THE INFLUENCE OF WORK PRESSURE, SAFETY CLIMATE AND SAFETY PARTICIPATION IN DETERMINING SAFETY BEHAVIOUR AMONG LOCAL AND FOREIGN WORKERS IN A MALAYSIAN STEEL INDUSTRY

By

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ABSTRACT

This study was conducted to determine the factors which influence safety behaviour among workers at a Malaysian steel industry. The significance of this study is explained by the fact that the country is experiencing a surge in foreign workers which could detrimentally affect the overall safety behaviour of employees. A total of 160 questionnaires' were distributed to the workers in a metal stamping industry. The questionnaire encompasses 3 independent variables of safety climate, safety participation, perceived work pressure and a dependent variable which is represented by safety behaviour. Results from this research shows that safety behaviour is positively correlated with safety participation and safety climate, and negatively correlated with work pressure. Workers who are working in morning shifts have been found to possess better safety participation, an increase in perceived work pressure, a better perception of safety climate and safety behaviour. Comparison between the Malaysian work force and foreign workers showed that Malaysian workers possess better safety behaviour, an elevated perceived safety climate and good safety participation compared to their foreign counterparts. In addition, workers with an education level below primary school lack safety participation. In another note, better safety participation was reported among employees with higher academic qualifications. Multiple regression analyses were performed to predict the safety behaviour of workers with respect to safety climate, safety participation and perceived work pressure. The results of the regression analyses suggest that safety climate and safety participation were more predictive and accounted for more unique variance in the safety behaviour variables than perceived safety pressure. Future researches are worth extended to include high risk metal and steel industry

Key words: Safety behaviour, safety participation, safety climate, perceived work pressure

ABSTRAK

Kajian ini dijalankan bagi menentukan faktor - faktor yang mempengaruhi tingkah laku keselamatan dalam kalangan pekerja-pekerja di salah sebuah industri besi dan keluli di Malaysia. Sumber kajian menunjukkan bahawa negara sedang dibanjiri pekerja asing yang boleh menjejaskan tingkah laku keselamatan pekerja secara keseluruhannya. Sebanyak 160 borang soal selidik telah diedarkan kepada pekerja-pekerja di kilang tersebut. Senarai soalan tersebut merangkumi tiga pembolehubah tidak bersandar dan satu pembolehubah bersandar. Pembolehubah tidak bersandar ialah iklim keselamatan, penyertaan keselamatan dan tanggapan tekanan kerja manakala pembolehubah bersandar ialah tingkah laku keselamatan. Hasil daripada kajian ini menunjukkan bahawa tingkah laku keselamatan secara positifnya berkait rapat dengan penyertaan keselamatan dan iklim keselamatan, serta berhubung kait secara negatif dengan tanggapan tekanan kerja. Pekerja yang bekerja dalam syif pagi pula didapati mempunyai penyertaan keselamatan yang lebih baik serta menunjukkan peningkatan dalam tanggapan tekanan kerja. Sehubungan itu, golongan pekerja ini juga mempunyai persepsi yang lebih baik dari segi iklim keselamatan dan tingkah laku keselamatan. Pekerja-pekerja Malaysia didapati mempunyai tahap tingkah laku keselamatan, iklim keselamatan dan penyertaan keselamatan yang lebih tinggi berbanding pekerja-pekerja asing. Di samping itu, kajian ini juga menunjukkan bahawa pekerja-pekerja yang berkelulusan di peringkat sekolah rendah mempunyai penyertaan keselamatan yang rendah. Dalam perkembangan yang lain, penyertaan keselamatan yang lebih baik telah dilaporkan dalam kalangan pekerja yang memiliki kelayakan akademik yang lebih tinggi. Analisa regresi berganda menunjukkan terdapat hubungkait antara pembolehubah tidak bersandar iaitu iklim keselamatan, penyertaan keselamatan dengan pembolehubah bersandar iaitu tingkah laku keselamatan. Walaubagaimanapun, analisa regresi berganda menunjukkan terdapat hubungkait yang lemah antara tingkah laku keselamatan dengan tanggapan tekanan kerja. Kajian seumpama ini disyorkan dalam industri besi dan keluli berisiko tinggi pada masa akan datang.

Kata kunci: Tingkah laku keselamatan, penyertaan keselamatan, iklim keselamatan, tanggapan tekanan kerja.

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LIST OF ABBREVIATIONS

TESB	Topaz Evergreen Sdn. Bhd.
OSHA	Occupational Safety and Health Act
BBS	Behaviour Based Safety

CHAPTER 1

INTRODUCTION

1.0 Background of the Study

Minimizing overhead costs via providing a safe and health workplace is one of the most effective strategies for reducing business operating costs. While most of the occupational safety behaviour indicators had used workplace injuries as an indicator of safety failures, researchers had investigated more proximal and positive safety-related outcomes, such as the safety related behaviours that precede and may prevent workplace injuries (Turner, Stride, Carter, McCaughey, & Carroll, 2012).

Accidents frequencies and property losses create great impact to industry. The impacts from accidents and incidents culminate in operational delays and also directly and indirectly incur cost. Therefore, it is mandatory for industries to provide a safe working environment for their workers and subcontractors and ensure safety behaviour of the employees is controlled effectively via elevating their level of participation (Walker, 2010)

Steel industry has been regarded as hazardous in nature due to its decentralization augmented by mobility and prevalence of hazards (Brown, Willis, & Prussia, 2000). Safety climate in steel industries has been recorded as lower compared to other industries (Smith, Huang, Ho, & Chen, 2006).

Safe work practices were compromised in industries which emphasizes on short lead time manufacturing, thus elevating workers work pressure resulting in an increase in accidents and incidents (Das, Pagell, Behm, & Veltri, 2008). Hence, Das et al. (2008) had emphasized on the significance of sustaining an equilibrium between quality and delivery because over indulgence in either one of these elements would defeat the purpose of instilling safe work behaviour among workforce. The importance of apprehending unsafe work behaviour of workers were also highlighted by Wirth & Sigurdsson (2008).

Hence, it is imperative to sustain a crucial balance between production pressure and safety behaviour. The importance of improving safety behaviour of workers is important because most of the industries work in two rotating morning and night shifts. This element becomes crucial when industry is faced with low safety behaviour and safety participation among workers during the night shifts due to the absence of management (Jiang, Yu, Li, & Li, 2010). It remains management's responsibility to ensure that work place remains safe and workers obey the safety rules and regulations via displaying good safety behaviour. Minor accidents can interfere with production in a variety of ways, and a serious accident can shut down an entire operation.

Whilst there are many antecedents to unsafe work behaviour which results in accidents and incidents, the detrimental effects of safety culture which causes a decline in safety behaviour , thus reducing their safety participation could not be denied (DePasquale & Geller, 1999; Zhou, Fang, & Wang, 2008). The first step in increasing employee involvement for safety is hiring conscientious employees who care about safety.

Optimizing safety culture requires active employee participation in safety endeavours created at a work place (Gravel, Rheaume, & Legendre, 2011). Hence, it is imperative that employees provide each other corrective feedback when unsafe behaviour is identified, especially since safety shortcuts are often human nature and because management aren't always around especially during the night shifts. This corrective feedback also sets the norm that safe behaviour is expected. Organizations with a weaker safety climate often had problems whereby, safety shortcuts become the norm which gets passed down from generation to generation (Zohar, 2010). To counter this, specific safety efforts should target safety culture improvement and hourly employees should be heavily involved in these efforts (Gravel et al., 2011).

This helps increase personal responsibility and employee buy-in for safety .This logic has prompted the choosing of safety participation, safety climate and work pressure as antecedents which could be counteracted in a much faster ways as pointed out by Nohammer, Schusterschitz, & Stummer (2010).

In order to better understand occupational safety and health and to investigate strategies for improving the effectiveness of industrial interventions for increasing safety-related behaviors, several authors has highlighted the importance of focusing in antecedents of accidents and incidents such as perceived work pressure, safety participation and safety climate rather than other antecedents of accidents and incidents (Ford & Tetrick, 2011; Lu & Yang, 2011; Seo, 2005; Zohar, 2010).

Improving safety behaviour of the employees would reduce risk and safety climate of the workplace (Mc Lain & Jarrel, 2007). The impetus behind safety climate research such as Zohar (2010) had clearly proven that improving safety of the work environment and sustaining an ambience of good safety climate would result in workers working safely even though there are subjected to an increase in work pressure due to production expediency.

