OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT IN SMALL AND MEDIUM SCALE RUBBER MANUFACTURING ENTERPRISES IN SRI LANKA

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Masters of Occupational Safety and Health Management

Department of Building Economics

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Thesis submitted in partial fulfilment of the requirements for the Masters of Occupational Safety and Health Management

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DECLARATION OF THE CANDIDATE & SUPERVISOR

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ABSTRACT

An emerging need has been identified in effective implementation of Occupational Safety and Health Management (OSHM) Practices in rubber manufacturing small and medium scale enterprises in Sri Lanka due to their importance as a valuable economic source for the country. Further, these industries provide a significant number of job opportunities, yet the risk is persistent in a noteworthy amount for the health and safety of the employees. Therefore, it is essential to find the current OSHM practices in such industries as well as the existing barriers and to determine the possible solutions for key barriers. The population consisted of 40 OSH experts from different SMEs in the industry located in Western province. The data were gathered using questionnaire, and personal interviews. The personal interviews were conducted among 10 OSH experts. The data analysis was done using SPSS (Version 21). The key findings of the study revealed that there are essential practices which were accepted to be high in importance level, but lower in performance level than expected. More concentrate was found to be needed for the practices including OSHM manuals and procedures are formulated and followed, OSH aspects are considered in the process designs and layout designs, a system is established and followed for hazardous waste management and OSH aspects are considered in the change management system. The key barriers found were poor monitoring system of safety performance, inadequate budget allocation, production based culture, inadequate information flow within the organization, lack of training and awareness, lack of senior management commitment, inadequate support and influence from other organizational members and inadequate legislation. Lastly, solutions were developed through expert perspectives. The key findings can be used as a tool to ensure the effective implementation of the OSHM practices in rubber manufacturing SMEs and the study can be expanded to other industry types as well to get a more broaden idea on the industry inherited practices.

Keywords: *Occupational safety and health management, small and medium scale industries, rubber manufacturing, Sri Lanka*

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
GDP	Gross Domestic Product
ILO	International Labour Organization
IPA	Importance Performance Analysis
KPI	Key Performance Indicator
NR	Natural Rubber
OHSAS	Occupational Health and Safety Assessment Series
OSH	Occupational Safety and Health
OSHM	Occupational Safety and Health Practices
OSHMS	Occupational Health and Safety Management Systems
SME	Small and Medium Scale Enterprise
SR	Synthetic Rubber
UK	United Kingdom
USA	United States of America
USD	United Status Dollars
WHO	World Health Organization

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CHAPTER 1

INTRODUCTION

1.1 Background

Occupational Safety and Health (OSH) has been generally defined as "the science of anticipation, recognition, evaluation and control of hazards arising in or from the work place that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and general environment" (ILO,2009).

According to World Health Organization (WHO) (2001), occupational health is a multidisciplinary activity which is aimed at several areas including;

- Preventing and controlling occupational diseases and accidents by eliminating occupational factors and conditions hazardous to health and safety at work in order to protect and promote the health of workers;
- The development and promotion of health and safe work, work environment and work organizations;
- The enhancement of the physical, mental and social well-being of workers and provision of the support for development and maintenance of their working capacity, as well as professional and social development at work;
- Enabling workers to conduct socially and economically productive lives and to contribute positively for the sustainable development.

Half the world's population is represented by workers and they are the major contributors for the economic and social development of the world. Workplace hazards are one of the key determinants of their health (Kirsten, 2011).

International Labour Organization (ILO is the only tripartite United Nations agency, established in 1919 and it fundamentally brings together governments, employers and workers of 187 member States in order to set labour standards, develop policies and devise programmes for the promotion of decent work for all women and men. This

had made an enormous efforts since the 1970s, yest occupational accidents and diseases are reported to be too frequent. The cost that lies on the society, enterprise, affected workers and their families due to occupational injuries and illnesses are continuing to exist in an unacceptable level. As per the data revealed by ILO, more than 250 million work-related accidents are been reported yearly in the global context. The same organization estimates, those who fall ill are over 160 million due to occupational accidents and diseases while more than 1.2 million workers die annually with occupational accidents and diseases caused by workplace hazards and exposures. They further state that it is not possible to tolerate such social costs as the inevitable price of the progress. Reducing the toll of occupational accidents and diseases have been suggested as an obvious implication in terms of the alleviation of human suffering. When considering the Asia and Pacific regions, ILO has estimated 1.4 million work-related deaths to be occurred annually. This accounts for 70 percent of global fatal occupational accidents and 60 percent of work-related fatal diseases.

The Employers' Federation of Ceylon (2017) reports that low-and middle-income countries of the region is found to be with the most work-related deaths and non-fatal accidents. Yet it has been argued that the reality is worse in Asia-Pacific region as the underreporting is very frequent. In Sri Lanka, the reported accidents per year is about 4,000 in number and relevant working days lost has been estimated to be around 600,000 workdays per year (Benjamin, 2001).

Factors that contributes to the direct costs in manufacturing industries have been identified as medical cost, rehabilitation costs and compensation costs while the factors that contribute to the indirect costs have been identified as the cost of productivity, cost that takes for worker replacement, cost related to legal and administrative issues, cost for investigations, cost due to product damage and machine equipment damage (Rohini et al., 2015). As stated by Rohani et al. (2015), compared to other cost components, machine equipment damage that may cause the productivity cost would give greatest impact. Further, due to the disruption to the production operation, the productivity of an organization reduces significantly, in worst cases causing the organization unable to fulfil the customer orders and requirements which may

eventually results in the organization unable to achieve its general goal, negatively affecting its reputation and company image.

Therefore, all levels of the individual workplace as well as the national and international organizations have long concerned on these human, social and economic cost of occupational accidents, injuries and diseases and major industrial disasters (Alli, 2008).

Jilcha and Kitaw (2017) asserted that provision of the workers' safety and health infrastructure leads the nation for economic, social, political and environmental sustainability development. They have stressed out few necessities to reach the development including healthy workers, the safe environment, safe working places and satisfaction of the society. Likely, it is not possible to achieve the maximum productivity and efficiency with unhealthy employees in unsafe environment whereas the organization may face financial crisis that can bring difficult economic sustainable conditions for workers and the stakeholders, including customers, shareholders, and the society. Besides, workers' injuries as well as property damages may destroy the business reputation causing the reduction of the market share while increasing the cost of the company, including medical expenses, compensation cost and operational cost. Consequently. The morale and motivation of the employees will be weaken which may also adversely affect the product quality which cause unescapably the organization to disappear from the market. Accordingly, they suggest to address the workers directly with occupational safety and health programs since it may long term indirectly impact on few different aspects including the society, innovation, technology, culture, economy, environment and politics.

As highlighted by Fernández-Muñiz et al. (2009), occupational accidents have capability of severely deteriorating the human capital, and hence negatively impact on the productivity. The general belief among Spanish firms that "investing in safety is a cost" has a negative impact. Lay et al. (2017) suggest that the risk of work injury has been arisen through more than simply unsafe work conditions or the unsafe actions inherent to specific work population. Their study contributes for the argument, inadequate prevention and efforts of control at the levels of both worker and

organization place the workers at increased risk of injury as they combine with the presence of hazards. Therefore, it is obvious that a success of a business highly depends on implementation and operation of adequate occupational safety and health management (OSHM) practices within the organization.

Among various other sectors, manufacturing sector has been more focused for so long due to its inherent risky environment and in evidence of the United Kingdom (UK) health and safety statistics for 2014/15, that every year in the sector of manufacturing, around 3%of workers suffer due to work related illnesses and 2% of workers suffer due to occupational injuries which may lead to 2.4 million working days lost and £1.2billion cost (Health and Safety Executive, 2016).

This is simply similar in the Sri Lankan context, since manufacturing sector is consisted of highly labour-intensive industries, which includes activities that are placed higher in the value chain and are considered to be important as it acts as a major source of employment opportunities for the growing labour force (Government of Sri Lanka, 2012). In Sri Lankan context, manufacturing activities have been accounted for 15.7 percent of real gross domestic product (GDP) in 2017 and it has been grown at a rate of 3.9 percent in 2017, having grown at 3.2 percent in 2016 (Central Bank of Sri Lanka, 2017). The favourable developments in export oriented industries such as wearing apparel, rubber and plastic products, as well as industries with a high domestic market orientation, such as food and other non-metallic mineral products supported the growth in the manufacturing sector (Central Bank of Sri Lanka, 2017) .

It is reported in the annual report of Central bank (2017) that manufacturing of rubber and plastic products have been increased by 4.2 percent in 2017, over the growth of 3.7 percent in 2016. It further states that a considerable increase in the production of rubber tyres was witnessed during the period, largely supported by improved exports to the United States of America (USA), Canada, Brazil and European markets as well as the local market. In addition, the expansion in the production of rubber gloves during 2017 can be attributed to higher export demand, particularly from the USA, Brazil, India and Canada.

Sri Lankan rubber products have earned a reputation for high quality and reliability in the global market and has the potential to make further contributions towards the generation of foreign exchange revenue and employment opportunities in the country (Central Bank of Sri Lanka, 2017).

Other than the sector, range of factors influence for the implementation of OSHM practices in companies. In manufacturing industries, safety culture, company size and creditworthiness have been found as associated with the better or worse safety practices. Among these factors, company size has been reported to have a significant impact on the safety practices in the company; the larger the company, the better the OSHM practices are implemented (Nordlöf, Wiitavaara, Hogberg, & Westerling, 2017; Sinclaire, & Cunnigham, 2014).They also suggested that the company size as a proxy variable for other factors such as organizational structure and routines, available resources, knowledge and competence, management commitment whereas they will vary depending on the size of the company.

Various risk factors have been suggested throughout the studies based on the sizes of enterprises. As stated by Cagno, Micheli, Masi and Jacinto (2013), it is reported to have a higher injury risk in smaller enterprises when compared to the larger enterprises due to less human, technological and economic availability of resources. Public health and other initiatives do not have the ability to sufficiently provide the support to businesses in small scale with occupational safety and health (OSH) (Cunningham & Sinclair, 2015). According to the study done by Masi and Cagno (2015), the barriers related to the size of the organization which are specific to the small and medium scale enterprises (SMEs) have been identified as inadequate legislations, bureaucracy, and lack of resources.

In comparison with larger organizations, poor OSHM outcomes are identified in SMEs which are suggested to be attributed to the numerous factors that present in SMEs and arise as barriers making it more problematic for them to form and continue a work environment which is safe and healthy for the employees (Legg, Olsen, Laird, & Hasle, 2015). This may also provide an explanation on the question why employees in SMEs are generally more commonly exposed to situations which are hazardous and suffer

more occupational injuries and illnesses than those who are working in larger organizations.

1.2 Problem Statement

Throughout number of other sectors, manufacturing sector has been identified as high in its inherited risk and significant amount of occupational illnesses and injuries are been reported as a result of this risky environment where the workers have to do their job (Health and Safety Executive, 2016). In the Sri Lankan context, this is a labor intensive sector and therefore, an additional attention should be provided to ensure the health and safety of the workers who are been employed in the industries relevant to this sector (Central Bank of Sri Lanka, 2017). Further, among various types of manufacturing industries, rubber manufacturing industry is highly important to give a more focus on the OSHM as various kinds of risks are persistent in the industry and on the other hand, this is a key industry which provides a higher contribution on the economic development of Sri Lanka.

Past literature reveals that the company size is a key factor which influence the implementation of OSHM practices in the organizations. It has a significant impact on the safety practices in the company; the larger the company, the better the OSHM practices are implemented (Nordlöf et al. , 2017; Sinclaire, & Cunnigham, 2014). In other hands, this suggests that small and medium scale enterprises (SMEs) have a higher injury risk when compared to the larger enterprises. There are numerous contributory factors which adversely impact on the effective implementation of OSHM practices in such industries (Legg et al. , 2015). There are very few available information on the OSHM practices existing in the rubber manufacturing industries and relevant barriers in Sri Lanka and there is an emerging need of finding these information as well as relevant overcome strategies for the specific barriers identified.

1.3 Aim

The aim of this study is to contribute for the effective implementation of OSHM practices in rubber manufacturing SMEs.

1.4 Research objectives

- To review current occupational safety and health management practices in manufacturing industry.
- To identify the key barriers of OSHM practices implementation in the manufacturing SMEs.
- To describe current OSHM practices in rubber manufacturing SME's in Sri Lanka.
- To determine barriers related to OSHM practices implementation and to discover solutions for the key barriers in order to provide recommendations for the effective implementation of OSHM practices in rubber manufacturing SMEs in Sri Lanka.

1.5 Scope & Limitations

Rubber manufacturing process is a valuable business for the country which significantly contributes to the economic development of the country. There are number of industries in this sector which operate in different scales or sizes and when compared the larger industries to the SMEs, the continual survival of the latter is in a doubt as the focus on the safety and health within these companies are limited and not prioritised as much as the productivity.

The author will mainly focus on the current OSHM practices in the rubber manufacturing SMEs along with their importance and performance levels as well as related barriers in this study. Further, the solutions will be identified through the expertise knowledge of the experts to ensure the effective implementation of OSHM practices in rubber manufacturing SMEs in Sri Lanka. It will be revealed whether the

facts identified in literature survey are related with the currents practices in the selected industry and the existing barriers. However, the research was limited to the one sub sector representing SMEs in Sri Lanka under the context of OSH focusing on current practices and related barriers. The research study will cover only selected SMEs of rubber manufacturing sector in Western Province due to the time and other constraints. The information was collected through questionnaire particularly designed for this purpose and personal interviews.

1.6 Methodology

Through the purposive sampling method, a sample of 50 experts were selected representing different rubber manufacturing SMEs in the Western Province of Sri Lanka and 40 were responded for the survey study. The survey study was carried out based on the research oriented questionnaire method. Additionally, personal interviews were conducted to discover the solutions relevant to key barriers. The questionnaire was prepared by the researcher based on the extensive literature survey and it was suitably modified after the pilot study done among three experts. The data collection was completed through the emailed questionnaires and one-to-one interviews. The collected data were analysed using computer based statistical software SPSS (Version 21) to accomplish the third and fourth research objectives. Further, the input taken by the personal interviews were used to present the recommendations to overcome the key barriers identified through the questionnaire responses. The conclusions were based on the results of the data analysis. Lastly, the author provides the recommendations for the effective implementation of OHSM practices in rubber manufacturing SMEs in Sri Lanka in reference to the data analysed in this study.

1.7 Limitations of the Study

The limitations are potential in this study, when considering the time, cost and many other. The author would be able to easily provide a much more generalized conclusion if these limitations could be overcome or withdraw. Majorly, the final sample size had to limit 40 considering the convenience of data collection, yet the study somehow could cover justifiable amount of relevant SMEs in Western Province. For the personal interviews, the author could only get the participation of ten experts due to the tight time schedules of the other participants. It would be better if the author could interview all the participants personally as it might have provided more generalised perspective, especially when it comes to providing the solutions for effective implementation of OSHM practices in rubber manufacturing SMEs in Sri Lanka.

1.8 Organization of the Study

Assessing the current OSHM practices in Rubber manufacturing SMEs in Sri Lanka as well as the existing barriers for the effective implementation of the OHSM practices within the organizations and the solutions for key barriers, the study will be outlined into five main chapters which were Introduction, Literature Review, Methodology, Data analysis, Conclusions and Recommendations. The chapters will include below contents.

Chapter 1 : This chapter provides the outline to the study.

Chapter 2 : Throughout this chapter, the existing literature will be reviewed.

Chapter 3 : Methodology chapter is to discuss the study design, study frame work, data collection methods, data collection tools and lastly the data analysis method.

Chapter 4 : Data analysis will be included primary and secondary data analysis, reliability and validity tests of the data set and data collection tools, descriptive data analysis, graphical representation of results and importance performance index analysis and the results achieved will be discussed and interpreted.

Chapter 5 : Conclusion and recommendation will be presented in the last chapter, which will conclude the entire study and discuss the findings of the study and recommend solutions to ensure the effective implementation of OSHM practices in rubber manufacturing SMEs in Sri Lanka.

