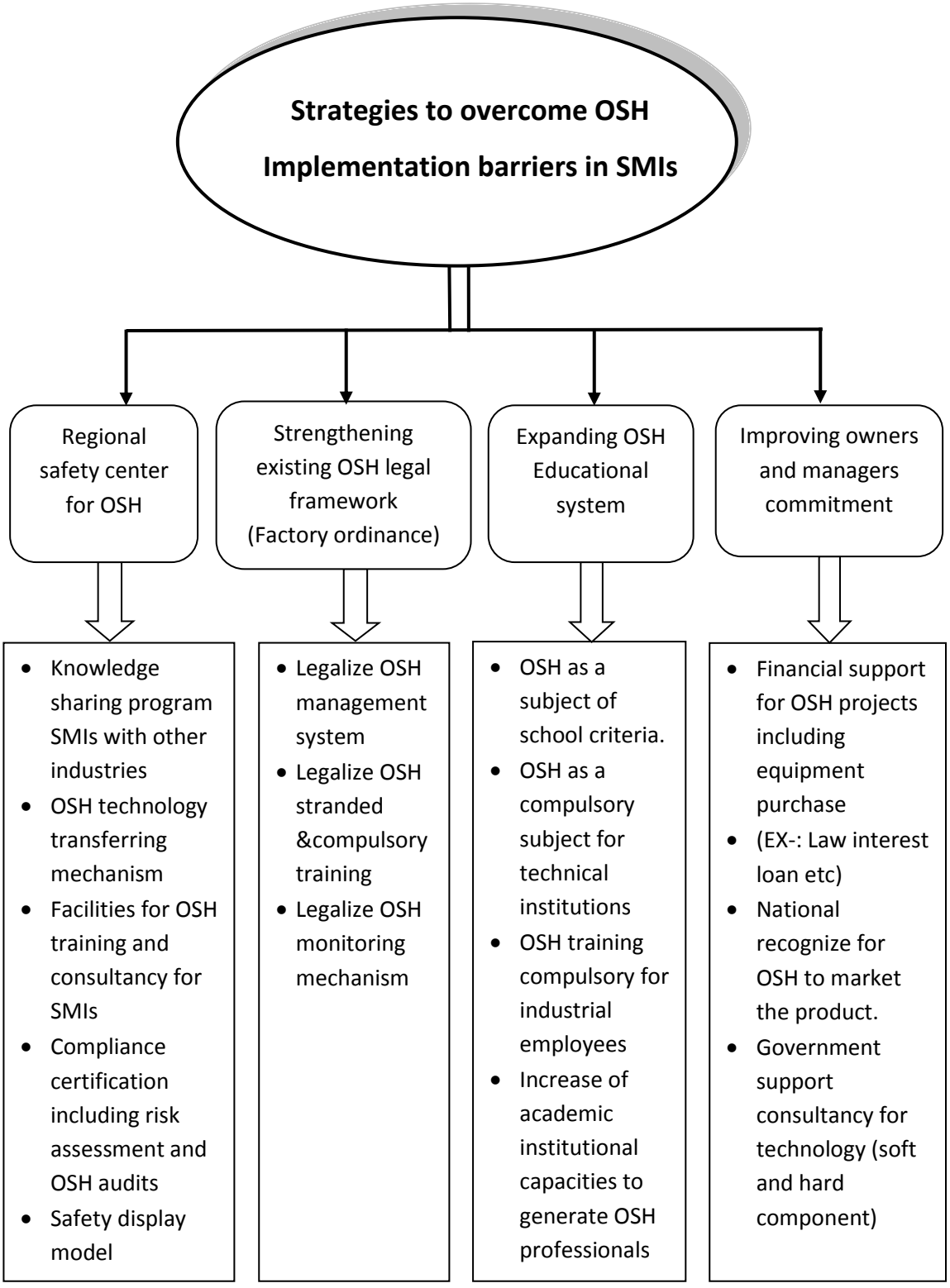


Figure 4.10; OSH implementation framework

- **Establish Regional safety centres**; By establishing safety centres regionally under the administration of the OSH regulatory body for inspection in safety technology development of soft and hard component as of training promotional activities generally which will be very useful and important by conducting knowledge sharing programs as well as providing facilities for training and consultancy of OSH for SMIs with locally and internationally. The technology transfer mechanism should not only be introduced and operated under OSH locally and internationally but also should introduce vocational and part time training for school leavers. And it will be great by displaying the models of operational level for a better and clear understanding of any workout which also comply to audit at risk assessment OSH.