Work pressure has become a norm in industries which are fast facing shortage of man power with employment of workers from different background, work culture and academic levels which raises concern in expediting the instilment of safe work behaviour among workers (Seo, 2005). Industrial sectors often focus in improving production efficiency via reducing the workers and improving the cycle time which increases production work pressure (Keren, Mills, Freeman, & Shelley, 2009). However this negative effect could be reversed when the safety climate of the organization is improved which would result in an increase in safety participation among employees (Jeremy, Bergman, & Payne, 2010; Neal, Griffin, & Hart, 2000).

Human behaviour plays a major role in every safety-related process as pointed by Hale, Guldenmund, Van Loenhout, & Oh (2010) who had suggested that human factor interventions such as improving safety behaviour would yield better results compared to other forms of intervention programs.

Safety behaviour analysis has made substantial contributions to the field of occupational safety by documenting the determinants of at-risk behaviors, directing the development

of effective behavior change interventions and applying these interventions in a variety of domains (Geller, 2001; Kapp, 2012; Khader, 2004; Luria & Morag, 2012). Within this context Khader (2004) highlighted the pertinence of understanding the cultural safety behaviour of workers because this will determine the level of safety participation and safe acts of workers.

The importance of elevating safety behaviour as one of the essential interventions of unsafe work behaviour and unsafe act has resulted in the strong application of applied behaviour analysis principles (Ajzen, 1991; Geller, 2001; Khader, 2004; Krause, Seymour, & Sloat, Mullen, 2004; Neal et al., 2000; Seo, 2005).

Employee involvement for safety can be increased through behavioural safety efforts (DePasquale & Geller, 1999). Also, organizations are increasingly focusing on safety behaviours to reduce injuries. In fact, most injuries are due, in part, to at-risk behaviours (Williams & Geller, 2000). In order to reduce injuries, it's paramount to ascertain the antecedents of unsafe work behaviour which could be easily intervened (Luria, Zohar, & Erev, 2008).

Behaviour-Based Safety (BBS) can be an excellent process to increase employee participation for safety (Williams & Geller, 2000). BBS encourages peers to provide safety feedback to one another. By observing safety related behaviours, employees point out risky behaviours that may lead to injury. Management and employees in an organization needs to develop interventions which would reduce the unsafe work behaviour and improve safety participation (Ford & Tetrick, 2011; Kapp, 2012). The

creation of a safe working environment via improving the safety climate facilitates this achievement. Management's roles in keeping a balance between work pressure and production outputs would augur well as a faster intervention in enhancing safety behaviour of the workers. Hence production demand should not supersede safety behaviour (Choudhry & Fang, 2008). Workers should not perceive that working safely would deter their performance in completing their tasks efficiently (McGonagle & Kath, 2010). The challenge to sustain high productivity and safety behaviour of employees simultaneously remains paramount to the manufacturing industry (Mitropoulos, & Cupido, 2009).

In essence, most organizations are developing methods to increase employee engagement for safety. This study addressed key issues to accomplish this goal, via improving safety climate, sustaining a balance between production expediency and encouraging safety participation. In particular, emphasis was placed on specific considerations for implementing and optimizing BBS. The concept of safety management by walking about was conceived from this concept.

1.1 Problem Statement

Workplace accidents, injuries, and illnesses continue to be a significant problem in industries today (Hamalainen, Takala, & Saarela, 2012). Industrial safety remains a major concern for operations' managers with minor accidents interfering with production in various ways. An incident of serious accident can shut down an entire operation. In this connection, determining antecedents of workplace accidents are crucial. Whilst there are other antecedents which causes workers to indulge in unsafe

acts and displaying of unsafe behaviour, improvement of safety climate has remained as a novel intervention owing to the fact that improved safety climate would result in a positive safety behaviour and improve workers safety participation at their work place (Zohar, 2010).

Even though there is an interesting notion that employees' unsafe acts are the primary causes of workplace accidents, numerous authors had suggestive perspectives that highlights influences from operating and social systems (Brown, Willis, & Prussia, 2000; DeArmond, Smith, Wilson, Chen, & Cigularov, 2011; DePasquale, & Geller, 1999; Guldenmund, Cleal, & Mearns, 2012; Hamalainen, Takala, & Saarela, 2012; Shang, & Lu, 2009).

Safety climate in steel industries remains much lower compared to other industries as pointed by Smith, Huang, Ho, & Chen (2006). In addition, vitality and lacks of resilience in economic conditions might keep individuals in the workplace who successfully perform their jobs but do not conform to the prevailing perceptions of safety climate as suggested by Jeremy, Bergman, & Payne (2010).

Table 1.1

Occupational accidents by sector from 2008 to 2011

Sector	2008			2009			2010			2011		
	NPD	PD	D	NPD	PD	D	NPD	PD	D	NPD	PD	D
Public services	3	2	2	0	0	1	40	2	3	30	1	1
Financial, insurance, real estate and business centres	2	1	4	0	0	1	30	1	1	18	0	5
Hotels and restaurants	13	1	1	1	18	0	0	0	0	1	0	0
Wholesale and retail trade	2	0	0	0	0		0	0	0	1	0	0
Trsnaport , storage and communication	18	1	8	18	0	8	16	1	14	17	5	3
Utilities	82	32	19	85	3	18	34	3	11	26	1	2
Agriculture, forestry, logging and fishing	365	7	42	363	8	40	467	38	30	200	7	37
Construction	55	2	72	34	6	62	50	4	66	23	2	24
Mining and quarrying	4	0	6	2	3	2	2	1	1	7	0	2
Manufacturing	1565	134	76	1186	79	53	1493	162	59	808	78	27

NPD : Non permanent disability PD : Permanent disability D : Death

Source : News Straits Times , 23rd February 2012

Whilst the statistics in Table 1.1 depicted a decline in the number of accidents recorded in 2011 shows a reducing trend i.e. 27 deaths compared to 59 deaths in 2010 and 79 deaths in 2009, the fluctuating trend since the last three years remains a puzzle. A significant reduction in permanent disability and death could not be deduced from this statistic. In this connection, statistics of occupational accidents involving high risk industries has continuously escalated over the past years and accounts to approximately 264 million accidents annually worldwide (Hamalaienan et al., 2012).

While most of the occupational safety behaviour indicators had used workplace injuries as an indicator of safety failures, researchers had investigated more proximal and positive safety-related outcomes, such as the safety related behaviours that precede and may prevent workplace injuries (Turner, Stride, Carter, McCaughey, & Carroll, 2012).

Walker (2010) had even considered safety climates as a superficial and comprehensible version of a safety culture which elevates conducive behaviour of the workers towards safety.

Apart from that strategic safety management must therefore concentrate on reduction of unsafe behaviours, and be aware of the responsibilities of the management as factors that influence their effectiveness in safety participation. The integration of safety climate in a workplace design that promotes and improve safety outcomes by influencing organization members' safety behaviour has been highlighted as a pertinent factor which should be investigated and improved by numerous researchers (Luria, Zohar, & Erev, 2008).

Production process that yield high productivity while sustaining high safety at the same time and by which production and teamwork practices affect the likelihood of accidents has been proven to be related to safety. In addressing the importance of this element, controlling the production pressures is an important consideration for both productivity and safety as highlighted by Gravel, Rheaume, & Legendre (2011).

Industrial accidents and incidents at factories have been increasing as depicted in Table 1.1. The table reflects that manufacturing sector has one of the highest numbers of accidents and incidents which could be related to the shortage of manpower and sourcing of workers from developing countries. An acute shortage of manpower in Malaysian industries had resulted in the influx of foreign workers at Malaysian industries. Volatility of the job market and high turnover rates at workplace has resulted

in the hiring of temporary workers and part time workers in Malaysia as reported in PTI (2011). TESB had been sourcing workers from developing Asian countries such as Indonesia, Nepal, Vietnam and Myanmar.

Safety culture is known to be lacking in developing countries, where production expediency and cost consciousness often overriding safety. This notion is further supported by the researches done by Geller (2001); Khader (2004); Luria et al.(2010); Fang, Chen, & Wong (2006) who found that safety behaviour is a factor influenced by the work culture, which workers become accustomed during their tenure of employment.