CHAPTER 2

LITERATURE SYNTHESIS

2.1 Introduction

This chapter presents the literature based on SMEs, OSHM practices and their current applicability in rubber manufacturing industry as well as barriers which have been identified as adversely impacting on the effective implementation of those practices. The author found out number of journal articles, research articles, conferences reports, industrial annual reports and various other facts through industrial expert views published.

2.2 Small and Medium scale Enterprises (SMEs)

As stated by Croucher et al. (2013), over 50 percent of the new jobs are created globally in SMEs. Moreover there's a tendency of employing more people in the SMEs than in the large enterprises. This may mimic the clear potential of the SMEs to significantly contribute in the worker's economic and social progress as well as communities, yet most of them, particularly who are in developing and emerging countries are not achieving their full potential. The researchers further emphasise that this is partly a result of OSH being less well managed in SMEs which creates unsafe working conditions where the health of the workers are exposed to the greater risks than the large enterprises.

The term of SME is used to represent mainly small and medium enterprises and different countries have defined SMEs using variety of criteria particularly based on their level of development (National Policy Framework for Small Medium Enterprise Development, 2015). Defining a "small business" is challenging as the diversity of such business is high and the range of factors are required to define them. Meanwhile, the significant characteristics which distinguish the smaller businesses from the larger businesses have drawn the attention for qualitative definitions (Laird, Olsen, Harris, Legg, & Perry, 2011).

According to the National Human Resources and Employment Policy by the government of Sri Lanka (2012), SMEs account for 80 percent of all businesses and this is a huge portion of the Sri Lankan's economy. It further stated, that these SMEs are found in all sectors of the economy, primary, secondary and tertiary providing employment for those with different skills, skilled, semi-skilled and unskilled. It further emphasises that manufacturing sector is also consisted of the SMEs and these SMEs are engaged in number of industrial activities which are accounted for about 20 percent of industrial establishments. Therefore, all together SMEs are a vital source which provides numerous employment opportunities and are accounted for about 35 percent of the employment in Sri Lanka, playing a major role in the inclusive growth promotion.

As reported by the Department of Census and Statistics in Sri Lanka (2015), for developing economies like Sri Lanka, SMEs provide assistance to alleviate discrepancy which forms a wall between the rich and the poor. These SMEs have become a source of income to a considerable portion of the population through offering decent jobs for them and consequently contributing largely to the GDP by participating in the mainstream economy. In addition, it serves as a learning opportunity for large enterprises of the future, as most of large enterprises right now has been originated as SMEs in the past. Moreover, it is stated that there is no generally accepted criteria to define SMEs in Sri Lanka presently, but different organisations tend to use different criteria constructed on their organizational objectives and no consistency has been found between them. Further, the economic sectors have been separately considered by most of the developed and developing countries to recognise SMEs as their turnover varies across sectors.

Few criterion used for SMEs by the different organizations in Sri Lanka are mentioned in the table 2.1.

Table 2.1 : Definition of SMEs in Sri Lanka

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	Les than Rs. 2 Million
Ministry of Small and Rural Industries	Total Investment	Between Rs. Million 20 to 50 Million	Between Rs. 1 Million to 20 Million
Ceylon National Chamber of Industries	i) Value of assets other than buildings and lands.	Between Rs. 4 Million to Rs. 20 Million	Less than Rs. 4 Million
	ii) No. of employees	Between 10 -50	Less than 10
Sri Lanka Export Development Board (EDB)	i) Capital investment excluding lands and building	More than Rs. 40 Million	Less than Rs. 20 Million
	ii) Annual export turnover	More than Rs. 100 Million	Less than Rs.100 Million
World Bank (for Sri Lankan country studies and loan programmes)	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
Sri Lankan Apparel Industry, Task force on five year strategy (2002)	i) Export value	Rs. 101 Million to 250 Million	Rs. 0.25 Million to 100 Million
	ii) No. of Employees	1 - 100	101 - 250
The Dept. of Small Industries	i) Capital investment	Between Rs. 25 – 5 million	Less than Rs. 5 Million
	ii) No. of Employees	Between 100 - 50	Less than 50 employees

Source : Dasanayake, 2009

The most recent category of SMEs was found to be the enterprises which are employed less than 300 employees with an annual turnover not exceeding Rs.750 Mn (National Policy Framework for Small Medium Enterprise Development, 2015). This criteria which is presented in the table 2.2 was used in this study to categorize SME's from micro and large scale industries.

Table 2.2: Characteristics of a SME

Sector	Criteria	Medium	Small
Manufacturing Sector	Annual Turnover	Rs. Mn. 251 – 750	Rs. Mn. 16 - 250
	No. Of Employees	51-300	11-50

Source: Ministry of Industry and Commerce, 2015

2.3 Rubber product manufacturing SMEs

Globally, more than 400 billion United Status Dollars (USD) of total revenue is earned through value added products which are produced by over 27 million tons of Natural rubber (NR) and Synthetic Rubber (SR). Over 50,000 variety of products are served to satisfy the needs of different consumers in diverse sectors including automotive, agricultural, mining, industrial and health within the global rubber product market (Asian Development Bank, 2017). It is further stated in the Asian Development Bank report (2017) that over 1,100 million USD are earned by the Sri Lankan rubber product makers out of exports and local sales by 2012. As a result of market dynamics, this amount has been reduced to around 900 million USD by 2016 with the export income of 750 million USD. Small sized firms are found to be contributed in less than 5% for this earn, yet it is further reported that some of the medium sized firms are performing well focused on the own upgrade.

In Sri Lanka, there are around 300 SMEs in operation which have been registered under different government institutions and manufacturers, mostly auto spare parts and general household rubber goods (ADB, 2017). Among these 300 SMEs, most are located in Western Province, especially based on Colombo and Gampaha Districs as these organizations preferred to be located closer to the service providers including the Rubber Products Development and Services Centre (RPDSC), Rubber Research

Institute of Sri Lanka (RRISL), Industrial Technology Institute (ITI) and private compounding facilities and mould makers. The medium sized firms have more requirements such as sufficient land, building and other supplies with adequate manpower and therefore, mostly they have been located outside Colombo considering the ease access and provisions of their requirements. In accordance with the reliable information received by the Census and Statistics Department, 185 number of rubber manufacturing SMEs have been located within Western Province of Sri Lanka.

2.4 Rubber production process and Occupational Exposures in Rubber Manufacturing Industry

Generally rubber manufacturing process is comprised of number of operations as indicated in the figure 2.1.

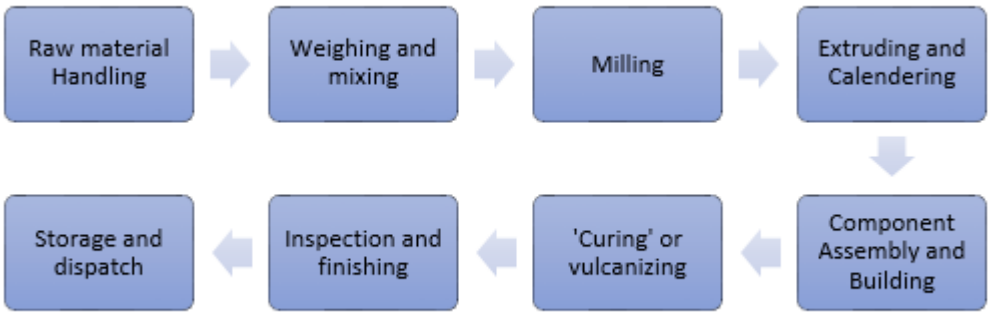


Figure 2.1 Rubber production process

Majority of the rubber goods are manufactured as per the stages described above and only a substantial proportion of rubber production involves the use of liquid latex. Dipped rubber goods (such as rubber gloves and some footwear), extruded thread products (such as elasticated fabrics and surgical hose) and foam-latex products (such as mattresses, cushions, etc.) are manufactured through the mentioned process.

During these operations, the employees can be exposed to various occupational safety and health hazards such as dusts, fumes, chemical hazards, mechanical hazards, biological hazards, ergonomic hazards and job related stress. These occupational

hazards may lead to injuries and ill health of the workforce in these organizations. Skin diseases, such as hand dermatitis, have been reported as a common problem in the rubber manufacturing industry, as workers are exposed to a wide range of chemicals with known irritant and sensitizing potential (Vermeulen, Kromhout, Bruynzeel, Boer, & Brunekreef 2001). Zuskin et al. (1996) suggested that exposure to noxious agents in the rubber industry are associated with the development of acute and chronic respiratory impairments. Cancer is another illness which could commonly find in the rubber industry (Lewis, 1999).

2.5 Occupational Safety and Health Management System (OSHMS)

As a result of finding a way to ensure the optimal safety performance in a business regardless of its size, the industries in the manufacturing sector have adopted the OHSAS 18001 certification (Abad, Lafuente, & Vilajosana, 2013).

As stated by Abad et al. (2013), the reasons may be it is accepted as a tool that has the ability to facilitate the creation of a competitive advantage and the effect of the OHSAS 18001 on performance is twofold. Further, with the adoption of OHSAS 18001, the labour productivity has been reportedly increased, which may be resulted from the better occupational risk management practices which reduce the rate of accidents and the productivity cost that has to be allocated for the accidents such as the accident compensation cost for the employee, loss of skills and human capital for the organization. In addition, Abad et al. (2013) more emphasised on the capability this system to reduce interruptions in the production process that may cause by the workplace accidents.

Redinger and Levine (1999) has identified specific elements of OHSAS 18001 management system framework and the researcher uses these elements as a baseline to pick up the best safety practices that can be existing in the particular safety manufacturing industry.

Main elements of the OSHMS are presented in figure 2.2.

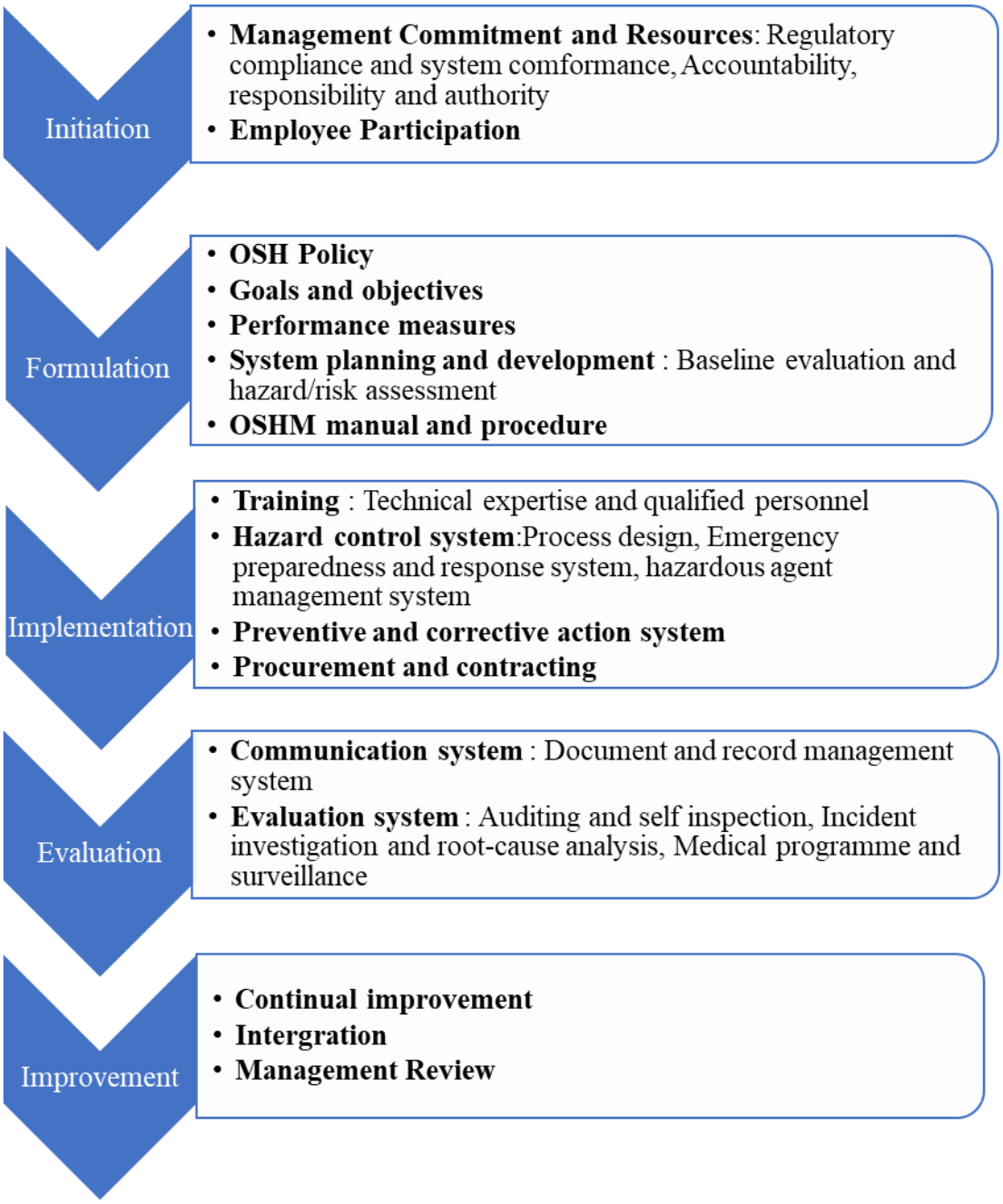


Figure 2.2 : OHS management systems elements

Source : Redinger and Levine, 1999

2.5.1 Initiation

Management commitment reflects the values top management has on safety related issues and the understanding that workplace safety is paramount towards organizational effectiveness and efficiency by providing the necessary support and encouragement to employees to engage in safe behaviour while at work (Lee, Wu, & Tanako, 2007). A contribution for a safer workplace has been found from the top management's values and attitudes and manifestation of those attitudes in the form of operational policies and informal actions (Geldart, Smith, Shannon, & Lohfeld, 2010).

It is found that the management commitment indirectly affects safety compliance through safety participation (Subramaniam, Shamsudin, & Zin, 2016). Subramanium et al. also highlighted the fact that safety interventions are more effective in preventing occupational accidents and injuries when there is management commitment.

As suggested by Huang et al. (2011), the employees perceive their safety trainings as good once they perceive that their management has a higher commitment to safety. They further stated that employees' perceived safety training will predict future injury experience of the employees.

When considering the leadership-safety in manufacturing sectors, empowering is required for OSH officers by the leaders in relevant operations to implement company-wide safety and health programs. Such sincere empowerment from the leadership may lead to wholehearted commitment of the officers in the plants which reveals that empowering behaviour of the leadership is inspiring OSH officer's psychological empowerment as well as commitment for the contribution of safety in the plant. Other than that, when an adequate support and concern on the needs essential for the safety program was perceived by the officer from their company leaders, it produces a motivation to the officer as well as the production team to work as a team on safety aspects (Tong, Rasiah, Tong, & Lai, 2015; Kvorning, Hasle, & Christensen, 2015).

Many government regulations and non-governmental standards impose requirements on OSHM focusing on the regulatory Compliance and system Conformance, and therefore, can impact on the way the OSHMS is designed, implemented and operated.

A system should be there in an organization to identify, document and implement applicable governmental and non-governmental requirements. In addition, the personal roles in OSH management and those who are affected by it including the workers, supervisors and managers need to be defined by the organization. It is also required to define, support and enforce the occupational health, safety and OSHMS accountability, authority and relevant responsibility by the top management (Redinger, Levine , Blotzer, & Majewski, 2002).

In the two way process of worker participation on health and safety, there will be a face to face conversation between employers and their worker, pay attention on the personal concerns, tend to share views and other information, talk about the issues in good time, consider what others have to say, take decisions together and maintain trust and respect for each other.