- **Strengthening existing OSH Law (Factory Ordinance);** OSH is one of the major factor to impact the growth of SMIs and the efficiency and effectiveness of the sector, also existing OSH legal framework (factory ordinance) should be strengthened specially considering the important areas, such as legalizing OSH management system in matching with ILO guidelines for local industry of various requirement which improve continually to run the industry, the OSH standards should be legalized and at the same time the training levels should be specified depending on the employment and compulsory for each person. The level should be standardized by issuing certificates. Finally there should be a monitoring mechanism of preview of the management of OSH audits to measure performance of risk assessment.

- **Expanding OSH Education;** OSH education is very important for any industry to reduce the unnecessary hidden losses and understand the level of impact to the growth of the industry by introducing OSH as a subject to school from its junior level; also in technical institutions. The OSH education should be wide spread to industries and government sectors and training should be compulsory in academic level where the capacity to generate OSH professionals to carry out courses among industries would be great for the safety of employees.

- **Improving management commitment**; management commitment is very important factor for OSH implementation in SMIs. Hence strategies should be proposed to get the interest of owners and the managers regarding OSH. When OSH projects are conducted. Funds should be allocated under low interest, tax concession for PPE and other OSH related purchase which would be a great financial support boost. The standards of OSH should be improvement and as a must of national concern and soft and hard component should be easily available for consultancy service under government support to the SMIs. The national recognition should be established for OSH to market the product.

4.10. Summary

According to the observations of two categories such as managers and other workers who are mainly involved in the manufacture sector, analyze the collected data to identify current OSH management practices such as safety policy and law, safety system and practices and infrastructure. Also, analyze the critically affected factors for OSH poor implementation in manager's perspective and other worker perspectives. Results presences that are insufficient risk assessment and an OSH audit is the biggest OSH implementation barrier in SMI's and followed by lack of tool box meeting, lack of training and lack of safety technology. Finally clarifications were taken from local experts to find the strategic solutions for OSH implementation barriers.

CHAPTER 05

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The SMIs make up a large part of economy and essential source of employment opportunities in Sri Lanka. SMIs in manufacturing sector are engaged in numerous industrial activities. The SMIs play an important role in promoting inclusive growth. The SMIs have been recognized as important strategic sector for generating economic growth and innovations, innovation mechanism and reducing unemployment, inequality and poverty. Hence this can be seen as useful in promoting social cohesion. Therefore it is important to consider the level of OSH. A large number of factories of SMIs are located in the western province of Sri Lanka and they produce finished good for local market and international markets. Hence SMIs are not only for local market but also for the international market. Some of SMIs are given service to the large companies as subcontractors by producing part of item or complete item. Therefore SMIs have faced for numerous inconveniences. However, there is a less attention for their physical and mental well being. It creates consequences of OSH problems.

In this research, it was studied and identified the following objectives to study the SMIs in manufacturing sector and current level of OSH management practices in SMIs. Further, it has been able to identify the critical barriers for OSH implementation and finally propose strategies to improve OSH in SMIs. The practical implication of OSH in SMIs in other countries and the applicability of OSH best practices and good systems to improve OSH in SMIs in Sri Lanka are analyzed as well. This chapter comprises of the main outcomes from the executed research. The prime objective was to formulate the strategies to improve the level of OSH in manufacturing sector SMIs. The survey results figure out percentages of managers' perspectives and other workers' perspectives and also some factors have been analyzed considering total work force as one team including managers.

The first objective is study SMIs in manufacturing sector and level of OSH practices in SMIs. It was focused as on current OSH management practices in SMIs by categorizing such as safety and health law, safety system and safety practices and infrastructure. It was identified the availability of OSH policy is 22.5% and implemented only about 16.5%. Safety Policy represents the management commitment regarding OSH and also contribution level of OSH by employees and also the Knowledge of OSH legal requirement and its applicability. It was identified knowledge of OSH legal requirement is 12.5%. However Knowing of applicability of OSH law is about 38.3%. Most of them do not respond due to lack of knowledge on safety policy and OSH law. The Survey was done on method of being aware of safety policy and law as well as review detail. Hence, it is realized practice of OSH law and implementation safety policy is very poor in SMIs.