Thus, one of the primary focus of this study is the understanding of factors which could improve safety climate of the organization because employing workers from developing countries could not be averted, however safety behaviour intervention via the improvement of their safety participation, improved safety climate are more feasible compared to other methods (Brown et al., 2000). This is because the majority of workforces originating from developing countries often demonstrate poor safety behaviours (Brown et al., 2000; Fang et al., 2006; Fugas et al., 2012; Neal, Griffin, & Hart, 2000; Seo, 2005). Thus the element of safety participation has remained as one of the primary focus of this study because it reflects the degree of workers concerns on their own safety and safety of their co-workers (Brown et al., 2000; Khader, 2004).

However, antecedents of unsafe work behaviour are not solely limited to work culture. It has been found that the absence of management and supervision during night shifts had emerged as one of the major contributing factor towards unsafe acts and unsafe work

behaviour amongst workers (Huang, Chen, DeArmond, Cigularov, & Chen, 2007). TESB' manufacturing operates in two 12 hours rotating shifts owing to the acute shortage of manpower. This had subsequently increased production expediency, thus jeopardizing safety concerns. It is suspected that promptness in delivery of finished goods to the customers remains a priority which causes work expediency, thus affecting overall safety climate of TESB, reduce safety participation among workers and cause a decline in safety behaviour among workers.

Manufacturing precision and high quality products which are consistent in Quality has remained paramount to TESB as a fulfilment of customers' requirements. Esteemed customers such as Samsung, APM, Panasonic and Sony had imposed high quality standards, which had eventually exerted pressure on the management and the workers. TESB was selected for this study due to the fact that this organization is not an OHSAS certified organization. This notion was also shared by Muniz et al. (2012) who suggested that workers in organizations which are certified to a safety management system are able to cope with extreme work pressure without jeopardizing safety and health in comparison to organizations' which are yet to adopt the safety and health management system.

Adherence to labour laws, perceived safety climate of an organization, safety participation among workers and perceived work pressure has been believed to be an antecedent which influences safe work behaviour amongst employees. However, the interactions and interconnections of all these elements in reducing hazards have not been given much emphasis in steel industries (Brown et al., 2000). Hence it is vital to study

these factors and it's interactions among workers in a steel industry such as Topaz. This is important due to the fact that unsafe acts and behaviours are controlled by human cognitive elements, which could be improved (Geller, 2001; Lu & Yang, 2011; Lu & Shang, 2005).

1.2 Company Information

This study was conducted at Topaz Evergreen Sdn. Bhd (TESB), which specializes in the manufacturing of metal stamping parts that caters for the electronics and automotive industries. The double storey manufacturing plant with the state of the art robotic metal stamping production lines is located at Lot 1843, Jalan KPB 8, Balakong Industrial Estate, Bukit Belimbing, Seri Kembangan 43300. The products manufactured at Topaz Evergreen ranges from metal parts of various grades such as electro-galvanized steel, stainless steel, spring steel, aluminium, tinplate and brass.

TESB is an organization certified to ISO 9001:2008 quality management system and ISO 14001:2004 environmental management system. However, the adoption of a safety management system such as OHSAS 18001 is yet to be conceived. Nevertheless, the management is committed to comply with the occupational, safety and health legislation, which are governed by Malaysian law. Ample opportunities had been provided for the employees to participate and communicate their safety and health predicaments to the management in line with requirements of section 15 of the OSHA Act, 1994. This project was initiated by the concerns expressed by the managing director with regards to the protection of safety and health of his employees.

Despite the endeavours to embark on this research project, there were several obstacles and predicaments, which are associated with instilling safety consciousness among TESB workers, were encountered. The dependency and surge in foreign workers at TESB who outnumbered Malaysian workers by more than fifty percent had raised concerns on the prevalence of unsafe acts and unsafe work behaviours among workers. Emulation of foreign workers unsafe work behaviour by their local counterparts would be a concern that should be reckoned.

The sole dependence on establishment and provision of safety standard may not always reciprocate in reduced accidents, incidents and unsafe work behaviours as pointed out by researcher (Fugas, Silva, & Melia, 2012; Hayes, 2012; Luria & Yagil, 2010; Luria & Morag, 2012; Luria, Zohar, & Erev, 2008; Muniz, Montes-Peon, & Vazques-Ordas, 2012). In this connection, the adoption of stringent safe working policies aimed at creating a safe working environment will not reciprocate in reduced accidents and incidents.

TESB production department operates a two cycle manufacturing system with work performed 24 hours (from 8 am to 8 pm and vice versa). The indirect departments (human resources, planning, quality assurance and management) work from 9 am until 6 pm., thus there are no management staffs present during the night shifts to supervise and monitor workers. There are a total of 73 local workers and 82 foreigners employed by TESB.

1.3 Research Questions

The pertinent questions which are explored in this research are as follows :

1.3.1 How does safety participation, perceived work pressure, safety climate relates to safety behaviour ?

1.3.2 Are there differences in safety behaviour among workers working in morning and night shifts ?

1.3.3 Are there differences in safety behaviour among Malaysian and foreign workers ?

1.3.4 Are there differences in safety climate among Malaysian and foreign workers ?

1.3.5Are there differences in perceived work pressure between workers from morning and night shifts ?

1.3.6 Are there differences in safety climate between Malaysian and foreign workers ?

1.3.7 Are there differences in safety participation between workers from morning and night shifts ?

1.3.8 Are there differences in safety participation among workers of different academic levels ?

1.3.9 Are there differences in safety participation among Malaysian and foreign workers ?

1.3.10 Does safety climate, safety participation and perceived work pressure influence safety behaviour of the workers ?

1.4 Research Objectives

Objectives of this research are distinctly divided into general objectives and specific objective, which are elaborated as follows:

1.4.1 General Objectives

The general objective of this research is to ascertain the distinction of safety behaviour, safety climate, safety participation, perceived work pressure and its influence on employees' safety behaviour.

1.4.2 Specific Objectives

a) To examine the relationship between safety participation, safety climate, work pressure and safety behaviour.
b) To investigate safety behaviour differences among morning and night shift workers.
c) To investigate safety behaviour differences among Malaysian and foreign workers.
d) To investigate safety climate perception among workers in morning shift and night shift.
e) To investigate the differences in perceived work pressure among workers in morning shift and night shift.
f) To investigate the differences in perceived safety climate among Malaysian and foreign workers.
g) To investigate the differences in safety participation among morning and night shift workers.
h) To investigate the differences in workers academic levels and their safety participation.
i) To investigate the differences in safety participation among Malaysian and foreign workers.

j) To investigate whether safety climate, safety participation and perceived work pressure influence safety behaviour of the workers.

1.5 Significance of the study

The significance of this study is explained by the fact that safety behaviour is found to be linked to unsafe work behaviour and could eventually escalate into work place accidents and incidents (Choudhry & Fang, 2008). Steel industry has been regarded as hazardous in nature (Brown, Willis, & Prussia, 2000). In this connection, safety behaviour and poor working environment synergistically reduce the safety climate of an organization (Parboteeah & Kapp, 2008) The sourcing of foreign workers from developing countries for Malaysian industries further aggravates the situation due to the fact that foreign workers from developing countries possesses a much lower safety behaviour compared to their local counterparts (Huang, Chen, DeArmond, Cigularov, & Chen, 2007). Hence it is pertinent to study the interaction of safety climate, safety behaviour with other elements of expediency in order to improve the safety behaviour of the workers (Zohar, 2008).

1.6 Organization of the Thesis

The thesis is subdivided into 5 chapters which address the followings:

Chapter 1 explains the importance of this study, justifications for the selection of the industry and scope of research. Chapter 2 provides an insight into the literature of previous researchers which would augment the overall subject matter. Chapter 3

determines the methodology used for the surveys, sampling concerns, and statistical analysis techniques. Chapter 4 explicitly analyses the outcomes of the research, interpretation of the results and compares and contrasts the research finding with the previous literatures. Chapter 5 provides a conclusion from the study and limitations of the research and suggestions to TESB on endeavours which could be initiated.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

The purpose of this chapter is to review and summarize the relevant literature, as well as articles and journals on the topics of safety behaviour, perceived work pressure, safety participation and safety climate with respect to workers perspective on operational safety.