It is important to keep the workers informed, instructed, trained and consulted on health and safety. It is required to go beyond consultation for full participation where workers along with their representatives involved in decision making process (European Agency for Safety and Health at Work, 2012). Less injury rate is reported in the workplaces with more worker involvement for safety activities (Geldart, Smith, Shannon, & Lohfeld, 2010).

2.5.2 Formulation

Organization's occupational safety and health policy reflects where the safety and health is placed in that particular organization. This policy must be approved by the top management demonstrating their commitment on the workplace health and safety. The safety and health policy statement of an organization explains the policy requirements, assists to standardize safety in the company, give assistance for the implementation of safety and enforces the health and safety in the organization (Reese, 2003). Geldart et al. (2010) stated in his research which was conducted among manufacturing companies, that the policies have a fundamental impact on the workplace safety and health. They highlighted the importance of formal and informal policies in regard with generating and maintaining safer and healthy workplace. Safety

promotion policies. Directly observable, reasonable, measurable, attainable and pre-defined goals and objectives are essential and need to be in line with the organizational goal and embedded in the safety policy (Reese, 2003).

A systematic reporting procedure is required to be implemented as the safety statistics need to be reported in each site (Koivupalo, Sulasalmi, Rodrigo, & Väyrynen, 2015). Further, communication of these safety related statistics is also very essential to make the employees aware about the hazardous conditions they have been surrounded while work.

It has been observed a direct relationship between safety rules, procedures and safety compliance by Subramanium et al. (2016). Moreover, they discuss that employees are more compelled to work in a safe manner once there are safety rules and procedures are well-implemented within the organization through periodic safety inspections and enforcements of safe working procedures. It is also emphasised that it is necessary to have advices and adequate assistance from their co-workers though effective safety procedures along with the safety rules are likely to provide adequate impulse for the employees to comply to the safety standards while accomplishing their job. As per their findings, in SMEs, the implementation of safety procedures can be done effectively, as the small number of employees allows to monitor the behaviour of each employee closely.

2.5.3 Implementation

Safety trainings are a significant aspect which provides a motive for the employees to assist their co-workers and organization toward complying with work safety rules and procedures (Laberge, MacEachen, & Calvet, 2014). They further stated that effective safety training will be there when training transfer takes place, that is when the knowledge and skills are applied by employees on the safety obtained through safe working at work. However, it is accepted that the application of safety training needs to be vary in accordance with different learning capabilities, knowledge and skill acquisition.

The sense making process has a significant impact on the motivation that is built upon the employee participation in the OSH program and is influenced by the manner the program is introduced, conducted, its content and limitations on the program mechanisms (Kvorning, Hasle, & Christensen, 2015). As reported by Subramanium et al. (2016) that safety training indirectly affects safety compliance through safety participation.

Organizations should have hazard control systems such as process design changes to prevent hazards, emergency preparedness and response plans and hazardous waste management systems (Reese, 2003).

Safety climate and safety culture are key indicators for a company that allows them to relate safety performances, though the data on accidents and illnesses are rare and which will assist to improve the working condition development strategies in the long run (Arezes & Miguel, 2003). They further defined safety culture and safety climate as;

Safety culture: "The enduring value and priority placed on worker and public safety by everyone in every group at every level of an organization. It refers to the extent to which individuals and groups will commit to personal responsibility for safety, act to preserve, enhance and communicate safety concerns" (Arezes & Miguel, 2003).

Safety climate: "The temporal state measure of safety culture, subject to commonalities among individual perceptions of the organization. It is therefore situational based, refers to the perceived state of safety at a particular place and time, is relatively unstable, and subject to change depending on the features of the current environment or prevailing conditions" (Arezes & Miguel, 2003).

As described by Liu et al. (2015), Occupational injuries occurrences related to the manufacturing sector is influenced by the safety climate and workplace safety behaviour. They further suggested that it is possible to decrease the workplace occupational injuries rate by strengthening the occupational safety climate and safety behaviour. Safety culture has been strengthen as the result of the implementation of safety management system (Lin, 2012).

It is reported that injury management takes a significant importance as it may assist in improving the practices related to workplace safety and health and it may lead to less suffering towards accidents and injuries (Taufek, Zulkifle, & Kadir, 2016). Hazards must be addressed through implementing corrective actions and preventive actions (Wester, 2018).

2.5.4 Evaluation

Intranet is one of the communication systems which is extensively used for safety communication today and it is necessary to keep updated HS materials such as safety policy, procedures and safety statistics, work instructions as well as different safety related forms in the system and anyone should be able to access it whenever required.

Numerous tools can be used in order to ensure the safety communications other than the intranet such as meetings, face-to-face discussions, e-mail messages, notice boards and telephone conversations (traditional notice boards and electronic screens) (Koivupalo et al., 2015). Audits need to be planned periodically and it can be a very detailed auditing schedule which includes internal audit as well as external audit. Contractor auditing is also required. In addition self-inspections and accident investigations are necessary (Reese, 2003).

2.5.5 Improvement

The organization should be focusing on the continual improvement of existing OSHM system or OSH practices by integrating and updating the system elements. Further, the safety should be prioritize and reviewed in management review meetings (Reese, 2003).

2.6 Barriers

Multiple barriers could be identified that are associated with the selected sector which have been reported in the literature as adversely impacting on the effective implementation of the OSHM practices.

2.6.1 Inadequate legislation

As cited by Masi and Cagno (2015), mostly frequented barrier was related to stringent legal requirement related to SMEs. The legal requirements are inadequate to the needs of SME.

Masi and Cagno (2015) have identified variety of reasons for this inadequacy. The heterogeneity of SMEs has been highlighted as the first cause. The diversity of the SMEs characteristics have made it very challenging for the preventive efforts proposed by regulations to grasp all SMEs effectively. The second cause has been proposed as the inadequate expertise and the time to focus on complying the regulations. The expertise with correct perception on the legal requirements are mandatory to overcome this dispute. When the practitioners' perception is in an acceptable level, it is required to modify the regulation tailoring to the needs of SMEs. It is a waste of resources when making much effort to comply with regulations with the practitioners with correct perception, rather than trying to ameliorate their OHS conditions. The decision making of the practitioners depend on their perception and therefore, stringent and bureaucratic legislation is essential to intervene on the practitioner's awareness.

As stated by Rampal and Nizam (2006), it is vital to have an effective and efficient law enforcement to ensure compliance to safety and health law in the country. Further, it is recommended to use their own occupational safety and health requirements and relevant standards for the multinational companies that are locally operated, however they should meet the minimum requirements as stipulated in the statutory requirements of the country. It is further emphasised by the same researchers, apparently the effort is poor among those in SMEs. It is been also suggested that smaller enterprises would desire a more "prescriptive" legal framework, as they consider the existing one is insufficient for their requirements and size. The previous researchers have emphasised that the law is a significant dimension of safety and health management, whereas slow progress would be perceived as long as the enterprises continue considering OSH measures as costly obligations and fail to recognise related the positive economic value (Cagno et al., 2013).

2.6.2 Lack of Resources and low bureaucracy

Similarly, high resource constraints reflected by inadequate time and inadequate economic resources as well as unavailability of adequate human resources have been proposed as another major issue (Masi & Cagno, 2015 ;Legg et al., 2015; Perry, 2011). Specially, when considering the small and medium firms it is mostly perceived in the terms of time and economic requirements instead of awareness, technical support and expertise (Bonafede, Corfiati, Gagliardi, Boccuni, Valenti, Marinaccio, & Iavicoli, 2016). Resources are more accessible to the larger organizations and it is possible for the larger organizations to employ an expert to manage the matters related to safety and health. Further, lack of financial resources and managerial skills are the typical problems that inherent to the smaller organizations laird(Floyde, Lawson, Shalloe, Eastgate, & D'Cruz, 2013). Laird et al. (2011) has similar finding which suggested that small businesses are particularly shaped by the resource constraints. Since they are lacking with resources such as finance and time, their typical operation lies on ad-hoc and relative basis. pragmatism and financial prudence have been reported as common values of the owners and managers of SMEs because such businesses are generally continue with a many constraints on the budget which further mimics the fact that they have poor financial resources to plan and execute initiatives for health and safety including engineering controls, safe machines and equipment and personal protective equipment.

Masi and Cagno (2015) highlighted that there are generally less resources in SMEs compared to large enterprises, therefore these sources are considered to be allocated on priority basis which is perceived by the decision makers. In addition it has been stressed that these priorities perceived might be changed for the reason that the benefits taken by investments in the production are short term perceived, while the benefits of the investments in OHS are long term perceived. This has been cited as a barrier in the relevant industry which is complex to overcome. Cagno et al. (2013) strengthen the idea with their findings that the data and resources of the small enterprises are not immediately available and lacking which negatively affect to the effective implementation of OSH practices in the workplace. Owners and managers of SMEs rarely perceive the economic advantage of investing in OSH, rather they would tend

to look at it uniquely as a cost (Loosemore, & Andonakis, 2007). Simply, the implementation costs is stated as one of the main barriers that avoids effective compliance with safety practices. The financial constraints may contribute for the lack of awareness in small industries (Unnikrishnan, Iqbal, Singh, & Nimkarsuggest, 2015).

As proposed by Legg et al. (2015) and Unnikrishnan et al. (2015), other underlying factors associated include lack of expertise knowledge, lack of skilled workers (due to low wages and less job security),lack of energy (less incentives, rewards),low financial budgets allocated for implementation of OSH practices. SME practitioners consider that the bureaucratic activities are unnecessary as it involves an amount of paperwork. This is partly connected with the poor availability of staff who are dedicated for OSH activities whereas, the owner has to perform himself to who it is difficult to deal sufficiently with all the paper work (Masi & Cagno, 2015).

In addition, having a sufficient number of safety experts with expertise knowledge is required as their role takes a significant part in the effective implementation of OSH practices in the organization. Safety Professional is a person who is designated to be responsible for providing advices related to safety matters, specially focusing on different types of hazards or creating a generalist safety role in order to coordinate support and advice (Provan, Dekker & Rae, 2017).

2.6.3 Informal management Structure and adverse working conditions

As cited by the previous researchers, there is more informal and simple management structure in small businesses whereas there are short lines of communication, which are more oral than written, and very high and immediately felt commercial pressures are there(Laird et al., 2011; Perry, 2011). Further, it has been stressed that the OSH practices in small businesses cannot be separated from the other functional aspects such as financial management, selection and recruitment of staff, task training.

According to the findings of Laird et al. (2011) when compared to the larger organizations, the working conditions in the small businesses are tend to be relatively poor, particularly safety and health is not in high standard. They further emphasised that employees in such industry are more tend to accept the poor work environment

possibly because their positions are vulnerable in the labour market. More importantly, when compared to those who are employed in large enterprises, many of the employees in the small businesses are either not willing to complain to the relevant authorities as they are scared of the potential consequences or they attempt to keep loyal and obedience to their employee and having a lower educational attainment, being part time workers or being workers less than 25 or over 65 years old could be the reasons behind.

2.6.4 Lack of management commitment and employer's perception

Many managers primarily concern on the compliance with OHS regulation, to a certain degree, for many enterprises, it is the main driving force, especially for the SMEs where the resources are lacking and the survival is apparently a challenge (Cagno et al., 2013; Floyde et al., 2013). Lack of interest of the managers on the implementation of safety practices with more concern on the productivity has been found as an another issue that act as a barrier to implement proper safety practices (Laird et al., 2011; Unnikrishnan et al., 2015).

It is reported that the owners/managers of SMEs generally suffer from high/very high psychological distress (Cocker, Martin, Scott, Venn & Sanderson, 2013). Several other underlying factors are proposed that might associated with the management commitment and employer's perceptions on implementation of OSH practices within SMEs during the study conducted by Legg et al. (2015). Those are,

- Highly personalized non-formal management when the owner is the manager
- Independent management
- Operating under financial pressure and therefore priority is towards achieving targets
- Profit focusing culture
- Higher potential to failure
- Poor access to external sources for advices and support and to business information/expertise.
- Poor communication methods (Mostly use oral communication)

- No formalised management structures
- Most of the SMEs are economically isolated units
- Lack of awareness on OSH legislations

OSH is more focused when it comes for being complied with rules and regulations, instead of its management value for managers (Cagno et al., 2013). Being less active and confident of managers on the implementation of OHS measures could be identified as a problematic matter in SMEs (Bonafede et al., 2016). It is further stated that SMEs inadequately acknowledge the positive effect (quality management, health promotion) that results from the OSH integration with the management activities of other companies due to limited use of integrated management systems with economic reasons or a lack of awareness. In general, smaller enterprises have less perception of risk and this affect their motivation on OHS performances (Cagno et al., 2013).

2.6.5 Inadequacy of information flow within the organization

Having absent or inadequate communication and information, poor awareness of workers in OSH, poor technical support from the control authorities and poor guidelines are reported as the contributory issues that are relevant to the inadequacy of information flow within the organization (Masi, & Cagno, 2015). This can be linked to different levels of the socio-technical system used for the safety control: the regulators and associations level, the organization level, and the staff level. The causes for the inadequacy of the information flow between the regulators, associations, and enterprises have been also addressed in the same research and those causes were reported to be different. Primarily, the regulators as well as relevant associations might limit themselves to evaluate the incompliance that is related to the OSH conditions of the enterprises and they could avoid providing any suggestions to improve such conditions. Secondly, it is important to focus on the information channels as these could be inadequate whereas the enterprise will not receive required technical support through internet or they may unaware of the availability of such support. Thirdly, there can may be extreme expectations among SMEs on the support of control authorities who actually cannot operate in the roles of consultants. The inadequacies relevant to the information flow in an organization can differ according to the personnel who are

involved in the process. It is likely that they hinder an effective communication due to lack of motivation. Not only the personnel who are involved, but also there can be ineffective communication channels used in enterprise.

2.6.6 Lack of safety management practices to evaluate OSH compliance

Karanikas (2017) reveals that safety concerned organizations must align with the safety management practises effectively and to ensure that various monitoring or evaluation methods should be implemented focusing in weak areas identified. He also states that there are numerous OSH management practices which contribute for the sustainability of an organization other that review meetings, safety investigations and audits. Risk management, safety trainings and many other activities need to be focused and it should be evaluated to which extent they are aligned.

Audit scores has been identified as a leading indicator for OSH performances by Robson, Ibrahim, Hogg-Johnson, Steenstra, Van Eerd and Amickin (2017) during their study done to develop leading indicators from OHS management audit data.

2.6.7 Behaviour of trade unions, inadequate partnerships and supporting parties

The scarce importance given to behaviour of trade unions was predictable, since a supportive role can be expected by the unions in respect to OHS issues (Hasle, 2000). According to the findings of Rampal and Nizam (2006), slowly emerging interest is shown by the unions to control the exposures and ensure the occupational safety and health. In small enterprises, the employment relations practices tend to be inadequate as there is huge covert conflict which has been built as a result of absence of a union, poor working conditions, and informal training, labour division and recruitment (Wilkinson, 1999; Massey, 2002; Laird et al.,2011). Lack of representation by workers has been a potential adverse impact which would be resulted from the unavailability of unions (Floyde et al., 2013).

Cunningham and Sinclair (2015) emphasised there is no assurance to declare the fact that the public health and other initiator organizations have the capacity to sufficiently assist SMEs with OSH. As a result, intermediaries are involved and the initiators have

to rely on those intermediaries with compatible interests in SMEs. This partnering would cause many challenges, yet that is the most promising approach for assisting the smaller enterprises and their workers who highly require OSH assistance that is sustainable.

2.6.8 Inadequacy of OHS policy

When considering about the OHS policy that often in SMEs, no OHS policy will be there or not the existing one is not effectively formalized (Hasle, & Limborg, 2006). However, there is no generalised practice of relating the difficulties that the practitioners perceive while implementing the OHS management to the unavailability of an OHS policy (Masi, & Cagno, 2015). As stated by Unnikrishnan et al. (2015), implementation of policies being expensive and infeasible has become the main reason for negative safety practices in SMEs.