Further It was found the power of safety system and practices by aware of PPE, satisfaction of PPE, availability of sign board, first aid facility and fire alarm & fire safety, satisfaction of machine guard and space, satisfaction of light and ventilation, safe mobility, conducting fire drill, use of work permit, use of general register and accident reporting system. Satisfaction of PPE was very poor as 25.8% although being aware of PPE is about 72.5% and also availability sign board is 14.2%. Fire alarms are used only about 32.5%. Machine guard and space is basic requirement of safety for workers in any industry. But Satisfaction level for the same is 60% only. Similarly satisfaction level of working environment is 54% only. The practice of fire drill is helpful to minimize the damage or injury to the workers during fire or any other emergency situation. But practice of fire drill is only about 28.35. Work permit system is also a good management practice for pre arrangement of work to prevent accident. But it is practiced only about 2.5%. Maintaining of general register is legal requirement of OSH to record accidents and dangerous occurrences and also it is used to report the accident detail to the regulatory body. But use of general register is 33.3% only and also accident reporting practice 16.6% only.

Further identified level of infrastructure were represented through satisfaction welfare facility as 72.5% and resting period availability as 85% but satisfaction level

for utility services (electricity) as 43.3%.It creates unnecessary production stoppage but It has to be completed within short period by introducing overtime work or shift work to finish the target. It has caused for unnecessary stress for workers and result appears as health problems.

Second objective is to identify the barriers for OSH poor implementation in SMIs. It was focused to identify the factors affected for OSH poor implementation in workers perspectives and management perspectives. In case of workers' perspective, the biggest critical factor for poor implementation is insufficient risk assessment and OSH audits and followed by insufficient tool box meeting, lack of OSH training, lack safety technology, lack of support from regulatory body, extending existing OSH monitoring, poor financial support through bank loan, poor workers attendance of OSH, lack of provision for supervisory guidance, insufficient financial allocation for OSH, insufficient fire training and first aid training. Also as obtained by the survey, the nature of most of the affected factor for OSH is poor implementation in view of management perspectives. Most extreme critical factor for OSH poor implementation is insufficient risk assessment and OSH audits secondly affected factor is insufficient tool box meeting. However, almost similar results were obtained from managers as well as other workers perspectives. It is realized that the managers accept the worker view of OSH. This can be concluded as the weakness in hazard identification and risk assessment in SMIs.

However Observations have been made by expertise regarding critical factors affected for OSH poor implementation such as Insufficient risk assessment and OSH audits, insufficient tool box meeting, lack of OSH training, lack of safety technology. These findings were critically analyzed by experts and Suggestions were given to overcome the OSH poor implementation in SMIs. According to the view of experts, More attention should be provided on strengthening legal frame work on OSH (including models of OSH management system, training stranded, monitoring mechanism), OSH education for all sectors (including industry, technical institution and schools). Regional safety centers for technology (soft component and hard component) development including training administrated by OSH regulatory body

linkage with public and private sector SMIs, Management/ owner commitment for OSH by introducing financial support, free consultancy and national recognition for OSH.

5.2. Recommendations

- Promoting safety culture

The safety culture of an organization is the product of individual and group values, attitude perceptions, competencies and pattern of behavior that can determine the commitment to and the style and proficiency of organization health and safety management system. The following areas should be promoted within the organization.

  - Situational aspect (policies, procedure, regulation, organization structure and management system).
  - Behavioral aspect (safety related action and behavior throughout and all level of organization).
  - Psychological aspect (safety climate of the organization which is concern with individuals and group values, attitude and perception).

- In dealing with chemical products in SMIs there are various chemical products, which are harmful to the employees. Solvent is one of such. In such chemicals used in production areas where ventilation is a must for respiratory protection, and other personal protection equipment are important to protect workers during chemical processing. Therefore workers should know, where and how to utilize the material safety data sheet (MSDS) for each chemicals used in their workplace.

- Many tasks of SMIs are manual handling with repetitive motions and awkward posture. To prevent ergonomics injuries worker should be encouraged to identify the good posture for each activity and reduce the repetitive motion through administrative control or workstation design by considering ergonomic principles.

- With proper training on machine guarding, chemical handling, proper tool selection, SOP, personal protecting equipment, and ergonomically designed work systems, SMIs workers can manufacture products in safe manner.
- Establish good housekeeping practices to prevent expose to slip, fall, electrocution and chemicals etc. Hence it should be done under supervision of trained person regarding risk of machine, chemical and risk of the premises.