2.1 An Overview of Relevant Legislation

Occupational Safety and Health Act, 1994 serves as the major occupational safety and health legislation which governs occupational safety and health issues in Malaysia. Section 15 of this act has pertinent objective which precisely requires employers to adopt certain practices, means, methods or processes reasonably necessary to protect workers during work. Thus, the onus is on the employers to familiarize themselves with standards applicable to their establishments, to eliminate hazardous conditions to as far as is practicable, and to comply with the regulations and orders required by this act.

Compliance may include ensuring that employees are given the opportunity to protect themselves via the utilization of personal protection equipment. Employees are expected to reciprocate by complying with the rules and regulations that have been established and enforced by the employers as required by section 24 of the act.

Apart from this legislation, other relevant legislations which are relevant to Topaz Evergreen Sdn.Bhd are: USECHH, 2000 (Use and Standard of Exposure of Chemicals Hazardous to Health), CPL, 1997 (Classification, Packaging and Labelling of Hazardous

Chemicals), and FMA, 1967 (Factory and Machinery Act). TESB's main manufacturing process involves metal stamping of products, which is governed by Factories and Machinery (Fencing of Machinery and Safety) Regulations, 1970. In addition, it is mandatory to provide safe work place and ensure that the welfare of the workers is protected regardless of their country of origin (Factories and Machinery (Safety, Health and Welfare) Regulations, 1970.

2.2 Theories on safety behaviour

The theories which are relevant to this research could be elaborated as follows :

2.2.1 The antecedent-behaviour –consequence model

The antecedent-behaviour-consequence model of applied behaviour analysis developed by Geller (2001) identified antecedents or activators, direct one's focus and attention on relevant safety behaviours needed for a given task. Effective activators are simple, memorable, and tied closely to consequences. This author further extended the research to introduce the actively caring model which could be adopted as a self-sustaining safety model by industries. This concept has been widely accepted as a behaviourally based safety (BBS) endeavours. Workers who lack safety participation due to either an increase in work pressure to expedite production or perceived that the safety climate of their work place is poor often would have poor work attitude and safety behaviour. The importance of skills and job expectations had been identified as an important parameter which could influence safety behaviour among workers.

One of the important elements which had been used in this research is the level of safety participation which could be used as an intervention to apprehend unsafe work behaviours and instill good safety behaviour among workers. It has been an established fact that disincentives are often ineffective because they are used inconsistently and encourage avoidance behaviour rather than achievement. In addition, safety-incentive programs based on outcomes can stifle employee safety participation in the development and administration of an effective behaviourally based safety programs.

2.2.2 Heinrich's Domino Theory

Heinrich's Domino Theory was developed by H. W. Heinrich during his tenure with Travelers Insurance Company in the 1930's and 1940's. Heinrich conducted research on thousands of insurance and injuries as well as illness reports. These reports blamed human fault for 73% of the accidents. Heinrich concluded that 88% of industrial accidents are caused by negligence of workers. Heinrich further refined his research and discovered that the antecedents of injuries are attributed by workers indulging in unsafe actions. There are several reasons which motivates unsafe behaviour , among others are the work pressure and lack of safety participation among workers. Implementations of engineering control measures are essential to abate the unsafe acts and unsafe work behaviour amongst workers. Safety climate could also be elevated via initiating such endeavours because workers, who perceive that the work environment is safe and without hazards possess an elevated level of safety climate, thus are self-motivated to participate in safety activities and adhere by established safety norms. It is also imperative to implement non engineering interventions such as safety training, hiring on the basis of safety-related selection criteria, progressive disciplinary programs and

terminating the employment of habitual offenders. Safety professionals have based their work on Heinrich's faulty theories platform, thus evolving into various number of theories such as the BBS (behavioural based safety) and ACM (actively caring model).

2.2.3 Theory of Planned Behavior (TPB)

Theory of Planned Behavior (TPB) was introduced by Ajzen (1991). This auditor has designed a theory which is able to predict and explain human behavior in specific context. According to the theory of planned behavior, perceived behavioral control augmented by behavioral intention, can be used directly to predict behavioral achievement. Workers intention influences their behaviour and it is not a stand-alone parameter. A volatile work environment would influence the worker on whether they will perform the behaviour willingly or unwillingly.

The safety participation of most workers would be influenced by non-motivational factors as availability of requisite opportunities and resources. Production expediency which increase perceived work pressure among workers would reduce the workers control over safety behaviour. In addition a poor work environment lurking in hazards would reduce perceived safety climate of the work place, thus causing the workers to intentionally violate safety rules and circumvent safety procedures and standard operating procedures. Safety behaviour achievements depend jointly on motivation (intention) and ability (behavioral control). The locus of control explained in this theory explains the safety participation and safety behaviour variable which has been selected for this research. Workers who do not possess a solid locus of control would engage in unsafe work behaviour when safety climate is low, thus weakening their safety

participation. According to the theory of planned behavior, perceived behavioral control augmented by behavioral intention, can be used directly to predict behavioral achievement.

TPB is a pertinent concept which is adopted in this research because workers intentions whether deliberate or unconscious would reflect their safety behaviour. Interventions of deliberate intentions which may have been caused by poor safety climate and an increase in work pressure would elevate safety behaviour, thus reducing accidents and incidents at workplace. Fogarty, & Shaw (2010) explained the interactions between safety climate and workplace behaviours that are intentional but unsafe. This type of deliberations are often referred as violations and involves the deliberate deviation from rules that describe the safe or approved method of performing a particular task or job; as opposed to errors, which refer to unintended outcomes caused by workers negligence.

Figure 2.1 shows that safety climate and perceived work pressure would have an impact on the workers behaviour which related to their safety participation. Eventually this relates to their intention to behave in an unsafe manner or safe manner. Thus, the deliberate violation or even compliance to safety norms within an organization would be related to the quantum of work pressure subjected on the workers. The main focus of this diagram is the intention of the workers which could be intervened via perceived behaviour control.

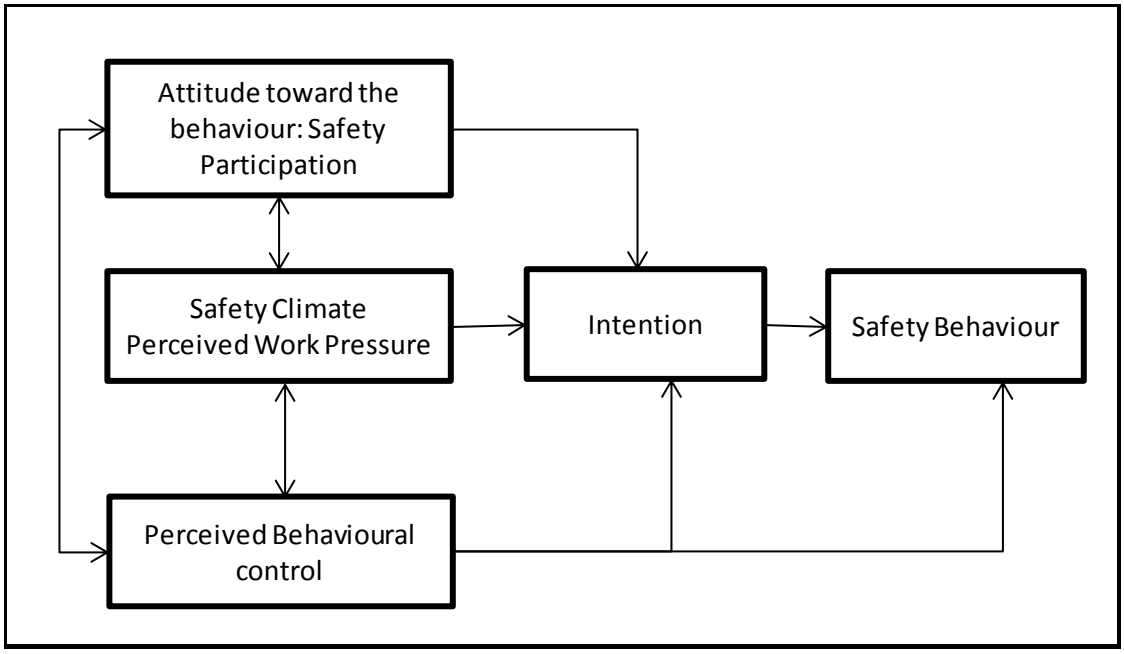

Figure 2.1

Research framework and Theory of Planned Behaviour

2.3. Review of Previous Research Studies

Numerous studies have been conducted by researcher with respect to determining the antecedents of unsafe behaviour and interventions which could apprehend unsafe work behaviour among workers. The following literature review explains the research endeavours, which had prompted this project.