2.6.9 Lack of training and awareness

Knowledge management of the smaller organizations are significantly different when compared to larger organizations. (Floyde et al., 2013). Lack of awareness on safety practices have been found to be leading explanations for many other negative consequences arise in safety practices within organizations (Unnikrishnan et al., 2015). Panagiotakopoulos (2011) found that budget constraints, poor owner commitment and fear of poaching to more eclectic arguments have been caused for insufficient training in the SMEs. Even in the Sri Lankan SMEs in the manufacturing sector, lack of training has been reported as a major barrier (Abeysiriwardene, 2016).

2.7 Summery

With all above considerations, this study investigates to improve the effective implementation of OSHM practices in rubber manufacturing SMEs in Sri Lanka. It deeply and extensively analysed on the Sri Lankan SMEs, their role in the economy, rubber manufacturing SMEs and why it is important to have an effective OSHMS within the industry, universally accepted OSHM practices and globally identified barriers in related industry. The study design, study framework and methodology will

be presented in the next chapter. In summary, the literature review presents the general facts gathered from previous similar studies as a base for this study.

CHAPTER 03

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the author will provide an insight of the methodology that has been used in this study. It was a result of the literature review done throughout the previous chapters. This chapter will illustrate the study framework, study population, sampling technique, relevant measures, data collection methods and instruments, data collection procedure and data analysis method.

3.2 Study Framework

The study framework was developed and presented in figure 3.1 for the proposed study which was integrated an extensive literature survey on various facts relevant to this study.

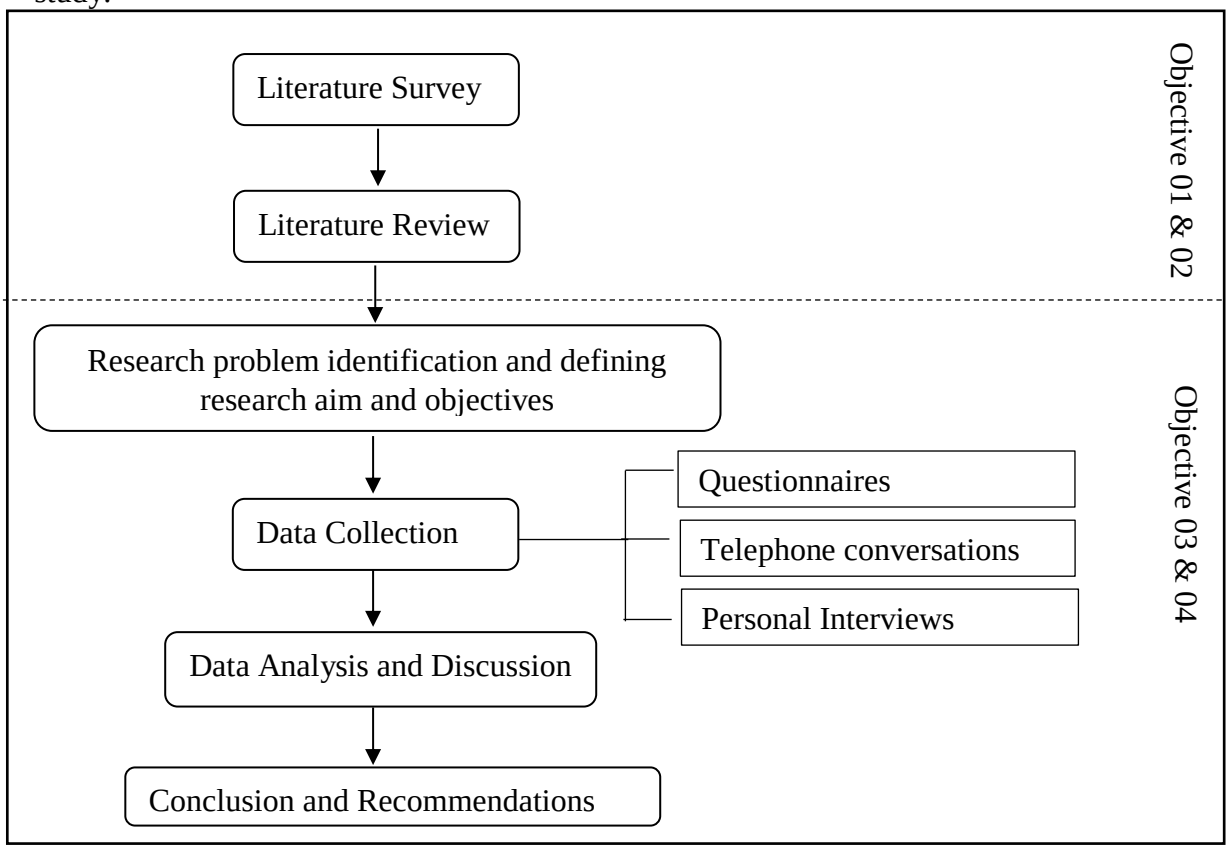


Figure 3.1 : Study Framework

3.2 Data Collection

3.2.1 Sampling Population

The target of this study was to identify the current OSHM practices in regards to their performance and important levels in rubber manufacturing SMEs, to identify the barriers that adversely impact on the effective implementation of OSHM practices in the selected industrial setting and the solutions to overcome key barriers. In Sri Lanka, there are around 300 rubber manufacturing SMEs in operation which have been authorised under different government institutions and manufacturers (ADB, 2017).

The scope has been narrowed down to Western province because most of the rubber manufacturing SMEs in Sri Lanka are established within this area. As per the reliable information received by the Census and Statistics Department, 185 number of rubber manufacturing SMEs were reported to be operated within Western Province of Sri Lanka. However, occupational safety and health is still an emerging field in Sri Lanka and therefore, only single or, may be no safety experts are there in these SMEs. The selected sample population was consisted of 50 OSH experts who have been employed in those organizations, each representing one of the organizations. The final sample size was limited to 40 as a result of time and other constrains. This sample size determination can be identified as justifiable since it satisfies rules of thumb proposed by Roscoe (as cited in Sekaran, 2007). Rosoe (1975) presents the following guidelines to determine a sample size for a study;

I. Most appropriate sample size for most researches is larger than 30 and less than 500

II. If samples are divided into sub samples, it is necessary to have a minimum of 30 for each category.

III. The sample size should be several times (preferably 10 times or more) as large as the number of variables in the study for multivariate research (including multiple regression analysis) (Samarasinghe, 2009).

The sample population was selected through purposive sampling method. The precise sampling method was selected considering the ease of access for the research participants. Research analysis was continued with the data collected from 40 experts as ten experts have not responded within the defined time frame for data collection. Therefore, the response rate for this study was eighty percent.

3.2.2. Data collection methods and instruments

Both primary and secondary data were used in this study. The secondary data were collected through the relevant print and electronic documents to review the past literature, to define the problem and specific objectives of the study, to find the most fit methodologies from the previous studies and also to support the findings of the study. The primary data were collected mainly using a self-administered questionnaire (Appendix A) and on to one personal interviews.

Questionnaires are a method which is most widely used to collect data, yet the respondents read the questions from their own view on the things, including their understandings, values, interpretations, and attitudes where the sensitive questions may cause adverse response effects (Barnett, 1998; Rowley. 2004). Generally established data collection instrument was not found to measure OSHM practices in rubber manufacturing sector in the previous literature. Therefore, a questionnaire was developed by reviewing the findings of previous studies. Measurement items were developed in relation to the literature found, but modified according to the objectives of the current study. The questionnaire was developed only in English language as the author assumed that all the respondents would have good understanding of the English language as they have been employed in a professional field with good educational background. The author consulted with the supervisor to improve the reliability and validity of the data collection instrument. Further, it was pretested for reliability.

The questionnaire was consisted of three main parts. The first part contained questions to reveal the information regarding each respondent and the organization they were representing. This information was consisted of details such as name and age of the

participant, number of years experienced in rubber manufacturing SMEs, designation, organizational age, market type, contact number and e-mail address. Contact information was gathered to contact them for future correspondence.

Current OSHM practices within the organization were measured through the second part of the questionnaire. To measure the current OSHM practices within rubber manufacturing SMEs, 23 items were measured under the stages of initiation, formulation, implementation, evaluation and improvement. The measuring scale in the relevant measurement was 5 point Likert Scale. The participants were required to give his or her answer on "Not at all", "To a small extent", "To some extent", "To a moderate extent" and "To a large extent" to get both the measurements, the importance level and the current performance level of practice in accordance with their expert perspective. A Likert scale is used as a psychometric scale in survey questionnaire, in which the respondent can indicate their agreement or disagreement level on a symmetric scale for a list of statements (Barua, 2013). A Likert scale can have advantageous as well as disadvantageous. Likert scale reliability is good and it can be generated and modified easily while using the outcomes directly for statistical implications and those are the key advantages. Still it cannot estimate the intervals of ordinal data and the respondents may force to select an answer from the provided options which may mismatch with their exact responses. The third part of the questionnaire consisted of the list of barriers that have been adapted for the current study after careful review of past literature (Legg et al., 2015; Masi & Cagno, 2015; Loosemore & Andonakis, 2007), wherein the participant have to provide their perspective on each barrier listed whether it is a barrier or not. A 2 point yes/no scale was used to get this measurement.

Other than the questionnaire, the one to one personal interviews were carried on among ten participants from the sample to determine the solutions for identified key barriers through questionnaire. The selection was done based on their work experience and educational qualifications. As per the inclusive criteria for the interview, all respondents should minimally have 3 years of work experience in the field and relevant

industry along with OSH certificate level education qualification. The table 2.1 shows the profile of the interviewed respondents.

Table 2.1 : The profile of interviewed respondents

Interviewee	Designation	Small/Medium/ Large	OSH Experience	Educational Qualifications
Interviewee 1	HR Officer	Medium	3 Years	OSH Certificate level only
Interviewee 2	HSE Officer	Medium	4 Years	OSH Certificate level only
Interviewee 3	Engineer (HSE as a Key responsibility)	Small	4 Years	General Degree +OSH qualification
Interviewee 4	HR Officer	Medium	6 Years	OSH Certificate level only
Interviewee 5	HSE Officer	Medium	6.5 Years	OSH Certificate level only
Interviewee 6	Engineer	Medium	7 Years	General Degree +OSH qualification

	(HSE as a Key responsibility)			
Interviewee 7	Engineer (HSE as a Key responsibility)	Medium	8 Years	General Degree +OSH qualification
Interviewee 8	HSE Executive	Medium	6.5 Years	General Degree +OSH qualification
Interviewee 9	HSE Assistant Manager	Large	>8 Years	General Degree +OSH qualification
Interviewee 10	HSE Director	Large	>8 Years	General Degree +Post Graduate Qualification + OSH qualification

The OSH experts for the interviews were selected not only from SMEs but also from the large scale rubber industries (two interviewees) as it will provide an opportunity to get a broader and different view on the existing key barriers within the relevant industry SMEs. A specific interview guideline (Appendix B) was pre-developed and each expert was interviewed in reference to the specific questions. The time was limited to 30 minutes only for each interview due to the time constraints with the tight

schedules of the respondents. Their suggestions and explanations were noted with their consent and used for the recommendations.

3.2.3 Data Collection Procedure

Initially, a pilot survey was conducted among three experts in the relevant industry to evaluate the suitability of the wording and format of the questionnaire, and the extent to which measured represented all the facets of the constructs. Based on the pilot-study responses, necessary modifications were adapted into the final data collection instrument.

During the data collection procedure, firstly 50 participants were contacted via phone to check their availability and willingness to participate for the study. At the initial telephone conversation, they were given an introduction on the study as well. The questionnaire was distributed to the contacted experts via company and personal e-mails.

The one-to-one interviews were conducted only among ten selected experts, after analysing the data relevant to barriers and the solutions were determined for the key barriers through the expert expertise knowledge of the respondents.

3.7 Data Analysis Method

The raw data set which was obtained through the sampled questionnaire was fed into the Statistical Package for Social Sciences (SPSS version 21.0). Descriptive tests, validity tests and importance performance analysis were used in the data analysis process. Cronbach's alpha was used to measure the reliability of the questionnaire items used in the current study.

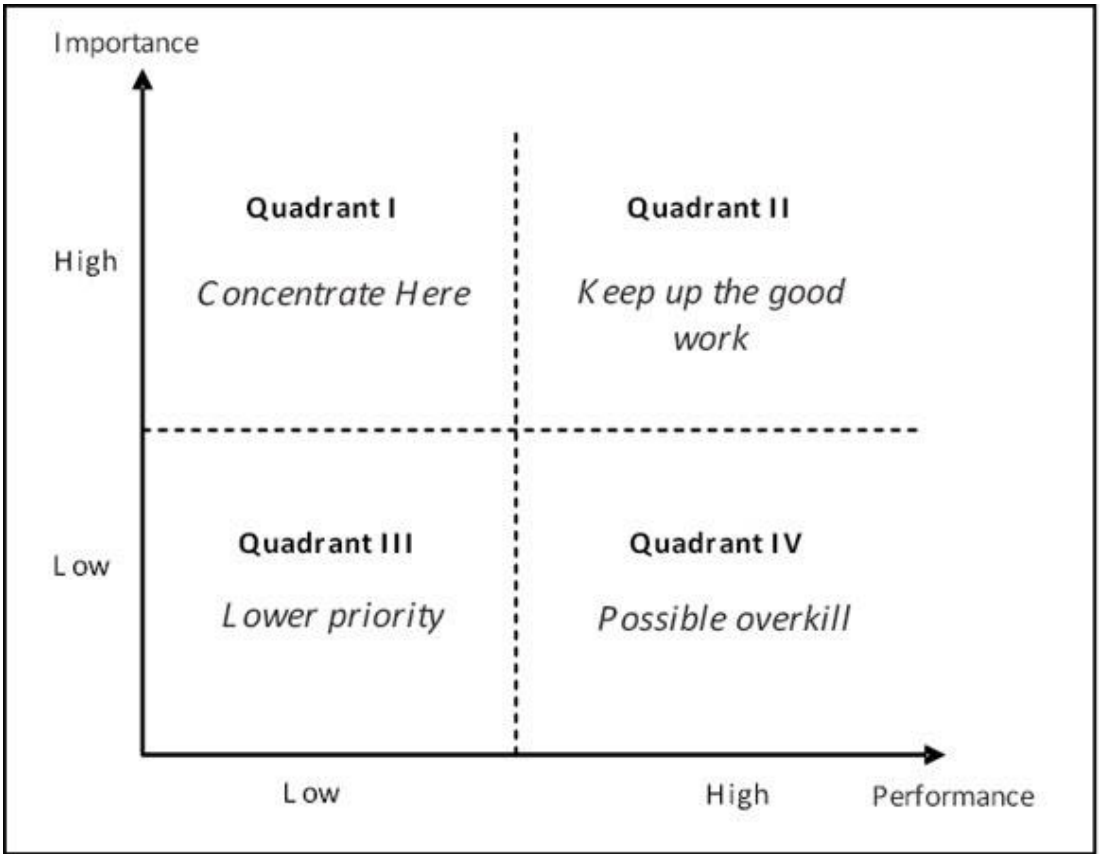


Figure 3.2 : Importance Performance Index (IPA)

In the current study, the IPA was used to identify the current performance level of OSHM practices that needed to be prioritised for improvements. The quadrant approach which is shown in the figure 3.2 is used in Importance Performance Matrix where the importance and performance of each attribute has been plotted in regard with four quadrants, "Concentrate here", "Keep up good work", "Low priority", "Possible overkill" (Bacon, 2003). Silva, & Fernandes (2011) have characterized these four quadrants in the IPA as,

"Quadrant A **Concentrate here**- high importance, low performance: requires immediate attention for improvement and are major weaknesses."

"Quadrant B **Keep up the good work**- high importance, high performance: indicate opportunities for achieving or maintaining competitive advantage and are major strengths."

"Quadrant B **Low priority**- low importance, low performance: are minor weaknesses and do not require additional effort."

"Quadrant D **Possible overkill** - low importance, high performance: indicate that business resources committed to these attributes would be overkill and should be deployed elsewhere."