5.3. Further Research

This research mainly focused to identify the OSH issues of SMIs in manufacturing sector and barriers for OSH implementation.

- This research is limited only to several workers in manufacturing sector SMIs. Hence the study can be extended to cover all the workers in manufacturing sector SMIs.
- This research is limited to western province Colombo district one of industrial zone in Sri Lanka and this can be extended to cover all the country.
- Some research can be conducted relate to SMIs in other sectors.

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Appendix - 1

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Research on occupational safety and health issues in small & medium scale manufacturing industries
Objectives of the research

- Study the SMIs in manufacturing sector and level of OSH practices in SMIs
- Identify the OSH issues and critical barrier for OSH practices
- Propose strategies to improve OSH in SMIs.

How to conduct the research

- The research will be conducted on OSH practices, safety system, infrastructure and identify the barriers and solution to improve the OSH. These data will not be diverted into any other third party.

How to fill research sheet and send How to fill research sheet and send

- The questionnaire can be filled by owner or a manager who is in charge of safety and health.
- Both languages; English or Singhalese can be used to fill the questionnaire.
- Most of the questions are closed-ended (Yes/No) questions.
- Italic letter questions are open-ended questions and you are required to provide brief answer. Please send the filled questionnaire in the stamped envelope provided with address within one week.
- For further details, please contact me; E. Abeysiriwardena (0718053058).

Benefit to industries

- It is also expected to provide strategies to enhance OSH in small & medium scale manufacturing industries

Please note that the data will not be diverted into any other third party and keep their confidentially.
Thank you,

Yours faithfully

…….

Eng. E. Abeysiriwardena

Industrial Safety Division

Appendix - 2

Questionnaire

Occupational safety & Health issues in manufacturing SMI's

Section A – General information

1).Organization name (optional) -:…….

1.1. Name of the respondent(optional) -: ……

1.2.Designation -:…….

1.3.Year of experience of the respondent.

Between 1 - 5 ☐ Between 05 -10 ☐ More than 10 ☐

2) Year of experience in the present workplace.

Between 1-5 , ☐ Between 05 -10 ☐ More than 10 ☐

3) No of Employment in your organization. .

Less than 50 , ☐ 50 - 250 , ☐ More than 250 ☐

3)Type of organization . Manufacturing ☐ Service ☐

4) If manufacturing

Does your product for local market - ☐ Yes ☐ No

Does your product for Export market - ☐ Yes ☐ No

Does your product for Export through large company - ☐ Yes ☐ No

Section B – OSH Management,

1) Please indicate most appropriate answer for following factors given below.

NO	B1;Safety policy & Law	Yes	No	Don't know
B1.1.	Does your organization has safety policy			
B1.2.	Does it follow in your organization			
B1.3	How do you aware about OSH policy. 3.1. By practicing in the workplace 3.2. From the neighboring workplace in the zone 3.3. . Some other method State: …….	 ..... …… …… ……	 ….. … … …	 ……. ……. …… …...
B1.4.	Does It review annually			
B1.5.	Do you know about OSH legal requirement			
B1.6.	Does it applicable to your organization			

B2; Safety system and practices		Yes	No	Don't know
B2.1.	Do you aware about PPE			
B2.2.	Do you receive PPE & satisfy about same			
B2.3.	Does your organization has safety sign board			
B2.4.	Does your organization provide first aid facility			
B2.5.	Does your organization provide fire alarm with fire safety			
B2.6	Do you satisfy about machine guard & space			
B2.7	Do you happy about working environment such as light ,ventilation			
B2.8	Does your organization provide safe mobility			
B2.9	Does your organization conducting fire drill			
B2.10	Does your organization practice work permit			
B2.11	Do you maintain General register			
B2.12	Does your organization has accident reporting System			
B4 ; Infrastructure				
B4.1	Do you satisfy about your organization welfare facility			
B4.2	Do you happy about resting period during work			
B4.3	Does your organization provide better utility service			

C ;To what extend do you believe following factors will affect implementing OSH in your organization, according to the following scale:

Scale -: 1- not at all, 2- fair, 3- moderate, 4- critical, 5- extremely critical

C1;Critical Factor for poor implementation of OSH		1	2	3	4	5
C1.1	Lack of safety technology					
C1.2	Lack of OSH training					
C1.3	Poor attendance of OSH of workers					
C1.4	Insufficient financial allocation for OSH					
C1.5	Poor financial support through bank loan					
C1.6	Extend of existing OSH monitoring					
C1.7	Lack of support from regulatory body					
C1.8	Lack of Provisions of supervisory guidance					
C1.9	Insufficient tool box meeting					
C1.10	Insufficient first aid training					
C1.11	Insufficient fire training					
C1.12	Insufficient risk assessment and OSH audits					

Appendix - 3

Questionnaire Data Sheet

Other Workers

Respondent	Lack of safety technology	Lack of OSH training	Poor attendance of OSH of workers	Insufficient financial allocation for OSH	Poor financial support through bank loan	Extend of existing OSH monitoring	Lack of support from regulatory body		Lack of provisions of supervisory guidance	Insufficient tool box meeting	Insufficient first aid training	Insufficient fire training	Insufficient risk assessment and OSH audits
No	C11	C12	C13	C14	C15	C16	C17		C21	C22	C23	C24	C25
1	1	2	2	1	1	2	2		1	2	2	1	4
2	4	4	1	2	5	3	2		1	5	3	2	2
3	5	4	4	4	5	4	4		3	5	2	2	5
4	5	4	4	4	5	4	4		3	5	2	3	5
5	4	4	4	4	5	4	4		3	4	2	3	5
6	5	4	4	4	5	5	4		3	4	4	4	5
7	4	4	4	4	5	4	4		4	5	4	5	5
8	4	4	4	4	5	4	4		4	5	4	5	5
9	4	4	4	4	5	4	4		3	5	3	4	5
10	4	4	4	4	5	4	4		4	5	3	5	5
11	5	5	5	5	5	4	5		3	5	3	4	5
12	5	5	5	5	5	4	4		2	5	3	5	5
13	5	5	5	4	5	4	4		3	5	4	4	5
14	4	4	4	4	5	4	4		2	5	3	4	5
15	5	5	4	4	5	4	4		4	4	4	4	5
16	4	4	4	4	5	4	4		4	5	4	4	5
17	5	5	4	4	5	4	4		4	4	4	4	5
18	4	4	4	4	5	5	4		4	5	5	5	5
19	4	4	4	4	5	5	3		5	5	5	5	5
20	4	4	4	4	4	5	4		3	4	4	4	4

21	5	5	5	5	5	4	4		3	5	3	3	5
22	5	5	5	5	5	4	4		3	5	3	3	5
23	5	5	4	4	4	4	4		3	5	2	2	5
24	4	4	3	2	–	3	3		1	5	3	2	3
25	4	4	3	2	3	3	3		1	5	3	2	4
26	2	3	1	1	5	1	4		2	2	2	1	4
27	2	3	1	1	4	1	3		2	2	2	1	4
28	4	5	4	4	4	4	4		5	5	3	4	5
29	4	5	4	4	5	4	5		4	4	3	4	5
30	4	4	–	–	–	5	4		4	5	2	2	5
31	4	4	–	–	–	4	4		3	5	2	2	5
32	4	4	–	–	–	4	4		3	4	2	2	5
33	4	4	3	–	–	3	3		4	4	2	2	5
34	5	5	5	5	5	5	5		5	5	2	3	5
35	4	4	4	4	4	4	4		4	4	2	4	5
36	5	5	4	5	–	5	4		5	5	3	3	5
37	4	4	3	–	–	3	3		4	4	1	1	5
38	4	4	4	4	–	4	4		4	5	4	4	5
39	4	4		4	4	4	4		3	4	2	4	5
40	4	5	3	–	–	5	5		4	4	2	2	5
41	3	5	4	4	4	4	4		4	4	2	4	5
42	3	5	4	4	4	5	4		4	5	2	4	5
43	3	5	4	4	4	4	4		4	5	2	4	5
44	4	4	4	4	4	4	4		4	5	3	5	5
45	4	4	4	4	4	4	4		4	4	2	4	5
46	4	4	4	4	4	4	4		4	4	2	4	5
47	5	5	4	4	4	4	4		4	5	2	4	5
48	5	5	4	4	4	4	4		4	5	2	4	5
49	4	5	4	4	4	4	4		4	5	2	4	5
50	4	4	4	4	4	4	4		4	5	2	4	5
51	4	4	5	4	4	4	–		4	4	2	4	5
52	4	4	4	4	4	4	4		4	5	2	4	5
53	3	3	4	3	3	–	4		4	4	2	2	5
54	5	3	4	2	2	–	4		4	5	2	2	5
55	5	5	2	3	3	4	4		4	4	2	2	5
56	5	5	4	3	3	4	4		4	4	4	2	5
57	5	5	4	3	4	4	4		4	4	2	2	5
58	5	5	4	4	4	4	4		4	4	2	4	5
59	5	5	4	4	4	4	4		4	4	2	4	5
60	5	5	4	4	4	4	4		4	4	2	4	5