2.3.1 Safety Participation, shift work, nationality and academic levels

Behavioural approaches to safety performance improvement have been recognized as a solution to occupational health and safety challenges in industries (Geller, 2001; Khader, 2004; Krause, Seymour, & Sloat, 1999; Mullen, 2004; Neal et al., 2000; Seo, 2005; Wiegand, 2007). It remains as an essential intervention endeavour because employees

who are motivated to comply with safety requirements are more likely to engage in safety compliance behaviors. Thus employees who are motivated to involve themselves in safety participatory activities are also more likely to be motivated to participate in safety activities (Parboteeah & Kapp, 2008).

This notion is further supported by recent research on employees' participation with respect to health, safety and environment improvement of an organization (DeArmond, et al., 2011; DePasquale, 1999; Ford et al., 2011; Guldenmund et al., 2012; Hale, Guldenmund, Van Loenhout, & Oh, 2010; Hamalainen et al., 2012; Shang et al., 2009; Walker, 2010). Further research within this context had proven that safety participation is determined by an employee's personal interest, positive expectations, trends and convenience issues which could be manipulated towards the advantage of an organization (Nohammer, Schusterschitz, & Stummer, 2010).

Clarke (2006) further refined this context of safety approach and discovered that the convenience factor associated with safety participation and performance is often influenced by the perceived work pressure exerted on the individual workers, thus increasing their work load.

These findings are pertinent because Mitropoulos & Cupido (2009) pointed that workers who actively participate as a team to further improve safety at the work place had better controls of the safety environment at the workplace, thus resulting in reduced accident rate (Mitropoulos et al., 2009).

Ford et al. (2011) had discovered that the degree of safety participation among workers could be utilized to predict safety performance of an organization . This notion was also supported by the research done by Lu et al. (2005) who had proven the existence of a clear distinction of safety participation among night and morning shift workers in an organization.

It has remained an established fact that occupational accidents and incidents could be abated by improving safety performance at the workplace (DeArmond et al., 2011; DePasquale et al., 1999).

The degree of safety participation was also found to be consistent with the workers work experience and position in an organization (Walker, 2010). Thus, it is imperative, therefore to allocate rewards as one of the inducers of safety participation. Apart from that, it was evidenced from those workers who originated from different countries and had diverse cultural experiences.

The general educational and cultural context in the country of origin would influence the extent of risk taking and resistance to pain or suffering and the degree of participation in safety (Gravel, Rheaume, & Legendre, 2011).

Improving safety performance of an organization had been found to elevate safety behaviour of workers (Geller, 2001; Luria et al., 2010; Shang et al., 2009). Apart from that, general organizational climate and safety climate are recognized as an element which predicts safety performance. It is interesting to note that several impeding factors

have been found to be a determinant on the degree of safety participation among workers.

Apparently, workers literacy had been identified as an element which predicts safety participation among workers (DePasquale, 1999; Geller, 2001; Luria et al., 2012; Shang et al., 2009).

Apart from that, Gravel et al. (2011) discovered that comprehensiveness and language barriers had remained an obstacle to foreign workers, thus hampering their participation in safety programmes. This notion was also shared by Guldenmund et al. (2012) who discovered that inadequate understanding local language of host country and literacy levels poses a negative effect on safety behaviour of foreign workers. Elevating safe work behaviours would eventually improve the overall safety climate of an organization (Geller, 2001). In this connection, workers habits inherited from their homeland determines the level of safety participation and safety efficacy among workers (Khader, 2004).

Hence, implementation of safety management could be hampered by numerous factors, including a partial or biased understanding, from workers and management with respect to occupational safety and health norms, rules and regulations. It was discovered that safety compliance gradually increases when participation of employees increases. Safety compliance and employee participation is imperative in industries as a demonstration of legal compliance and injury prevention. Safety compliance which is related to safe work behaviour is one of the key elements predicting safety participation.

The degree to which workers are motivated to comply with safety standards and their participation remains a pertinent factor in determining the degree of adherence to safety procedures(Geller, 2001). This has been recognized as an important facet for occupational accident reduction initiatives (Ford et al., 2011; Huang et al., 2007; Lu et al., 2011). This is possible because safety participation augmented by safety behaviour would effectively buffer the negative effects of work pressure (Brown et al., 2000). Consistent with this notion, researchers had proved that an increase in work pressure and high job demands lowers safety participation, as employees might forego effortful behaviours to improve safety to ensure that work tasks are accomplished (Turner et al., 2012).

Employee participation has been proven to be a pertinent factor which ensures the success of behavioural based safety programs (DePasquale, 1999; Geller, 2000; Luria et al., 2012). When workers participation declines, implemented safety intervention programs would fail, thus reducing safety performance of an organization (Williams, & Geller, 2000). The direct relationship between workers' involvement in safety and their participation had been linked to workers empowerment and participation (Vinodkumar & Bhasi, 2010). DePasquale et al. (1999) revealed that critical success factors which contribute towards the successful implementation of safety behaviour are related to voluntary employees' participation. Whilst a degree of forced participation could be enforced by an organization, it was proven that such methods would deprive the employee an opportunity to self-improve, thus stalling safety behaviour improvement programmes (Shang et al., 2009).

Safety participation has also been known to be enhanced via the implementation of a robust education and training programs (DePasquale et al., 1999; Shang et al., 2009). This would eventually lead to an improved safety culture, which would enhance safety participation (Wu, Chen, & Li, 2008).

In addition, Fang et al. (2006) obtained significant result implying the effects of safety climate and safety behaviour as a determinant of safety participation. These researchers' found that improving safety attitudes and beliefs of workers with regards to their safety environment would elevate safe work behaviour amongst workers. Apart from that, the existent of diverse work culture and its effects on safe work behaviour could not be denied. Poor working habits are known to impose a detrimental effects on safety participation amongst employees who come from diverse work culture (Khader, 2004; Krause et al., 1999).

Luria et al. (2010) had proven the notion that employees with different employment status such as temporary workers often possess lower safety participation compared to permanent workers. He further expressed the fact that the foreign workers could be safely categorized as temporary workers based on the fact that they had to return to their respective homeland at the end of work tenure.

Management's role in providing a safe work environment, thus elevating safety climate of an organization remains paramount. Researchers within this perspective such as the 'Safety management by walking around' (SMBWA) system has a good influence in

improving safety participation among employees (Luria et al., 2008). Safety management practices have direct and indirect relations with the safety performance components, namely, safety compliance and safety participation (Vinodkumar et al., 2010).

In a different note, Kines, Lappalainen, Mikkelsen, Olsen, Pousette, Tharaldsen, & Tomasson (2011) and Geller (2001) suggested that empowering employees by delegating a certain amount of authority and responsibility would boost safety participation among workers and eventually elevate safety behaviour. It is imperative that workers safe work behaviour and participation are improved in order to curb unsafe work behaviour and unsafe acts which could lead to accidents and incidents (Hale et al., 2010; Fugas et al., 2012).

Safety climate and leadership tended to be more highly related to safety participation than safety compliance (DeArmond et al., 2011). It should be noted that workmate's influence is closely related to team environment and work, which is one of the key components of organizational culture (Zhou, Fang, & Wang, 2008). Improving safety climate would eventually lead to an elevated degree of safety participation among workers as proven by Brondino, Silva, & Pasini (2012).

Fam, Nikoomaram, & Soltanian (2012) found a strong correlation between employees' academia and their participation level. This researcher reiterated that employees, who are well educated, are normally more aware of workplace hazards and of their roles in controlling such hazards through active participation in safety programmes.

It is an established fact that workers in morning shift have higher safety participation compared to their night shift counterparts. Luria et al. (2012) had proven that the presence of management during morning shifts instils a certain degree of safety compliance among workers.