Bacon (2003) has suggested that the importance/performance index mimics the future actions with the quadrants where the individual attribute is located. It has been proven that this method is generally applicable tool and relatively easy to administer and interpret resulting in extensive use among researchers and in various fields (Abalo et al., 2007; Silva & Fernandes, 2010; Silva, & Fernandes, 2011).

3.8 Summary

This chapter consisted of the information on study framework, study population, sampling technique, measures, data collection methods, data collection procedures and data analysis method. Survey approach was used to collect the data and a specific questionnaire was developed in regard with this purpose. Further, one- to-one interviews were used to obtain the data on solutions for key barriers. Data analysis was performed through reliability and validity tests, descriptive statistics and performance importance index.

CHAPTER 4

DATA ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter demonstrates the data analysed using various techniques and the discussion. As discussed in Chapter 3, the study was limited to the rubber manufacturing industries located in the Western Province of Sri Lanka due to the cost and time constraints. The chapter provides an overview of the sample which consist of 40 experts from different enterprises and the performance level and importance level of current practices of each organization will be identified as well as the relevant barriers. This chapter will further reveal the solutions that were identified as potential to overcome the key barriers. In addition, this chapter will discuss the findings in relevant to the previous studies.

4.2 Respondent rate and the sample characteristics

4.2.1 Sample Characteristics of the OSH experts responded for questionnaire

The author distributed the questionnaire among 50 OSH experts who were representing rubber manufacturing SMEs in the Western Province, yet the responses received from only 40 experts within the defined time frame for data collection. Therefore, the responses rate was 80% for the current study.

As presented in the figure 4.1, in regard to the work experience of the respondents, majority (60%) of the respondents were reported to have 1 to 5 years of work experience and 4% of respondents with 6 to 10 years of work experience were included in the sample. 12% of the sample represent the respondents with over 10 years work experience. In this research, only the OSH or OSH related work experience was counted from the total work experience of the respondent.

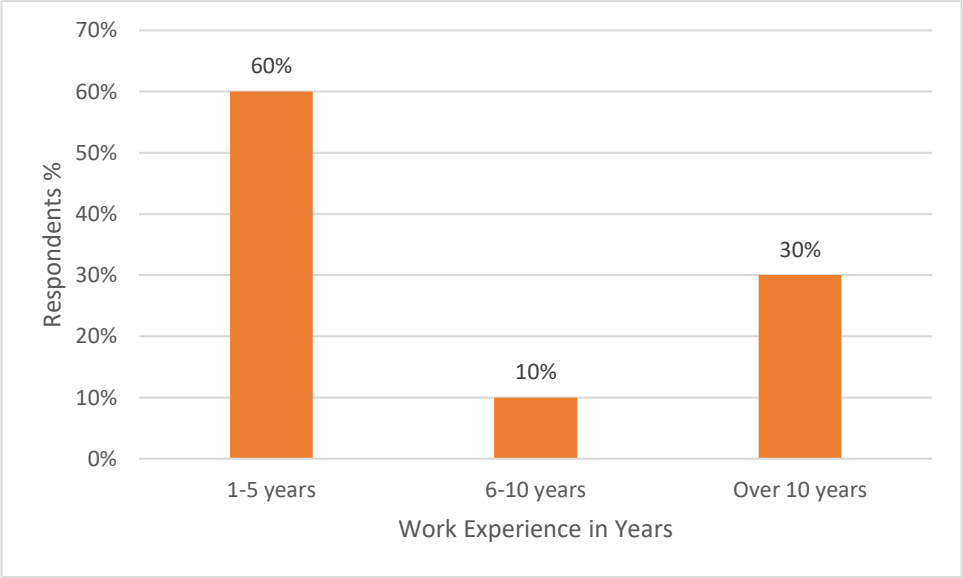


Figure 4.1 Work Experience

The respondents were taken into this study from different organizations and the organizations were categorised as per its historical ages. In regard to the ages of those organizations majority(45%) of the organizations were reported to have a history of over 10 years while 30% having a history of 6 to 10 years and the other remaining (25%) had a history of 1 to 5 years. This has graphically presented in figure 4.2.

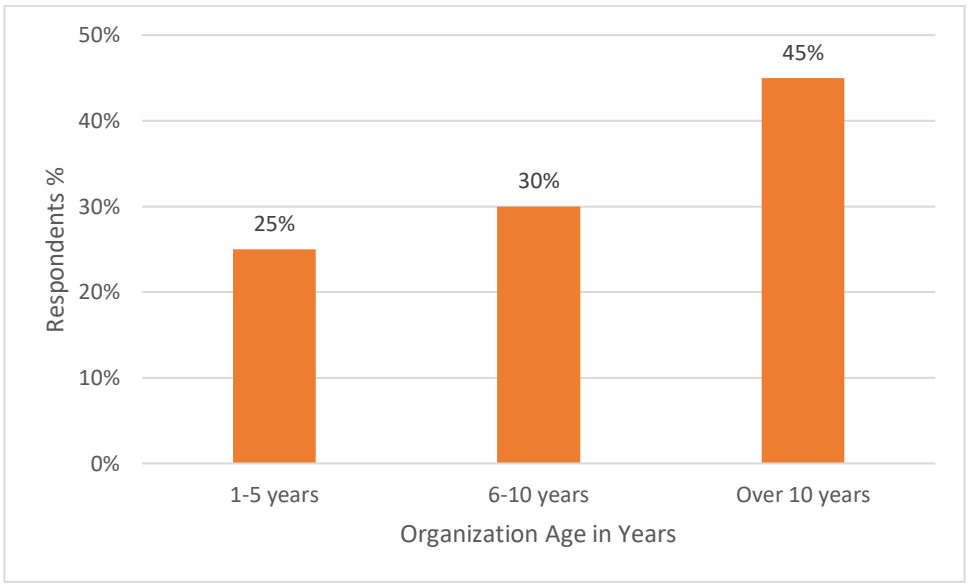


Figure 4.2 Organization Age

When considering the different market types the organizations are more focused, majority (70%) represented the local market while the other remaining 30% representing the export market as presented in figure 4.3.

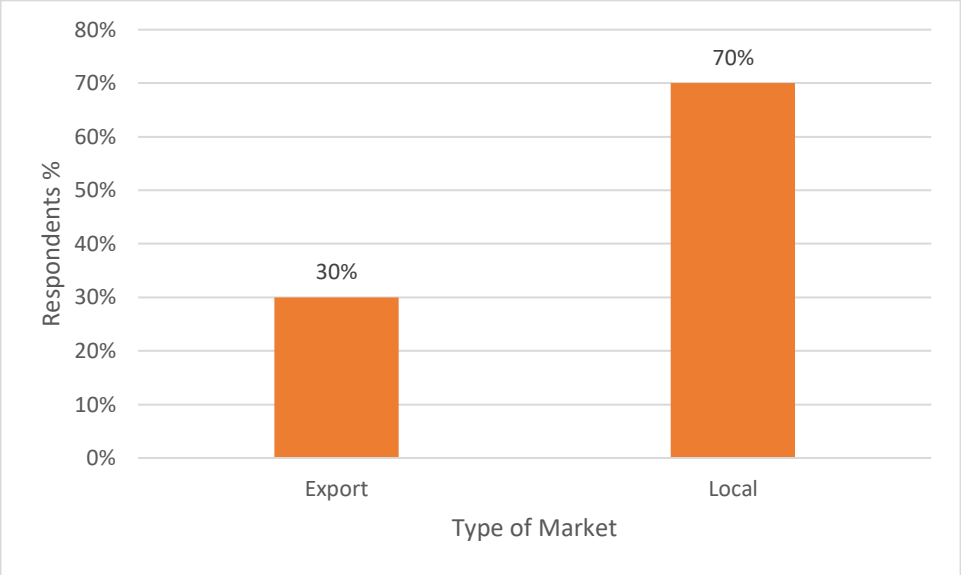


Figure 4.3 Market Type

4.2.2 Sample Characteristics of participants responded for the interviews

The author interviewed ten OSH experts who were representing rubber manufacturing industries and the sample was consisted of different characteristics. It was required to have at least 3 years of work experience in the field and relevant industry along with OSH certificate level education qualification.

As presented in the figure 4.4, in regard to the OSH work experience of the interviewed respondents, majority (50%) of the respondents were reported to have 6 to 8 years of work experience and 30% of respondents with 4 to 6 years of work experience were included in the interviewed sample. 20% of the sample represent the respondents with over 8 years work experience.

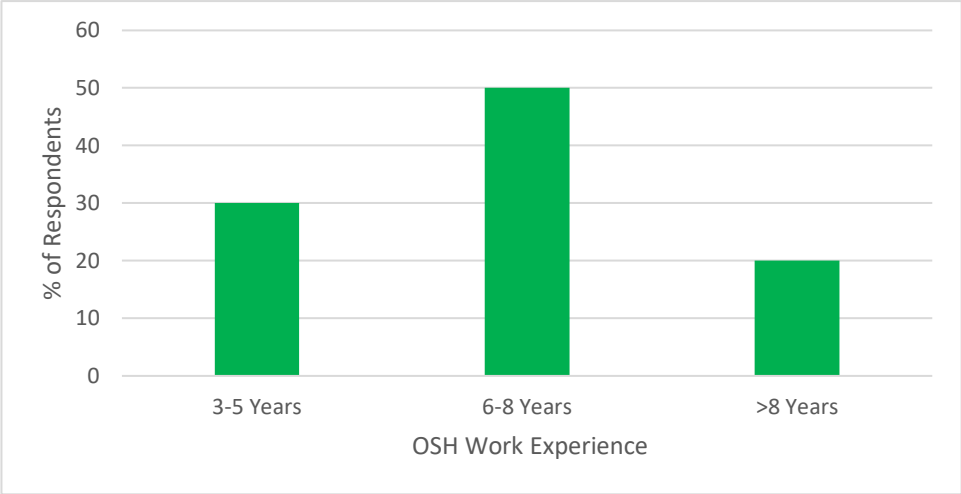


Figure 4.4 Work Experience in regards with interviewed respondents

As graphically represented in figure 4.5, 40% of the interviewees were reported to have only OSH certificate level qualifications while 30% of them having a general degree and OSH certificate level qualification, 20% of them having a general degree and OSH diploma level qualification and lastly, 10% having a general degree and a postgraduate level education along with OSH certificate level qualification.

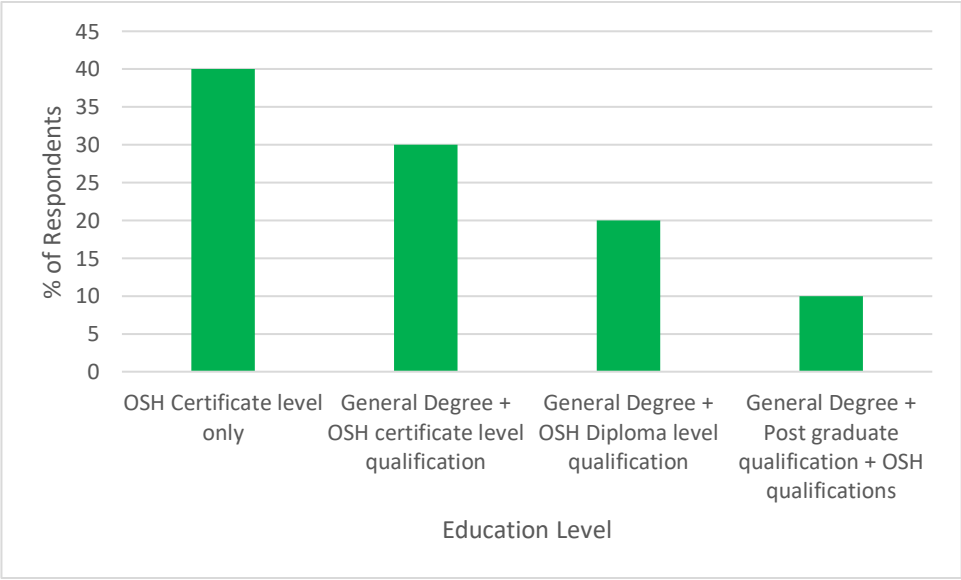


Figure 4.5 Educational Level in regards with interviewed respondents

4.3 Reliability of the instrument

This research study mainly evaluated the current performance levels and the expected levels of performance (importance level) in regard to the OSHM practices in rubber manufacturing SMEs.

The mean values and the standard deviations of the performance measurement scale are showed in the table 4.1.

Table 4.1 Mean values and standard deviations for the current performance levels of the practices

Descriptive Statistics	N	Min	Max	Mean	Stand Devi.
Initiation					
Regulatory compliance and system conformance is followed by the OSHM system.	40	2	4	2.85	.893
Responsibilities, accountabilities and authorities are allocated in the OSHM system.	40	1	5	2.80	.939
Formulation					
The organization has an OSH policy.	40	1	5	2.83	.984
The goals and objectives of the organizational OSHM system are pre-defined.	40	1	5	2.63	.952
The safety performance measures are pre-defined.	40	1	4	2.65	.921
Baseline evaluation is conducted when forming the goals and objectives of OSHM system.	40	1	4	2.20	.853
Risk Assessments are conducted.	40	1	5	3.08	.917
OSHM manuals and procedure are formulated.	40	1	4	2.53	.933
Implementation					
Training requirements of the employees are fulfilled.	40	1	5	2.98	.974
Process design and layout design is compatible with the safety requirements arise.	40	1	4	2.13	.911
There is an emergency preparedness and response system.	40	1	4	2.90	.900
There is a hazardous waste management system.	40	1	4	2.33	.997
Preventive and corrective actions are taken for the identified risks.	40	1	4	2.63	1.079
Level of Safety Management of the suppliers are assessed when choosing them.	40	1	2	1.08	.267
Contractor safety management system has been established.	40	1	4	1.30	.758
Documentation mechanism and record system has been established and communicated.	40	1	5	2.90	1.033

Hazard/ incident reporting system is implemented and well communicated.	40	1	4	2.78	.974
Evaluation					
OSH audits and self-inspection is done periodically.	40	1	5	2.83	1.035
Incident investigation and root cause analysis are done.	40	1	4	2.75	.981
Medical programmes and surveillance are conducted periodically.	40	1	4	2.50	1.062
Improvement					
Safety is part of management review meetings.	40	1	4	2.63	.979
Risks are assessed with process modifications and layout changes and necessary control measures are taken.	40	2	5	3.13	1.090
Gaps identified through the audits and inspections are addressed and necessary actions are taken to bridge the gap.	40	1	4	2.80	.911
Mean Value of PR	40	1.48	4.04	2.5728	.77950
Valid N (listwise)	40				

Cronbach's Alpha score was calculated and shown in the table 4.2. The measurement scale could be considered as reliable since the Cronbach's Alpha value is 0.98 which exceeded 0.7 (Malhothra et al., 2012). Cronbach's Alpha is used as an index of reliability, where the alpha coefficient ranges in value from 0 to 1 and may be used to describe the reliability of factors extracted from dichotomous (that is, questions with two possible answers) and/or multi-point formatted questionnaires or scales (i.e., rating scale: 1 = poor, 5 = excellent). The higher the score, the more reliable the generated scale is. It was found that 0.7 to be an acceptable reliability coefficient (Malhothra et al., 2012), yet lower thresholds are used in some of the past literature (Jayakody, 2014).

Table 4.2 Cronbach's Alpha

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.981	.981	24

4.4 Mean values comparison within sample characteristics

The mean values of the average performances levels of the current practices in relation to the organizational characteristics are shown in the table 4.3.

Table 4.3 Sample characteristics and mean values of the practices average performance level comparison

Organizational Characteristic	Category	Mean	N	Std. deviation
Organization Age	1-5 years	1.8913	10	.11995
	6-10 years	2.3514	12	.86530
	Over 10 years	3.0990	18	.54850
Market Type	Export	3.5217	12	.35419
	Local	2.1661	28	.50483

According to the figure 4.6, the organizations with a history of over 10 years have the highest mean value (1.8913) of average performance level while the organizations with 1 to 5 years have the lowest mean value of 3.0990. The mean value of the organizations with a history of 6 to 10 years is placed in between both with a value of 2.3514. This indicates that the average performance level is higher in the organizations which are more matured in the business.