Manager

Respondent	Lack of safety technology	Lack of OSH training	Poor attendance of OSH of workers	Insufficient financial allocation for OSH	Poor financial support through bank loan	Extend of existing OSH monitoring	Lack of support from regulatory body		Lack of provisions of supervisory guidance	Insufficient tool box meeting	Insufficient first aid training	Insufficient fire training	Insufficient risk assessment and OSH audits
No	C11	C12	C13	C14	C15	C16	C17		C21	C22	C23	C24	C25
01	1	1	2	1	1	2	2		1	5	2	2	2
02	4	2	1	2	3	2	2		2	5	2	2	4
03	1	1	2	1	2	1	2		1	0	1	1	1
04	2	3	2	1	1	2	2		1	2	4	4	5
05	5	5	4	4	4	4	4		4	4	4	4	4
06	3	2	1	5	3	2	2		2	5	3	3	3
07	3	3	2	2	0	3	3		3	2	2	2	3
08	3	2	1	5	0	3	2		2	5	3	3	3
09	5	4	4	4	5	3	4		2	5	2	2	5
10	5	4		2	4	2	4		2	5	1	1	5
11	4	4	4	5	5	3	4		1	2	3	4	5
12	4	4	4	4	4	4	4		2	2	3	4	5
13	5	4	4	4	5	4	4		4	5	4	4	5
14	4	4	4	4	5	4	4		4	5	4	4	4
15	5	5	4	4	5	5	5		1	2	2	2	5
16	5	5	5	4	5	4	4		2	5	3	5	4
17	3	2	4	1	5	5	5		3	4	4	4	4
18	5	5	4	3	4	4	4		4	4	4	4	5
19	4	5	4	4	5	5	4		4	5	5	5	5
20	5	5	4	4	5	5	3		4	5	5	5	5
21	4	4	4	4	5	4	4		4	4	3	4	5
22	4	2	2	2	5	4	4		2	2	2	2	5
23	3	2	2	2	5	3	4		2	2	2	2	5
24	5	3	3	4	5	3	4		3	2	2	2	5
25	2	2	2	1	1	1	1		1	2	1	1	1

26	3	2	2	1	1	1	1		1	2	1	1	1
27	3	3	4	4	4	4	4		3	3	4	2	4
28	3	3	4	4	4	4	4		3	4	4	2	5
29	4	3	4	4	4	4	4		3	4	4	2	5
30	4	3	4	4	5	3	4		3	4	3	1	5
31	5	5	3	3	1	3	5		3	3	1	2	5
32	4	4	4	4	4	1	4		1	4	3	1	5
33	5	5	4	5	3	5	5		5	3	3	5	5
34	3	5	5	4	4	4	4		4	2	2	4	5
35	4	5	5	4	5	5	4		4	4	2	4	5
36	4	5	5	4	4	4	4		2	4	4	4	5
37	4	5	5	3	5	4	4		3	4	4	4	5
38	4	4	4	4	4	4	4		2	2	4	4	4
39	5	4	4	4	4	4	4		1	3	4	4	5
40	5	4	4	4	4	4	4		2	3	4	4	5
41	4	5	4	5	4	5	4		1	5	5	5	5
42	4	5	4	3	0	4	4		4	5	2	4	5
43	4	4	4	3	0	4	4		4	5	2	4	5
44	4	4	4	5	0	4	4		4	5	2	4	5
45	4	5	4	4	0	4	4		4	5	2	2	5
46	4	2	2	2	2	4	0		4	4	2	2	4
47	4	3	4	4	3	4	4		4	5	2	3	5
48	4	4	4	4	4	4	4		3	5	2	4	5
49	4	5	5	4	5	4	4		4	5	5		5
50	4	5	4	4	4	5	4		4	5	3	4	5
51	4	5	4	4	4	5	4		4	5	2	5	5
52	4	4	5	4	4	4	4		3	5	4	2	5
53	4	4	5	4	4	4	4		4	5	4	2	5
54	4	4	4	4	0	4	4		4	5	4	2	5
55	4	4	4	4	0	4	4		4	5	4	4	5
56	4	4	4	4	0	4	4		4	5	4	2	5
57	4	4	4	4	0	4	4		4	5	4	2	5
58	4	4	4	4	0	4	4		4	5	4	4	5
58	4	4	4	4	0	4	4		4	5	2	4	5
60	4	4	4	4	0	4	4		4	5	2	4	5