2.3.2 Safety Climate, shift work, nationality and academic levels

Salient factors which influences safety behaviour had been defined as perceived safety climate and had remained as a major concern attracting attention among researchers' (Brown et al., 2000; Geller, 2001; Mc Lain et al., 2007; Mullen, 2004; Seo, 2005; Smith et al., 2006; Zohar, 2010). Neal et al. (2000) highlighted safety climate as a single factor which comprises management values, communication, training and safety systems, and studied the mediating role of safety knowledge and motivation on the relationship between safety climate and safety behaviour.

This is contrary to Seo (2005) who operationalized perceived safety climate as management commitment, supervisor support, co-worker support, employee participation, and competence level in the study looking for mediators in safety climate and safety performance relationship. The importance of safety climate as an intervention for unsafe behaviour was also analyzed by Lu et al. (2011) & Fang et al. (2006) who found that a positive safety climate would encourage safe work behaviour

In addition, it was found that injury rates were negatively correlated with safety climate which further signifies the importance of analyzing this variable (Smith et al., 2006).

In this connection, a shift in paradigm within the safety literature, away from individual level factors that might be responsible for accidents and incidents, such as error or non-compliance with safety procedures, deviations in organizational factors, such as safety climate has been proposed by several researchers (Hamalainen et al., 2012; Neal et al., 2000; Parboteeah et al., 2008; Seo, 2005; Smith et al., 2006).

Zohar (2008) had proven that safety climate remains the coherent elements of perceptions and expectations, which a worker has perceived at a work place. One feature of the safety climate approach is that it has become a research paradigm in its own right, reaching back into the literature on culture and climate and vigorously exploring themes within this paradigm (Fogarty et al., 2010).

This is a pertinent element of safety behaviour which needs to be explored because workers who are exposed to poor safety climate have been known to circumvent safety procedures and regulations thus leading towards accidents and incidents (Arezes & Miguel, 2008; Brown et al., 2000; Choudhry & Fang, 2008; Fugas et al., 2012; Neal et al., 2000; Seo, 2005). Cooper & Phillips (2004) took a safety climate measure in the manufacturing sector at the beginning of a behavioural safety initiative and discovered that the perception of employees on the importance of safety training could be applied to predict the actual level of safety behaviour and safety climate.

It is also interesting to note that employees with an education level below primary school often perceive a low safety climate compared to workers who possess higher education (Fang et al., 2006).

Further researches evident the existence of group safety climate as an antecedent, which determines the degree of safety participation and extension of support among employees Kapp (2012). This researcher found that improving the safety climate of an organization should be given due attention especially among industries, which operates in two or more rotating shifts. This is because night shift workers perceive a high level of risks owing to the nature of their working environment at night with less interaction of people or rest time (Huang et al., 2007; Luria et al., 2010).

This is a notion which has been widely supported by other researchers' (Lu et al., 2005; Smith et al., 2006; Turner et al., 2012; Zohar, 2008; Zohar, 2010). Among the effective intervention which was introduced to curb this detrimental effect was the improvement of workers emotional intelligence which would lead to an improved safety perception among workers and their perception of safety climate (Wiegand, 2007).

Workers are known to indulge in unsafe work behaviour when safety climate declines owing to the lacks of resources made available for them to protect themselves and perform job efficiently (Mc Lain, 2007; Geller, 2001). Safety climate has been known to resonate with attributes of safety performance and safety participation in a research conducted in Taiwan (Lu et al., 2005). This researcher justified that apart from safety climate, essential safety facets such as safety policy, safety promotion, and safety awareness have been effective and essential mediators in elevating the overall safety climate of an organization.

In addition the ability of safety climate to interact with other dimensions of climates such as ethical and motivation have been found to be a stimulus factor for curbing unsafe behaviour and unsafe act among employees (Zohar, 2008). This notion was also shared by Brown et al. (2000) who developed an empirical model to substantiate the effects of perceived safety climate on unsafe work behaviour via perceived work pressure and perceived barriers to safety.

These researchers found that it would augur well for management to elevate safety climate via providing adequate support to the supervisors and workers. Safety climate is a profound element in organizations which practices shift works (Huang et al., 2007). Night shift workers in a strong safety climate environment would perceive a lower risk of being injured at work than other night shift workers in a weak safety climate (Huang et al., 2007). This is an essential component of safety climate, which manifests industries and could be successfully manipulated to increase the robustness of safety behaviour among night shift workers. The urgency to instill safe work behaviour among night shift workers remains paramount because there is widespread of safety issues that are associated with works performed during the night shift. This notion is further supported by the circumstances surrounding the disasters of the decade such as Chernobyl, Three Mile Island, and the Exxon Valdez, which all occurred during the night shifts (Hamalainen et al., 2012).

The existence of logical links between safety climate and higher risk perceptions among night shift workers are profound. Workers who have the perception that night shift operations are not adequately supported by management would have lower levels of

safety participation, thus engaging themselves in unsafe work behaviour (Brown et al., 2000).

However Huang et al. (2007) proved that these effects could be significantly apprehended when the company's safety climate becomes a significant moderator of the relationship between work shift and perception of injury risk with night shift workers perceiving a higher level of injury risk compared to day shift workers. Similar notion was also tabled by other researchers such as Mc Lain et al. (2007) and Arezes et al. (2008). Arezes et al. (2008) had proven that when risk perceptions are apprehended, workers may voluntarily utilize the personal protective equipment which is given to them.

Hale et al. (2010) suggested that deploying interventions such as training and competency enhancement programmes with adequate support rendered by the management would improve the overall safety climate of an organization, thus alleviating workers work pressure. Trainings have received much attention in the safety literature, and several comprehensive reviews, which already exist (Ma & Yuan, 2009). This researcher suggested that improving workers' safety training is of paramount importance. The safety training should be put focus on to reduce industry injuries; and the management support is another vital factor in manufacturing concerns.

Safety training was identified by Vinodkumar et al. (2010) as an essential safety management practice that predicts safety knowledge, safety motivation, safety compliance and safety participation. However workers from other nationality are often

not given the opportunity to participate in safety and health related trainings due to their diverse language, which acts as a barrier. (Guldenmund et al., 2012). These deficiencies would eventually set a precedence of unsafe work behaviour among workers. Researches have underlined the potential threats to occupational safety of this workforce due to their vulnerability in grasping safety knowledge and their safety culture (Starren, Hornikx, & Luijters, 2012). Industries realized the notion that a workforce with different cultural backgrounds can lead to difficulties because almost all measures were focused on language issues (Fang et al., 2006).

Ma et al. (2009) pointed out that many managers felt lack of training because they were too busy in production. Substantial number of workers also felt lacking of training, which led them to deficiencies in safety knowledge, and poor use of personal protective equipment.

Perceived work pressures and perceived risks have been proven by Seo (2005) as an antecedent which encourages unsafe act and unsafe behaviour contributed by low safety climate. Low safety climate, increased work pressure, and a weak safety culture and values which emanates from certain core values and beliefs held by senior management with regards to policies and work practices serves as an antecedent of safety behaviour (Brown et al., 2000; Lu et al., 2005; Seo, 2005; Zohar, 2008).

These factors are further augmented by proximal situational factors such as, supervisor's descriptive safety norms, supervisor's injunctive safety norms, co-workers descriptive safety norms and co-workers safety norms (Fugas et al., 2012).

Workers who are assessed periodically evaluated by their management have a better perception of safety climate. One of the outstanding interventions of the decade was the introduction of SMBWA (safety management by walking around) by Luria et al. (2012). This patented method has been widely accepted as a tool, which increases manager safety interactions, thus ascending safety climate of an organization to greater heights.

Controls exerted by the management with regard to enforcement of the safe work procedures and rules have been discovered as an essential element, which improves the safety climate of an organization. Wu et al. (2008) pointed out that management intervention and leadership affect the overall safety climate which bonds a robust relationship between safety leadership and safety performance.

Whilst Zohar (2000) proved that safety climate and safety leadership depict positive benefits for employees with regards to employee safety via improved trust between management and safe behaviour , Mc Lain et al. (2007) further extended this research to encompass other essential parameters such as safety and production compatibility, which effects the overall safety climate of the organization.