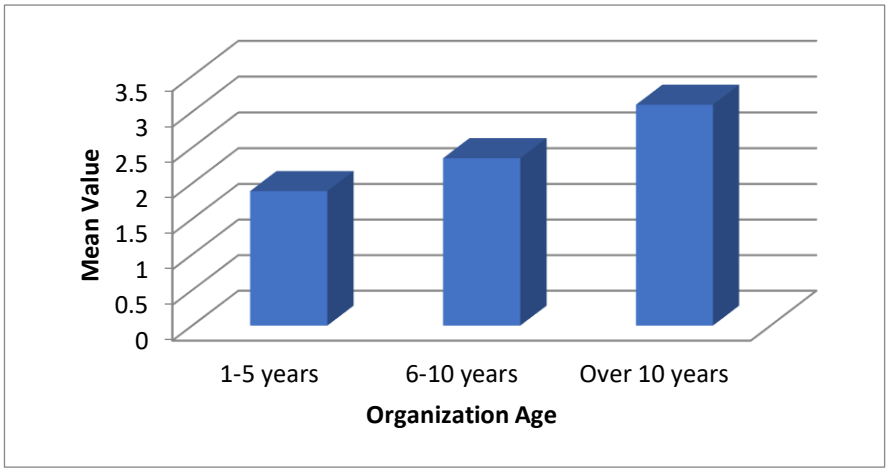


Figure 4.6 Mean values of average performance for organizational age categories

Figure 4.7 shows the mean values of average performance level for local and export market types which have indicated the highest mean value of 3.5217 in export market when compared to the local market which was found to be 2.1661. According to these results, the average performance level is higher in the organizations which are focused in the export market.

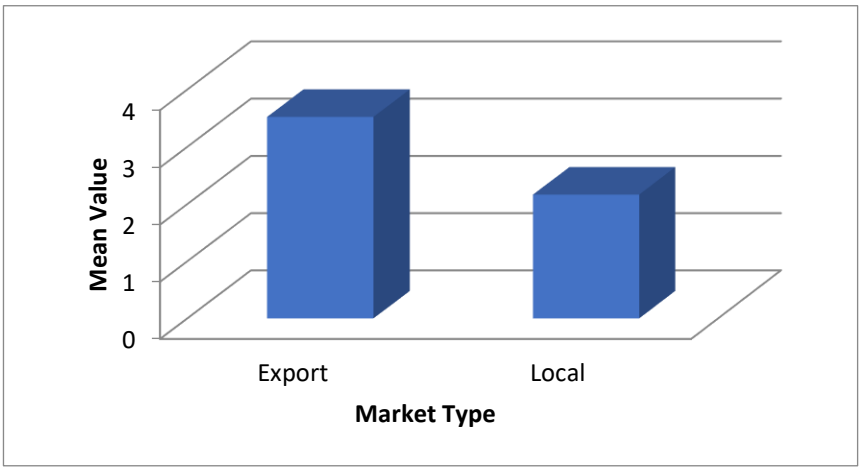


Figure 4.7 Mean values of average performance Market type categories

4.5 Frequency table for responses

As mentioned previously, the measurement scale was consisted of 23 items for which the current performance levels and expected levels of performances (importance level) were assessed through the expert perspectives. Each practice was assessed using a

likert scale which presented five options where they could choose from “Not at all”, “To a small extent”, “To some extent”, “To a moderate extent” and “To a large extent”.

The frequency responses in regard with the importance and performance levels of different practices are presented in the table 4.4.

Table 4.4 Frequency response of importance and performance level of practices

			Frequency Rate of Response (%)				
			Not at all	To a small extent	To some extent	To a moderate extent	To a large extent
1	**Initiation**						
PR1	Regulatory compliance and system conformance is followed by the OSHM system.	Importance	0.0	0.0	20.0	70.0	10.0
		Current performance level	0.0	47.5	20	32.5	0.0
PR2	Responsibilities, accountabilities and authorities are allocated in the OSHM system.	Importance	0.0	0.0	40.0	60.0	0.0
		Current performance level	2.5	45.0	25.0	25.0	2.5
2	**Formulation**						
PR3	The organization has an OSH policy .	Importance	0.0	0.0	0.0	80.0	20.0
		Current performance level	5.0	40.0	25.0	27.5	2.5
PR4	The goals and objectives of the organizational OSHM system are pre-defined.	Importance	0.0	0.0	2.5	77.5	20.0
		Current performance level	10.0	37.5	35.0	15.0	2.5
PR5	The safety performance measures are pre-defined.	Importance	0.0	0.0	20.0	70.0	10.0
		Current performance level	7.5	42.5	27.5	22.5	0.0
PR6	Baseline evaluation is conducted when forming the goals and objectives of OSHM system.	Importance	0.0	0.0	40.0	60.0	0.0
		Current performance level	20.0	47.5	25.0	7.5	0.0
PR7	Risk Assessments are conducted.	Importance	0.0	0.0	0.0	30.0	70.0

		Current performance level	2.5	27.5	32.5	35.0	0.0
PR8	OSHM manuals and procedure are formulated.	Importance	0.0	0.0	2.5	70.0	27.5
		Current performance level	12.5	40.0	30.0	17.5	0.0
3	**Implementation**						
PR9	Training requirements of the employees are fulfilled.	Importance	0.0	0.0	0.0	77.5	22.5
		Current performance level	5.0	27.5	37.5	25.0	5.0
PR10	Process design and layout design is compatible with the safety requirements arise.	Importance	0.0	0.0	40.0	52.5	7.5
		Current performance level	32.5	25.0	40.0	2.5	0.0
PR11	There is an emergency preparedness and response system.	Importance	0.0	0.0	12.5	40.0	47.5
		Current performance level	5.0	30.0	35.0	30.0	0.0
PR12	There is a hazardous waste management system.	Importance	0.0	0.0	0.0	22.5	77.5
		Current performance level	20.0	45.0	17.5	17.5	0.0
PR13	Preventive and corrective actions are taken for the identified risks.	Importance	0.0	0.0	15.0	75.0	10.0
		Current performance level	20.0	22.5	32.5	25.0	0.0
PR14	Level of Safety Management of the suppliers are assessed when choosing them .	Importance	0.0	0.0	72.5	22.5	5.0
		Current performance level	92.5	7.5	0.0	0.0	0.0
PR15	Contractor safety management system has been established.	Importance	0.0	40.0	35.0	25.0	0.0
		Current performance level	82.5	10.0	2.5	5.0	0

PR16	Documentation mechanism and record system has been established and communicated.	Importance	0.0	65.0	25.0	10.0	0.0
		Current performance level	5.0	37.5	25.0	27.5	5.0
PR17	Hazard/ incident reporting system is implemented and well communicated.	Importance	0.0	0.0	0.0	70.0	30.0
		Current performance level	7.5	37.5	25.0	30.0	0.0
4	**Evaluation**						
PR18	OSH audits and self-inspection is done periodically.	Importance	0.0	0.0	0.0	**75.0**	**25.0**
		Current performance level	7.5	35.0	30.0	**22.5**	**5.0**
PR19	Incident investigation and root cause analysis are done.	Importance	0.0	0.0	0.0	72.5	27.5
		Current performance level	10.0	32.5	30.0	27.5	0.0
PR20	Medical programmes and surveillance are conducted periodically.	Importance	0.0	0.0	12.5	55.0	32.5
		Current performance level	22.5	25.0	32.5	20.0	0.0
5	**Improvement**						
PR21	Safety is part of management review meetings.	Importance	0.0	0.0	5.0	57.5	37.5
		Current performance level	15.0	27.5	37.5	20.0	0.0
PR22	Risks are assessed with process modifications and layout changes and necessary control measures are taken.	Importance	0.0	0.0	0.0	55.0	45.0
		Current performance level	0.0	37.5	27.5	20.0	15.0
PR23	Gaps identified through the audits and inspections are addressed and necessary actions are taken to bridge the gap.	Importance	0.0	0.0	0.0	55.0	45.0
		Current performance level	5.0	37.5	30.0	27.5	0

4.5.1 Performance level of Initiation practices

Initiation was measured by two practices which were “the regulatory compliance and system conformance is followed by the OSHM system and responsibilities” and “accountabilities and authorities are allocated in the OSHM system”. The first practice is performing in all organizations while the other practice is not performing in 2.5% of the organizations. Majority of the organizations performing both practices to a small extent.

4.5.2 Performance level of Formulation practices

Formulation was measured by six practices which were the availability of a OSH policy, pre-defined OSHM goals and objectives, pre-defined safety performance measures, baseline evaluations, risk assessments, OSH manuals and procedures. Almost all the practices in this stage were practiced to a small extent except the practice of conducting risk assessments which was reported to be performed to a moderate extent.

4.5.3 Performance level of Implementation practices

Implementation was measured by nine practices which were OSH training requirements fulfilment, process and layout designs compatible with safety requirements, emergency preparedness and response system, hazardous waste management system, preventive and corrective actions taken for identified risks, safety oriented supplier management system, contractor management system, documentation mechanism and record keeping and hazard/incident reporting system. Majority of these practices were performing in the organizations to some extent while second most was reported to be performed to a small extent. The safety oriented supplier management system and contractor management system were found not to be performed at all and that is in a noteworthy level. Largely performed practices were found to be lacking.

4.5.4 Performance level of Evaluation practices

Evaluation was measured by three practices which were periodic OSH audits and self-inspection, incident investigation and root cause analysis and periodic medical programmes and surveillance. Majority of the practices were performed to a small extent and largely performed practices were found to be lacking.

4.5.5 Performance level of Improvement practices

Improvement is measured by three practices which are safety in management review meetings, OSH aspects considered in change management system and gaps identified through audits and inspections are addressed with adequate controls. Majority of the practices were reported to be performed to a small extent.

4.5.6 Other practices

Two experts had mentioned that they have few other practice which are focusing on the employee's behaviours and attitudes.

4.6 Importance of practices

In conclusion, majority of the respondents have agreed that almost all the practices are important for this type of an industry to a moderate extent. Safety oriented supplier management system, contractor safety management system and documentation mechanism is accepted as relatively low in importance by the majority of the respondents. Risk assessments, emergency preparedness and response plan and hazardous waste management system is accepted to be largely important for the relevant SMEs by the majority of the respondents.

4.7 Importance Performance Index (IPA)

The importance performance index was applied to the importance and performance of each practice to identify the areas that required improvements. For the ease of use in the IPA , a coding system was introduced to identify each barrier as presented in the table 4.5.

Table 4.5 : Coding for practices

Practice	**Code**
Regulatory compliance and system conformance is followed by the OSHM system.	PR1
Responsibilities, accountabilities and authorities are allocated and implemented in the OSH functions.	PR2
The organization has established an OSH policy which is regularly reviewed and updated.	PR3
The goals and objectives of the organizational OSHM system are pre-defined and taken into consideration when planning the OSH functions.	PR4
The safety performance measures are pre-defined and taken into consideration when planning the OSH functions.	PR5
Baseline evaluation is conducted when forming the goals and objectives of OSHM system.	PR6
Risk Assessments are conducted periodically.	PR7
OSHM manuals and procedure are formulated and followed.	PR8
Training requirements of the employees are fulfilled.	PR9
OSH aspects are considered in process design and layout design.	PR10
An emergency preparedness and response system is established, followed, periodically reviewed and updated.	PR11
A system is established and followed for Hazardous Waste Management.	PR12
Preventive and corrective actions are taken for the identified risks.	PR13
A Safety oriented supplier management system has been established and followed.	PR14
A Contractor safety management system has been established and followed.	PR15
Documentation mechanism and record system have been established and followed.	PR16
A hazard/ incident reporting system is established and followed.	PR17
Incident investigation and root cause analysis are done and necessary preventive actions are taken to avoid recurrence.	PR18
Medical programmes and surveillance are conducted periodically.	PR19
OSH aspects are considered in change management system.	PR20
OSH issues are discussed in a prioritized manner during the Management Review Meetings.	PR21
OSH audits and self-inspection are done periodically.	PR22
Gaps identified through the audits and inspections are addressed and necessary actions are taken to bridge the gap.	PR23

In this study, the rating was done using mean value and each attribute related to practice is plotted and the results interpreted using 4 quadrants of the "action grid" as indicated in the figure 4.8. The cross that separates the quadrants can be based on different principles (Bacon, 2003) although a cross point made up of the average

importance and the average performance seems to be the one most frequently applied (Bacon, 2003). This is also called the data-cantered quadrant approach.

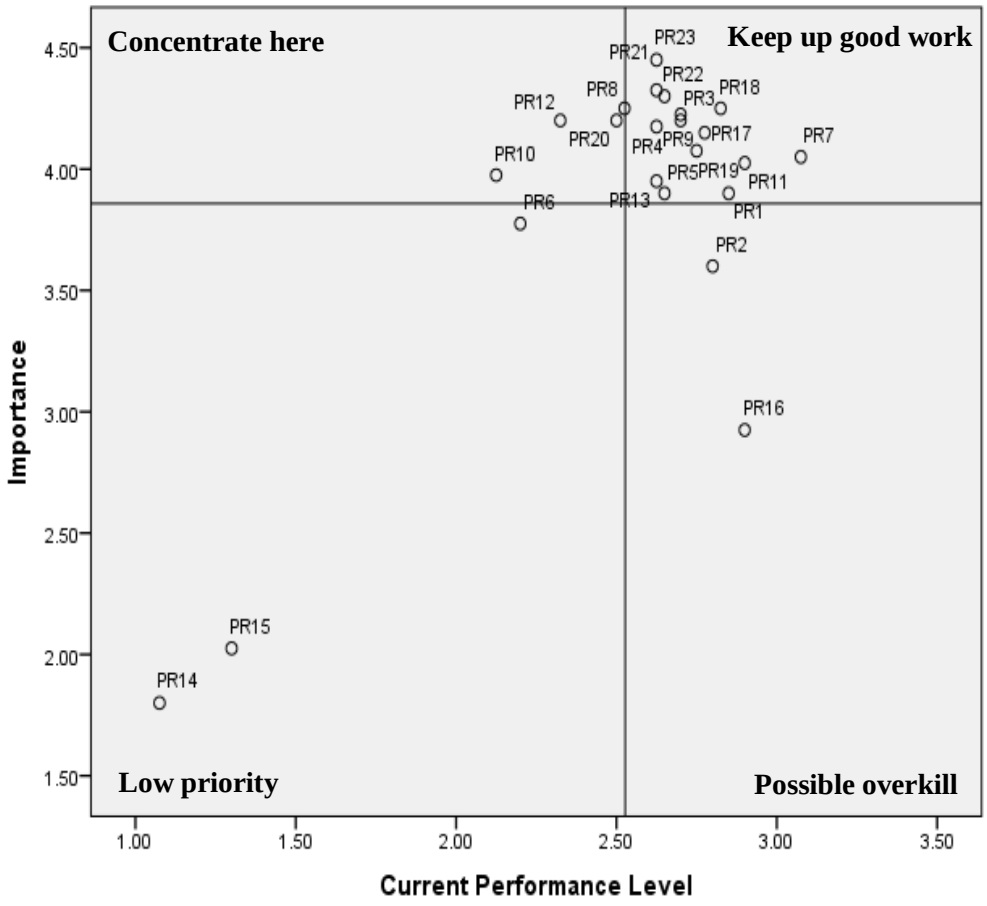


Figure 4.8 : Importance Performance Index Overview

As shown in the figure 4.8, "Concentrate here" of quadrant A was the key success factor to improve OSHM practices in the relevant industry for which the performance level was reported fairly low. This provides an indication that more focus and improvement efforts should be concentrated here which included the attributes of PR8, PR10, PR12 and PR20. PR8, PR10, PR12 and PR20 represent the practices OSHM manuals and procedures are formulated and followed, OSH aspects are considered in the process designs and layout designs, a system is established and followed for hazardous waste management and OSH aspects are considered in the change management system. Among these various attributes which were reported to need

more focus, PR8, PR10 and PR 12 were part of the implementation phase of the OSHMS while PR20 was a part of the evaluation phase of the system.