Appendix - 4

Transcript of Expert "A" interview

Discussion topic 1; Views for maximize the risk assessment and safety audit

- Concept should start from school and other educational institutions (technical colleges and universities)
- Develop government own mechanism training and monitoring.
- Consider this as legal requirement and included to the management system.
- Create opportunity in regional wise for knowledge sharing among industries (national and international)
- Develop capacities of educational institution to generate professionals from this field.

Discussion topic 2; Views for maximize the tool box meeting

- Establish this as a mandatory requirement for this industry.
- Establish monitoring mechanism govern by regulator body
- Concept should start by the educational institutes (technical colleges and universities)
- Annual monitoring performance consider during registration and other activities.
- Establish government own awareness programs to establish commitment for this among owners, managers and other employees.

Discussion topic 3; Views for maximize the OSH training

- Establish annual training calendar for industries owners, managers and other employees.
- Establish regional safety centers to operate and monitoring of training.
- Establish mechanism to operate the training calendar and compliance certification in regional level.
- Training consider as a legal requirement.
- Develop educational institutional capacities to generate OSH professional as well as training for trainers.

Discussion topic 4; Views for maximize the technology development

- Promote regional safety centers to following
  To conduct technology exhibition to establish technology sharing (industries national and international)
- Conduct regulator monitoring
- Establish and monitor OSH monitor consider as legal requirement.
- Promote technology improvement projects with government support (interest free loan duty concession)
- Establish mechanism for technical support for OSH with government support.

Appendix - 5

Expert interview summary sheet

Table 1: Insufficient risk assessment and safety audit

Respondent (Experts)	Answers
A, B, C, D, E, F, G, H, I	Starts from the school, technical college, university level.
	Government own risk assessment and safety audit methodology as a legal requirement.
	Government support periodical compulsory training. Training and compliance certification linkage with department of labour.
	Legalize monitoring mechanism.
	Increasing number of inspection visits by ministry of labour/ Department of labour.
	Compulsory OSH education mechanism for owners, managers, and other employees.
	Mechanism for technology transfer from experts as well as from large industries.

Table 2: Insufficient tool box making

Respondent (experts)	Answers
A, B, C, D, E, F, G, H, I	Monitoring should be done by regulatory body with point system.
	Concept should be start from schools, technical colleges and universities.
	Owners and managers training to get commitment during registration stage.
	Establish self-monitoring mechanism.
	Consider as a legal requirement.
	Government support awareness to promote onsite training concept.
	Performance consider for annual registration.

Table 3: Lack of OSH training

Respondent (Experts)	Answers
A, B, C, D, E, F, G, H, I	Compulsory annual training mechanism for owners, managers and other employees.
	Establish government own training facilities for organizational level and general public.
	OSH training consider as a national requirement for each organization. (public and private)
	Decentralized training facilities to regional level.
	Establish trainers training mechanism to improve the quality of training.
	Establish mechanism to increase OSH professionals from universities and other statutory bodies.
	Establish government on training monitoring mechanism and certification mechanism.

Table 4: Lack of safety technology

Respondent (Experts)	Answers
A, B, C, D, E, F, G, H, I	Establish facility centers to share technology among local industries as well as international.
	Establish OSH promotional activities by conducting exhibition, industrial visit, competition focusing SMI's.
	Government support projects to improve OSH focusing SMI's such as law interest loan, duty concession.
	Free consultancy services from government and upgrade the excising legal requirement (factor ordinance).
	Establish regional safety centers to promote and coordinate OSH as well as displaying safety models
	Develop regional wise institutional capacities and facilities to conduct research on OSH.
	Establish OSH standards and consider as legal requirement.
	National recognition for OSH to market the product.