The element of safety climate is the fundamental to the management of safe work behaviour and serves as an antecedent which determines the level of safety knowledge and safety motivation possessed by the workers in an organization (Kapp, 2012; Neal et al., 2000), hence safety climate acts as a mediator of the impact of general organizational climate on safety-related outcomes, which could be used to evaluate the overall safety performance of an organization. There has been a considerable number of studies which

evident the existent of a significant relationship between the antecedents of unsafe work behaviour and unsafe acts which demotivates employees and cause them to be engaged in unsafe act (Brown et al., 2000; Kapp, 2012; Mullen, 2004; Mc Lain et al., 2007; Neal et al., 2000).

The context of emotional intelligence, motivation, and workers participation, which are improved by elevating the robustness of safety climate was supported by Neal et al. (2000) research.

In this perspective, improving visibility at work stations would further improve the safety climate moderator (Luria et al., 2008). Visibility is well achieved at organizations, which has implemented safety management system such as OHSAS 18001. However Muniz et al. (2012) discovered that management's commitments and effective communication of safety issues and hazards have positive effects on safety behaviour.
Safety climate, risk perception among workers, and the lack of aptitude towards reducing the hazards from the work place due to incompatible priorities by the management often leads to accidents and injuries (Kapp, 2012; Muniz et al., 2012; Neal et al., 2000; Zohar, 2010).

However the basic elements of providing safe work place by conducting an effective HIRADC (Hazard identification, risk assessment and determining controls) would improve safety perceptions among workers and improve overall safety climate and safe work behaviour (Khader, 2004). Fang et al. (2006) distinctly identified the existence of a significant relationship between safety climate and safe work behaviour among

employees. Employees who comply with safety regulation acquire a more positive safety climate, thus enhancing the positive relationship between safety climate and individual safety behaviour.

Zhou et al. (2008) developed a Bayesian model of human safety behaviour by constructing a safety climate and work experience. Safe work behaviour among workers in a high risk industry is often influenced by the cumulative working experience acquired during their tenure and is associated perceived hazard levels (Seo, 2005). However, recent researches share the notion that a prevalence of safety hazards increases work place pressure which has been determined as one of the antecedents of accidents and injuries (Brown et al., 2000; Huang et al., 2007).

Safety climate deteriorates when hazards are left to stagnate in the workplace for a long duration, thus causing the workers to develop a perception of low safety climate of an organization (Mc Lain et al., 2007). This notion was also shared by Mitropoulos et al. (2009) who discovered that the demand and capabilities with regards to production pressure had to be in an equilibrium, failing which safety behaviour would decline.

Recent research warrants the need for management to reinforce the value and importance of safety among operatives. Workers are required to change their attitude towards safety by obtaining training and knowledge about their jobs and should not behave unsafely if they want to be accident-free (Choudhry et al., 2008; Mc Lain et al., 2007; Zhou et al., 2008). The safety attitudes among temporary workers are proven to be

lower compare to permanent workers (Luria et al., 2010). Hence employees status and their perception of safety climate should be given due consideration.

Zhou et al. (2008) had proven that safety was influenced by managements' commitments and co-workers' influences, and less sensitive to personal experience factors such as work experience and education. Hence, intervening attitude of the workers via commitments from the management would be able to increase workers perception of safety climate and hazards at the work place and eventually eliminate unsafe work behaviour among workers.

In line with this notion, Guldemund et al. (2012) argued that it would be logical to consider the outputs of the management processes not only as safety attitude objects for individual and group level evaluations but also as themes expressing their values regarding safety.

One of the demographic elements, which had been selected for this project, is the work tenure. This is consistent with the conclusions from Jeremy et al. (2010) findings which suggest that it is of utmost importance to sustain workers who possesses longer work tenure as their competency and knowledge in averting accidents, incidents, unsafe acts and unsafe work behaviours via increased participation could lead to a robust safety climate within the work force.

2.3.3 Perceived Work Pressure, shift work, nationality and academic levels

Perceived work pressure comprise of excessive workload, required work pace, and time pressure, which appears to be a causal factor to both accidents and unsafe work behavior. (Brown et al., 2000; Choudhry et al., 2008; DeArmond et al., 2011; Mitropoulos et al., 2009; McGonagle & Kath, 2010). These effects culminate in the employees finding themselves confused between compliance with safety rules and support of production quotas (Brown et al., 2000).

Whilst safety climate did not predicts accident involvement at industrial set up, workers' response to safety, and conflict between production and safety significantly predicted unsafe behaviour (Brown et al., 2000; Clarke, 2006). Increased pressure would eventually lead to workers perception of unsafe work environment and eventually lead to an increase in unsafe work behaviour, accidents, and incidents (Clarke, 2006). Perceptions of the work environment have important effects as a significant predictor of both accidents and unsafe work behaviour. To prove the significance of these two variables, Seo (2005) presented the evidence of associations between perceived work pressure and unsafe work behaviour using structural equation modelling.

Behavioural self-perception was a variable introduced by Geller (2001). This variable explains the workers perception of expediency of production quotas by trading off safety procedures and safe work systems when rewards and incentives bestowed by the management are tied to achievement of production quotas rather than safety compliance (Das et al., 2008). Perceived production pressure, which includes excessive workload, reduced work pace, and time pressure (expediency), apparently has been proven as a

determinant of unsafe work behaviour leading towards accidents at the work place (Fogarty et al., 2010; Geller, 2001; Mc Lain et al., 2007; McGonagle et al., 2010; Seo, 2005). This notion was also supported by Seo (2005) who found that improving safety climate decreases the level of work pressure, which subsequently reduces the risks at the work place. The conflicts between work safeties arise when workers perceive that working safely hampers them from executing their work demands. McGonagle et al. (2010) pointed out that workers' perceptions of work-safety tension would be associated with higher levels of perceived risk, which would eventually set a precedence of work place injuries. This circumstance becomes prevalent when workers are virtually convinced to trade off safety in order to expedite and increase production.

Whilst organizations tend to substantially bestow employees with monetary rewards, the safe work behaviour could not be sustained on a long term basis due to the absence of habitually safe work behaviour among workers (Geller, 2001).

Production pressure manifests the safety climate of workers who are pressured to prioritize production outputs against sustaining safe work behaviour (Brown et al., 2000; Kapp , 2012; Mc Lain et al., 2007; Mitropoulos et al., 2009). It is imperative that high productivity and safety is maintained within equilibrium (Mitropoulos et al., 2009). This researcher had pointed out the paramount importance of preventing disruptions, balancing the production pressures, and matching skills with task demands as an effort to maintain a satisfactory safety and productivity levels.

The interaction between several significant determinants of safe work behaviour such as external sources and pressure, and management and co-workers attitudes determines the type and severity of accidents and incidents which could occur at a workplace (Mc Lain et al., 2007).

Coercive pressure emanating from the management and section leaders has been a triggering factor of unsafe behaviour among workers (Brown et al., 2000; Mullen, 2004). This force culminates in the workers trading off their safe work practices to meet production quotas thus leading to violations of safe working procedures and the use of personal protective equipment (Brown et al., 2000; Mitropoulos et al., 2009). This is an essential notion because the establishment and enforcement of a robust safety policy and safety management system do not guarantee the sustenance of safe work behaviour among employees (Muniz et al., 2012). Workers compliance to safety policy is dependent on their production yield and the reasonable duration allocated for its achievement (Geller, 2001; Mc Lain et al., 2007).

Hence, communication between the management and workers on the expediency of work process need to encompass a balance between safe work practices, production output and quality (Das et al., 2008; Kapp, 2011; Mitropoulos et al., 2009). Workers need to be enlightened that expediency of production should not be compromised by trading off safety. Productivity, a major challenge to safety climate level due to the antagonistic relationship between productivity and safety targets, had been found to be one of significant dimension affecting safety behaviour among workers (Keren, Mills, Freeman, & Shelley, 2009).

In this connection, a justified communication between managers and front line workers were proven to be one of the effective ways in motivating safe workplace behaviours (Hale et al., 2010; Kapp, 2012). Sustaining effective communication between production planners and workforce are crucial when unsafe acts are to be abated. The fragile link between work pressure and safe work behaviour could be further enhanced via establishing a robust communication mechanism between management and workers with regards to production and quality expectations within a reasonable target (Arezes et al., 2008; Brown et al., 2000).

Visibility of communication has been the topic of interest in the research conducted by Luria et al. (2008). These researchers deduced a conclusion on the effects of visibility in communication between supervisors and employees, which was able to reinforce safe work behaviour among workers. These findings are essential as trained workers could revert to their unsafe work behaviours during the absence of enforcement.