"Keep up good work" of quadrant B was perceived to be very important for the effective implementation of OSHM practices in the relevant industry as per the perspectives of relevant OSH experts participated in the study. These attributes including PR1, PR3, PR4, PR5, 7, PR9, PR11, PR13, PR17, PR19, PR21, PR22 and PR23 representing all the phases in OSHMS are reported to be performed well, yet the maximum performance level of practices is reported to be 3.1 out of 5. Even the practice with the highest mean value has achieved only 61.5% of the desired target. That might be an additional indication of the need for further improvements in the performance of related practices.

"Lower priority" of quadrant C was having low importance and low performance in related to attributes PR14 and PR15 which are a safety oriented supplier management system has been established and followed and a contractor safety management system has been established and followed. Both these attributes which are part of the implementation phase of OSHMS have been underappreciated in the IPA model suggesting that they should not be highly concerned during the effective implementation of OSHM practices in the relevant industrial settings.

At the same time, the organizations seem to have high levels of performances in the quadrant D "Possible overkill" for the attributes PR2 and PR16 which are responsibilities, accountabilities and authorities are allocated and documentation mechanism and record keeping system have been established and followed, yet these are accepted as low in importance by the relevant experts. Therefore, it may mimic the need of deploying the related resources to improve another prioritised area. These two practices have been derived from the initiation phase and implementation phase.

The overall view of the IPA indicates that most of the practices are within the quadrant of "Keep up good work" regardless of its phase and the distribution of the attributes within importance performance matrix are not following any specific pattern in regards with the phase it belongs. Therefore, it would be better if each practice is focused

separately for future actions instead of looking at the critical areas depending on the phases of the OSHMS.

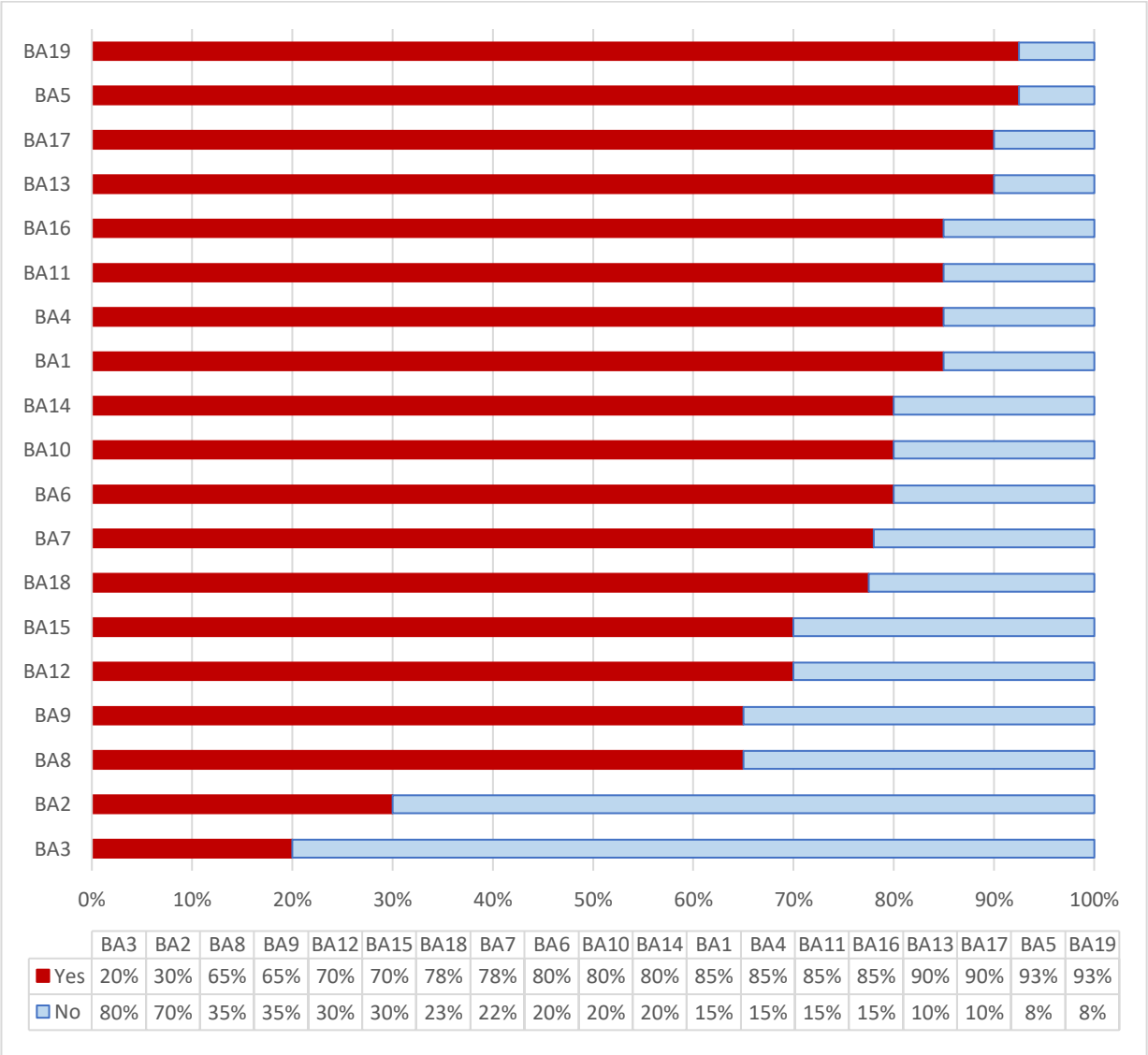
4.8 Barriers

For the ease of use in graphical presentation, a coding system was applied for the identification of each barrier as shown in the table 4.6.

Table 4.6 Coding for barriers

Barrier	Code
Inadequate legislation	BA1
Poor allocation of responsibilities, accountabilities and authorities	BA2
Inadequacy of OSH policy	BA3
Inadequate support and influence from other organizational members	BA4
Inadequate budget allocation	BA5
Lack of technical expertise and qualified people	BA6
Lack of relevant technology	BA7
Low bureaucracy	BA8
Informal management structure	BA9
Adverse working conditions	BA10
Lack of senior management commitment	BA11
Employer's negative perception towards safety	BA12
Inadequate information flow within the organization	BA13
Lack of effective evaluation methods (Review meetings/Audits)	BA14
Poor behaviour of trade unions, inadequate partnerships and supporting parties	BA15
Lack of training and awareness	BA16
Production based culture	BA17
Lack of opportunities for the employees to involve in safety decisions	BA18
Poor monitoring system of safety performances	BA19

Response rate of the barriers are shown by the figure 4.9.



	BA3	BA2	BA8	BA9	BA12	BA15	BA18	BA7	BA6	BA10	BA14	BA1	BA4	BA11	BA16	BA13	BA17	BA5	BA19
Yes	20%	30%	65%	65%	70%	70%	78%	78%	80%	80%	80%	85%	85%	85%	85%	90%	90%	93%	93%
No	80%	70%	35%	35%	30%	30%	23%	22%	20%	20%	20%	15%	15%	15%	15%	10%	10%	8%	8%

Figure 4.9 Response rate of barriers

As shown in the figure 4.9, more than 60 % of the respondents have responded that all the listed items are significant barriers except BA2 and BA3. The least were agreed on the policy inadequacy which is against the finding of Hasle and Limborg, (2006) who reported that the OHS policy is absent or not adequately formalized in SMEs. The major barriers were identified as the poor monitoring system of safety performance

and inadequate budget allocation. Similar issues have been identified in relevant to the OSHM practices implementation of the manufacturing SMEs within the global context as well as Sri Lankan context (Perry, 2011; Masi & Cagno, 2015; Leg et al. , 2015; Abeysiriwardene, 2016). Other key barriers with a rate of more than 80 percent were found to be production based culture, inadequate information flow within the organization, lack of training and awareness, lack of senior management commitment, inadequate support and influence from other organizational members and inadequate legislation. Lack of training have been also reported as a major barrier globally as well as locally (Unnikrishnan et al., 2015; Abeysiriwardene, 2016). Poor responsibilities, accountabilities and authorities allocation as well as the inadequate policy are less reported to be a barrier for the effective OSHM practices in the relevant industry which may mimic that most of the organizations already have such practices in a significant rate. Lack of availability of evaluation methods, adverse working conditions, lack of technical expertise, lack of relevant technology, lack of opportunities for the employees to involve in safety decisions, poor behaviour of trade unions, inadequate partnerships and supporting parties, employer's negative perception towards safety, informal management structure and low bureaucracy lie within 60 percent and 80 percent.

There were few added barriers which were unplanned work schedule changes due to demand fluctuations, issues arising due to high labour turnover, behavioural issues and employee attitudes, poor leadership and lack of understanding of the top management on the important of OSHM in the long run of the organization.

4.9 Solutions to minimise key barriers

This section will cover the latter part of the final objective of the study which is to discover the solutions for the key barriers and to contribute recommendations to overcome those barriers.

As shown in the figure 4.10, the outcomes of the study indicates that the existing barriers in the relevant industry is significantly high that this may adversely impact on the performance level of OSHM practices within.

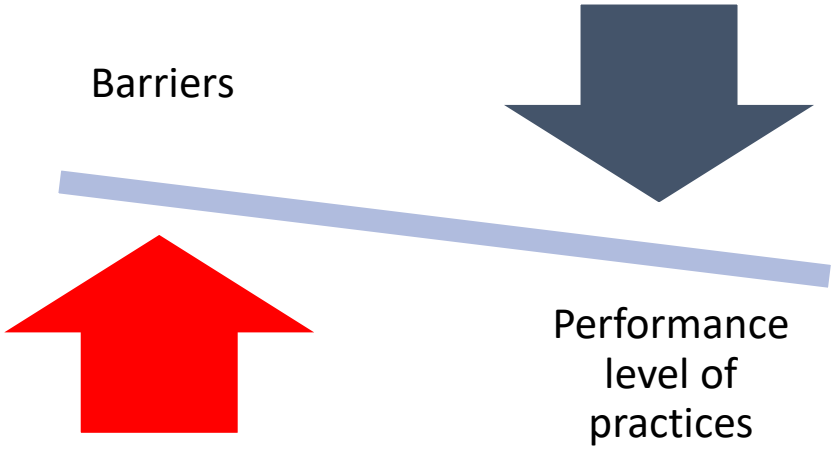


Figure 4.10 Impact of barriers on the performance level of practices

The solutions identified through the expert expertise knowledge were as below.

1. Poor monitoring system of safety performance.

Poor monitoring systems of safety performances have been found to impact on the implementation of OSHM practices in rubber manufacturing SMEs. The experts emphasised the fact that the safety is not highlighted and prioritised in the planning, commissioning and execution of projects and therefore, the safety systems are in a risk of not operating to the extent expected. In order to achieve an adequate safety performance monitoring, they suggest that there should be safety performance indicators.

The proposed safety performance indicators are shown in the table 4.7.

Table 4.7 Proposed Safety Performance Indicators

Proposed performance indicator	Explanation
Accidents reduction rate per month/near missed or hazards reported per month	These specific industries are reported with many incidents, near misses and hazards. Therefore, this is accepted as one of the most generalised and accepted tracking methodology for the OSH performance in the organization.

Number of reported complaints from the general public per year	In the rubber industry, it is common to have odour and dust issues. Small and medium scale industries rarely have relevant extractors and possible control measures due to budget restrictions and therefore, such complaints from the neighbourhood can be tracked in a defined period and used as a performance indicator.
Number of recorded complaints from external authorities/legal bodies per year	E.g. The PHI visits this industrial setting per 6 months and their complaints will be recorded in each visits. These complaints can be reviewed annually and used as a performance indicator.

2. Inadequate budget allocation

Inadequate budget allocations were found to be common barrier in the rubber manufacturing SMEs in Sri Lanka. Financial constraints have been found as a main barrier for the safety management practices in SMEs by Unnikrishnan et al. (2015). Budgeting has been suggested as a major challenge by the experts as these small scale industries run with a small capital along with insufficient investments from outside parties. It is a common fact that the outside investors more tend towards investing in the larger scale industries instead of small and medium scale industries as they are more established and sustainable with a more clear financial statements and higher security for the invested money. The external authorised and supportive bodies for the relevant industry such as Rubber Development Board and Rubber Research Institute should involve in strengthening the specific industries with various investment approaches.

Further, it was emphasised that these industries are more focusing on the production with a profit making need of culture, therefore, a limited or no budget will be allocated

for the safety. Therefore, opportunities need to be created for government and non-government organisations and personnel to invest on the SMEs and the banks need to create different loan schemes for such industries for financially assist them in need. Government bodies can encourage these industries by reducing the tax for raw materials used in such production where the saving can be used in OSH purpose.

The experts suggest that these specific industries can find methodologies to earn money which can be invested within the budgeting cycle. It was proposed to implement the systems to extract the carbon dust and find recycling opportunities to use it as raw materials in order to minimize the raw material cost and consequently go for a cost saving where the saved amount can be used for OSH improvements.

3. Inadequate information flow within the organization

It was commonly agreed that the information flow within these enterprises is not structured and therefore it's inadequate. As per the suggestions of experts, the information flow within an organization should be lied over a wide area, including the different layers of employees within the organizations. The information from the top level needs to be communicated to the bottom level and vice versa. As well, in this communication process, the information should be communicated as it is and should not be deviated from the original message. In order to achieve this, their general idea is it is essential to develop several common communication platforms to cover a range of layers within the organization. The employees and the management should be agreed in a common platform to follow and support on the OSHM practices. Top management safety review meetings, employees management involved safety committees were suggested as such communication platforms.

4. Lack of safety training and awareness

Lack of training and awareness provided on the safety aspects was found to be another major issue in the rubber manufacturing SMEs by considering the expert perspectives. Poor management commitment on the safety and lack of expertise knowledge were suggested as contributory factors. Management is more aware on the production in the purpose of profit earning and therefore, are reluctant to bear an additional cost on

the safety trainings. On the other hand, it takes an additional time, cost and effort to find a trainer with required expertise knowledge, skills and attitude and therefore, it has been a challenge which such organizations face.

The expert perspective is to provide safety oriented- leadership trainings for the management grade employees and develop their knowledge on why safety should be prioritised in the profit making process as well as the production. Further, the management commitment should be improved through individual safety performance monitoring by allocated key performance indicators (KPI). With the lack of expertise knowledge, what the experts are highlighting was that the expertise knowledge need to be developed through related educational programs. In order to achieve this, such educational institutions should be developed and there should be a quality ensuring process for the knowledge whatever shared in those programs. Further, government and non-government related organizations can provide development opportunities for the current experts to participate in the international and national level training programs and knowledge sharing sessions which may conduct by local or international expertise parties.

5. Inadequate support and influence from other organizational members

The fact that was mainly highlighted under this was that the networking between the experts is lacking causing the decline of opportunities to share their knowledge, skills and the attitudes. This has been proposed as a greater disadvantage on such organizations as the improvement opportunities are limited with the restricted information flow from the outside organizations. It was suggested to develop professional associations where the experts in the field can gather and share their area relevant knowledge, skills and the best practices in different organizations. Even the OSH practices in large scale organizations can be applied to the small and medium scale organizations only with few possible modifications under the consultation of those who have already applied the practices and achieve a greater improvement. Further, there are number of larger industries in Sri Lanka in regards with the relevant industry which can provide consultation on the safe technologies to use in SMEs and the financial support with various investments. Larger industries can provide

opportunities for the small and medium organizations to visit their factories and find the benchmarking OSH practices within the larger organizations.

Moreover, the government can organize workshops and conferences for the relevant industrial community to bring them to a common platform and provide solutions for industry-specific matters. Universities can arrange several research symposiums focusing on the rubber development opportunities and activities where the relevant workforce can attend and adapt those practices in order to upgrade their technologies to a more safer end.

6. Inadequate legislation

The safety related legal enforcements are majorly done by the Department of Labour in Sri Lanka. But as per the perspectives of the experts, this enforcement is not adequate and since the SMEs are more tend to rely on that, they do not pay much attention on the OSH practices within their organizations. The factory inspection is not been conducted adequately, especially when it comes to SMEs. Even the accident reporting process is also not systematic and happening as required in the law as the SMEs are less aware on the relevant legislations of the safety. Therefore, it was suggested that the legislations need to be developed focusing on a more systematic and specific enforcement for the specific industrial scale and should be ensured that the organizations are complied with requirements of the legislation.

In addition, there are only 23 district factory inspecting engineers in the country at the moment as per reliable information sources emphasising the fact that it is not adequate number when compared to the organizations available in the country. With the inadequacy of relevant authorised people, it was proposed to hand over the inspecting process to the labour officers as well who are already available and can propose as adequate in amount for the relevant function after developing their competencies.

4.10 Chapter Summery

This chapter included the outcomes of data analysis process and that was mainly consisted of reliability testing, validity testing, descriptive analysis and importance

performance analysis via the importance performance matrix. Through the reliability and validity testing, it was verified whether the measuring tools are acceptable for the process of data analysis. Further, the data were analysed using SPSS software (Version 21). The findings would be also discussed in this chapter and all statistical outputs would be described and interpreted in this chapter. The conclusions, recommendations, implications to theory and practice and further research areas will be included in the next chapter.

CHAPTER 5

CONCLUSIONS, RECOMMENDATIONS AND FURTHER RESEARCH AREAS

5.1 Introduction

The aim of this study was to investigate the current OSHM practices, related barriers and solutions to overcome key OSH barriers in rubber manufacturing SMEs in Sri Lanka. Re-visiting the objectives, the study reviewed current OSHM practices in manufacturing industry considering the global context, identified the key barriers for the effective implementation of OHSM practices manufacturing industry considering the global context, described current OSHM practices in the relevant industry, explained the key barriers for the effective implementation of OHSM practices in the relevant industry in Sri Lanka and discovered solutions to minimise the impact of the key barriers and to improve the effective implementation of OHSM practices in the relevant industry in Sri Lanka. Initially, an study framework was prepared to achieve this and upon that study framework, the study was developed to achieve the overall objectives.

This chapter is mainly consisted of the conclusions which were derived from the data analysis results in regards with the aim and objectives of this study. In addition, it will also include the recommendations to uplift the OSHM practices within the relevant industrial sector, the limitations of the study and further research areas.

5.2 Conclusions

The outcomes of this study revealed the OSHM practices currently practicing within the rubber manufacturing industry and it discussed the performance level of those practices as well as the importance level (expected level of performance) as indicated by the expert perspectives. In addition, the study results found the existing barriers in the relevant industry and the solutions for the key barriers as proposed by the experts in the field.

It was revealed that the organizations which are more matured in the business have high average performance level. This can be resulted from the effect of being matured and more stable in the market and therefore, perceiving the ability to adapt with the emerging needs of OSH practices when organizations become more established. Further, the results revealed that the organizations focusing on the export market are having a higher average performance level. The reasons behind can be the impact of the organization's customers and clients as well as the other regulatory requirements.

As per the expert perspectives, majority of the practices which were listed as the effective elements of the OSHMS were reported to be higher in importance (higher expected level), but not performed in the same extent within the organizations. Each practice need to be focused separately when prioritizing the areas to be more focused to improve the effective implementation of OSHM practices in the relevant industry. Further, the findings of this study reveals that more focus and improvement efforts should be concentrated on the practices; OSHM manuals and procedures are formulated and followed, OSH aspects are considered in the process designs and layout designs, a system is established and followed for hazardous waste management and OSH aspects are considered in the change management system.

The author identified major barriers for the effective implementation of OSHMS which were the poor monitoring system of safety performance, inadequate budget allocation, production based culture, inadequate information flow within the organization, lack of training and awareness, lack of senior management commitment, inadequate support and influence from other organizational members and inadequate legislation. Lastly, it was proposed to define safety performance indicators specific for the organization, create opportunities for the government and non-government organizations and personnel to invest in the relevant SMEs, create different loan schemes for the specific industrial scale by the banks, develop common communication platforms to ensure the proper information flow within the organization, provide safety oriented leadership programs, set individual KPIs for management staff, provide opportunities to develop expert expertise through establishing quality educational programs and institutions and trainings from local and

international parties, establish professional associations to improve networking opportunities, motivate larger companies assist with safe technologies and consultations and strengthen the legal enforcement on OSH implementation.

5.3 Implications

The current study contributes to the rubber manufacturing SMEs by determining the essential OSHMS practices signifying their performance level and importance level as well as the related barriers and proposing the solutions to overcome the key barriers identified. Especially, the importance levels of each practices that have been introduced by this study can be used as a guideline for the factories in the similar scale to measure their own status of performance levels. The existing industries in the rubber manufacturing industries in the relevant scale can adopt those practices, mainly the practices that needs more concentration within their organizations and in the process of adopting, they can also focus on minimising the relevant barriers through demonstrating the proposed actions by the experts. For such industries, these findings are beneficial in the process of determining their annual/yearly objectives for the organizations as well as relevant departments. The improvement activities derived from the proposed solutions can be incorporated to such objectives in order to improve the effective implementation of OSHMS practices within their organization. Those who are responsible for the policy making or policy development can identify own week areas relevant to the policy making and development and can adopt these findings to implement the improvement activities as suggested by this research. Moreover, the external regulatory bodies and policy makers can use these results to develop the existing laws, regulations and relevant policies to improve the OSH practices within the rubber manufacturing SMEs.

5.4 Recommendations

The author will provide the recommendations based on the conclusion of this study which was conducted to investigate the current occupational safety and health management practices, especially areas that require more focus, areas where the focus need to be reduced and related barriers in rubber manufacturing SMEs in Sri Lanka in

order to improve the effective OSHM practices within that industrial scale. This study itself marks the evidence to signify that most of the OSHM practices which are accepted to be important for such industries, yet found to be lacking in the performance. The author states that it is essential to initiate and carry on these practices in the expected level within the relevant industries, otherwise the safety and health of the employees who are been employed within them are at a risk as well as the sustainability of the organization. The author further researches on the barriers that keep minimising the effective implementation of OSHM practices within the same industrial settings, as these barriers may mimic why such practices are not performed effectively. This will lead the relevant organization bodies to discover the week areas that they own in OSHMS and will provide them an opportunities to look forward for the implementation of the improvement activities to overcome the identified or prioritised barriers. The author provides a platform to deal with, in order to overcome the key barriers that have been identified in this study with the expert solutions. Therefore, the author states such organizations should follow these solutions and attributed suggestions to overcome the key barriers that are significantly existing in these industries and improve the OSHM practices within their organizations. Ultimately, this may clear the path for the effective implementation of OSHM practices within the relevant industry.

5.5 Limitations and Further Research

This current study was conducted only among the rubber manufacturing SMEs located in Western Province of Sri Lanka and the final sample was limited to only 40 experts who were representing 40 different organizations due to the time constraints and cost constraints. Therefore, the current study findings are unlikely to generalise to the other organisations outside the Western Province. This research can be extended considering whole Sri Lankan context including the representation of each rubber manufacturing SME in Sri Lanka which may provide a more generalised idea. Further, the study population in the current study was restricted to SMEs in the rubber manufacturing industry. More studies can be conducted among the other industries in similar scales to get a clear view on the barriers inherited to the industrial type. Moreover, the study

can be incorporated to the larger scale organizations as well to identify the extent in which the practices and their performances levels are derived from the small scale industries.

The practice elements were identified through a framework which was designed base on the OHSAS Management system framework in the current study. But ISO 4500:2018 Management system of occupation health and safety has been introduced in March 2018 with leadership element embedded which was not adapted for this study. It can be identified as a limitation where a future study can be conducted based on the new management system standard.

The solutions were taken by the suggestions of limited number of experts through the personal interviews and the other disadvantage was due to time constraints on their schedules it was not possible to get the expert perspective on each barrier identified with an adverse impact. It would be better if total population sample could be participated in this part of the study as well for a more proven solutions and it would be beneficial if solution could be found for each barrier reported. Further, the author used only the survey method for the collection of data to determine the performance and importance levels of the practices. It would be better if the same method can be used in combination with observations and relevant documentary review for more generalised results. However, there can be potential obstacles in getting access to such documents as the majority of the industrial documents are allowed to be accessed by only authorised parties or officials. In addition, only the expert perspectives were assessed in this study as their expert knowledge and expertise could provide the essential of the required information, yet a secondary opinion could be obtained from the other management level employees and the shop floor level employees to get a more broader view of the problem.

5.6 Chapter Summary

Conclusions, recommendations, implications, limitations and further research were included in this chapter. The chapter provides conclusions on how to implement OSHM practices effectively in rubber manufacturing SMEs through different practices

identified as essential, related barriers and overcoming solutions. The author summarises the research findings and provide recommendations, as well brings an overview of the limitations that may embedded within the study along with the future research directions.

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APPENDICES

Appendix A: Questionnaire

RESEARCH QUESTIONNAIRE

OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT IN SMALL AND MEDIUM SCALE RUBBER MANUFACTURING ENTERPRISES IN SRI LANKA

Dear Sir/Madam,

I am a postgraduate student of Department of Building Economics, University of Moratuwa, engaged in a research which is titled "Occupational safety and health management in small and medium scale rubber manufacturing enterprises in Sri Lanka" as a partial fulfilment of the Master of Occupational Safety and Health Management degree program.

I would appreciate if you could spare 15 minutes of your precious time to fill this questionnaire. Information contained in this questionnaire will be used merely for academic purpose. No information will be shared and the confidentiality of the collected data will be protected.

Thank you

K. Piumi Ayeshika Perera

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OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT IN SMALL AND MEDIUM SCALE RUBBER MANUFACTURING ENTERPRISES IN SRI LANKA

Please fill the blanks appropriately. This section will require the general information of the study participant and the organization.

Section I

This part will require the general information of the participant for the research survey.

1. Name
   (Optional):_____
2. Gender : Male/Female
3. Age : _____
4. Years of experience (OSH related):
   - ☐ 1-5 Years
   - ☐ 5-10 Years
   - ☐ >10 Years
5. Designation: _____
6. Contact Number:
   _____
7. E-mail address:
   _____
8. Name of the organization (Optional):
   _____
9. Type of Market :
   - ☐ Local market
   - ☐ Export
10. Organizational Age:
    - ☐ 1-5 years
    - ☐ 5-10 Years
    - ☐ >10 Years

Section II

This section will require the information regarding current safety practices in your organization. Please indicate the most appropriate answer for the each element in the table.

1 – Not at all 2 – To a small extent 3- To some extent 4-To a moderate extent

5-To a large extent

			Not at all	To a small extent	To some extent	To a moderate extent	To a large extent
1	**Initiation**						
1.1	Regulatory compliance and system conformance is followed by the OSHM system.	Importance					
		Current performance level					
1.2	Responsibilities, accountabilities and authorities are allocated in the OSHM system.	Importance					
		Current performance level					
2	**Formulation**						
2.1	The organization has an OSH policy .	Importance					
		Current performance level					
2.2	The goals and objectives of the organizational	Importance					

	OSHM system are pre-defined.	Current performance level					
2.3	The safety performance measures are pre-defined.	Importance					
		Current performance level					
2.4	Baseline evaluation is conducted when forming the goals and objectives of OSHM system.	Importance					
		Current performance level					
2.5	Risk Assessments are conducted.	Importance					
		Current performance level					
2.6	OSHM manuals and procedure are formulated.	Importance					
		Current performance level					
3	**Implementation**						
3.1	Training requirements of the employees are fulfilled.	Importance					
		Current performance level					
3.2	Process design and layout design is compatible with the safety requirements arise.	Importance					
		Current performance level					

3.3	There is an emergency preparedness and response system.	Importance					
		Current performance level					
3.4	There is a hazardous waste management system.	Importance					
		Current performance level					
3.5	Preventive and corrective actions are taken for the identified risks.	Importance					
		Current performance level					
3.6	Level of Safety Management of the suppliers are assessed when choosing them .	Importance					
		Current performance level					
3.7	Contractor safety management system has been established.	Importance					
		Current performance level					
3.8	Documentation mechanism and record system has been established and communicated.	Importance					
		Current performance level					
3.9	Hazard/ incident reporting system is implemented and well communicated.	Importance					
		Current performance level					
4	**Evaluation**						
4.1	OSH audits and self-inspection is	Importance					
		Current performance level					

	done periodically.						
4.2	Incident investigation and root cause analysis are done.	Importance					
		Current performance level					
4.3	Medical programmes and surveillance are conducted periodically.	Importance					
		Current performance level					
5	**Improvement**						
5.1	Safety is part of management review meetings.	Importance					
		Current performance level					
5.2	Risks are assessed with change management system and necessary control measures are taken.	Importance					
		Current performance level					
5.3	Gaps identified through the audits and inspections are addressed and necessary actions are taken to bridge the gap.	Importance					
		Current performance level					

Please mention other safety practices in your organization if there is any.

_____
_____
_____
_____

Section III

This section will require the information regarding safety barriers in your organization. Please indicate the most appropriate answer for the each element in the table.

	Barriers	Yes	No
1	Inadequate legislation		
2	Poor allocation of responsibilities, accountabilities and authorities		
3	Inadequacy of OSH policy		
4	Inadequate support and influence from other organizational members		
5	Inadequate budget allocation		
6	Lack of technical expertise and qualified people		
7	Lack of relevant technology		
8	Low bureaucracy		
9	Informal management structure		
10	Adverse working conditions		
11	Lack of senior management commitment		
12	Employer's negative perception towards safety		
13	Inadequate information flow within the organization		
14	Lack of evaluation methods (Review meetings/Audits)		
15	Poor behaviour of trade unions, inadequate partnerships and supporting parties		
16	Lack of training and awareness		
17	Production based culture		
18	Lack of opportunities for the employees to involve in safety decisions		
19	Poor monitoring system of safety performances		

Please mention other safety barriers in your organization if there is any.

_____

_____

_____

_____

Thank you very much for your corporation.

Appendix B: Interview Guideline

OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT IN SMALL AND MEDIUM SCALE RUBBER MANUFACTURING ENTERPRISES IN SRI LANKA

Personal Interview Guideline

Introduction

I am Piumi Perera, thanks for giving your valuable time for me today. This will take around 30 minutes. My research is about effective implementation of occupational safety and health management in small and medium scale rubber manufacturing enterprises in Sri Lanka and this interview is a part of the data collection where I will be collecting data on the solutions for identified key barriers through the initial part of my data collection. This discussion will be highly confidential and your identity will not be revealed publicly. Kindly give your true perceptions on the identified elements and to get this feedback you will be running through few questions. You will be recorded, but these details will not be distributed.

Basic details of Interviewee

Name :

Designation :

Organization :

Work Experience in the field :

Educational background : Certificate Level/Degree/Postgraduate

Date & Time :

Questions

1. Do you think having poor monitoring systems of safety performance restricts the OSHMS performances in this specific industrial scale?

   If so, what are your suggestions for overcoming this barrier?

2. Do you think inadequately allocated budget restricts the OSHMS performances in this specific industrial scale?

   If so, what are your suggestions for overcoming this barrier?

3. Do you think having an inadequate information flow within the organization restricts the OSHMS performances in this specific industrial scale?

   If so, what are your suggestions for overcoming this barrier?

4. Do you think inadequate safety training and awareness provision restricts the OSHMS performances in this specific industrial scale?

   If so, what are your suggestions for overcoming this barrier?

5. Do you think having an inadequate support and influence from other organizational members restricts the OSHMS performances in this specific industrial scale?

   If so, what are your suggestions for overcoming this barrier?

6. Do you think having inadequate legislation restricts the OSHMS performances in this specific industrial scale?

   If so, what are your suggestions for overcoming this barrier?