Seo (2005) explained that in order to implement good intervention efforts to avert work place accidents and incidents, resources and endeavours should be allocated to the elements of safety climate and work pressure rather than merely focusing on the physical work environment and risk reduction. Whilst, HIRAD and implementation of a safety management system is essential, it does not always provide positive results with regards to employees safe work behaviour (Muniz et al., 2012).

Antagonistic reactions between safety and production expediency were found to be rampant when production outputs are considered as utmost important (Fugas et al, 2012; Geller, 2001; Mitropoulos et al., 2009; Parboteeah et al., 2008).

High levels of work-safety tension necessitate further inquiry and organizational interventions to improve safety. Perceived work pressure or work safety tensions have been found to be enhanced via participatory approach to safety, thus providing an avenue for the workers to share specific aspects of the job that prevent them from working safely, and lacks of safety participation (Geller, 2001; McGonagle et al., 2010; Parboteeah et al., 2008).

Foreign workers literacy levels are much lower and failure to master the language of the country they are subjected to work jeopardizes their own safety as well as of their peers. This factor increases when work pressure increases as time taken to read work instructions and standard operating procedures are compromised diminishes (Guldenmund et al., 2012).

Workers in morning shift have a higher perceived work pressure compared to night shift workers as explained by Luria et al. (2008). The elevation of production pressure to produce products with high quality at short lead time becomes apparent in morning shifts due to the presence of the management.

Foreign workers primary focuses are monetary reward, hence are easily exploited for monetary reasons by increasing their work pressure and duration of work. When this

occurs , their concerns with respect to safety requirements diminishes (Guldenmund et al., 2012).

2.3.4 Safety Behaviour, shift work, nationality and academic levels

The understanding of safe work behaviours and their reciprocal, unsafe behaviours are pertinent owing to their widely acknowledged links with workplace accidents (Choudhry et al., 2008). Understanding the factors that explain safety behaviours is not only theoretically useful, but it also has practical relevance for implementing a more effective and successful safety management strategy.(Arezes et al., 2008; Brown et al., 2000; Choudhry et al., 2008; Fogarty et al., 2010; Fugas et al., 2012; Neal et al., 2000; Huang et al., 2007; Parboteeah et al., 2008; Zohar, 2008; Zohar, 2012). Safety compliance and safety participation are two important components of safety behaviours, which synergistically reduce accidents and incidents via the elevation of safety climate (Zohar, 2008; Zohar, 2012). Clarke (2006) found that workers' safety attitudes towards safety, conflict between production and safety perceptions of the work environment (work pressure and work clarity) were significantly predictive of unsafe behaviours.

Safety compliance refers to activities employees need to do in order to maintain workplace safety (Neal et al., 2000). Unsafe acts and safety compliance behaviours reigns within the same dimension, thus determines the degree of safety participation among the workers. Within the perspective of an industrial set up, safety participation refers to voluntary safety behaviours of workers (Choudhry et al., 2008). Safety compliance would be part of work role, whereas safety participation includes behaviours beyond formal role. This suggests that safety climate will affect an individual's

perception of safety such that if management is committed to safety then it is likely that employees will also exhibit commitment to safety (Fogarty et al., 2010).

Whilst organization has adopted several countermeasures to curb and abate accidents, researchers have proven that antecedents of the accidents are mainly contributed by the system and person related variables within the context of behavioural based safety (Brown et al., 2000; Fugas et al., 2012; Luria et al., 2010).

Perception of a weak safety climate had been found to trigger the onset of unsafe work behaviour and unprecedented incidences of unsafe work behaviour(Brown et al., 2000; Fang et al., 2006; Fugas et al., 2012; Hayes, 1998; Luria et al., 2010; Neal et al., 2000; Seo, 2005; Zhou et al., 2008; Zohar, 2012).

Safety behaviour and poor working environment synergistically reduce the safety climate of an organization (Parboteeah et al., 2008). This is because, cognitive element controls the behaviour of the workers, who act based on their motivation, attitudes and cultural value (Geller, 2001). Workers emotional intelligence has been discovered by Wiegand (2007) as an element which is purely dependent on workers work culture; hence workers exposed to different work culture at their country of origin would possess different levels of safety behaviour. This notion is supported by several researchers' who found that foreign workers from developing countries have a lower display of safety behaviour compared to their local counterparts (Arezes et al., 2008; Huang et al., 2007; Luria et al., 2010; Mc Lain et al., 2007).

A study by Lind et al. (2008) showed that external reporting of accidents and incidents in companies remains scarce for fear of reprisals because workers would be penalised for negligent behaviour . In addition, publishing of accidents and incidents rate would be unfavourable to the industry as their reputation would be compromised. Hence, proactive efforts to improve safety behaviour of workers would remain paramount apart from reducing incidents and accidents. Complacency due to the absence of accidents would cause a false perception that safety rules and procedures could be disregarded in order to achieve production quotas (Mc Lain et al., 2007; Neal et al., 2000).

Whilst the various disciplines of risk aversion strategies have been implemented, this has not taken into account the important elements of perceived safety hazards, safety culture, production demand and pressures which motivates the workers into indulging in unsafe acts via ignoring safety norms, cultures and guidelines (Brown et al., 2000; Neal et al., 2000; Fang et al., 2006; Fugas et al., 2012; Fogarty et al., 2010; Seo, 2005).

Zohar (2008) explained the significant interaction of safety climate, safety behaviour with other elements of expediency, process flow, adherence to production schedules, and profitability.

Brown et al. (2000) cited the Domino theory as a classical example on how the safe work behaviour of employees could result in a series of accidents and injury. Domino theory introduced by H. W. Heinrich in 1936 explained that for every serious injury, there were 29 minor injuries reported and 300 accidents resulting in close calls. That

does not take into account the additional 42 million accidents that go unreported globally.

Research by Muniz et al. (2012) showed that workers compliance to safety procedures and safety measures are generally good in an OHSAS 18001-certified organization due to the willingness of the workers to comply rather that the bestowment of inducements. Within this context, foreign workers are found to be less concerned about complying to safety procedures compared to locals as their primary focus is earning as much as possible prior to returning to their homeland (Guldenmund et al., 2012).

This has kick started the Behavioural based safety (BBS) which is a recognized driver of methods to curb unsafe work behaviours and unsafe acts among employees (Geller, 2001; Muniz et al., 2012). Behavioural intervention was discovered by Williams et al. (2000) & Geller (2000) as an endeavour which could positively elevate safety awareness among workers. Behavioural self-perceptions have been found to be interacting with other constructs such as accountability system, attitudes, emotional intelligence and other internal state of inferences (Geller, 2001; Neal et al., 2000).

Hence, the support rendered by the management evident by the pertinence of a manager-employee interaction regarding safety issues has been acknowledged as a key predictor of employees' safety behaviour at the workplace (Luria et al., 2008). This interaction had to be perpetual as an endeavour to reinforce safe work behaviour among employees.

A change of workers attitude with regards to safe work behaviours would be beneficial to organizations because workers develop cavalier attitude towards safety when work

pressures builds up and the perception of safe working environment declines (Brown et al., 2000). The attitude change would eventually result in unsafe work behaviours and unsafe acts which could lead to accidents and injury (Cooper et al., 2004).

However, enforcement requires monitoring of the workers behaviour continuously over their time of work, which would be a difficult task, hence, concepts such as SMBWA introduced by Luria et al. (2012) not only develops managerial safety leadership but also facilitates in developing workers leadership. When good safe work behaviours are moulded with motivation and good leadership , it results in of reinforces the workers work culture, thus transforming it into a habit which requires less monitoring (Geller, 2001; Guldenmund et al., 2012; Starren et al., 2012).

Workers who are observant of the mishap suffered by their fellow workers due to unsafe workplace often engage in unsafe behaviours (Mullen, 2004). Instilling and sustaining good safety behaviour among workers remains as a pertinent construct, which would enable perpetual maintenance of safe work place at all times (Geller, 2001). This becomes paramount in industries, which are compelled to assign tasks to lone workers, without the supervision of co-workers and supervisors such as the steel industry (Arezes et al., 2008; Brown et al., 2000; Fugas et al., 2012; Mullen, 2004).

It has been found that the absence of management and supervision during night shifts contributes towards unsafe acts and unsafe work behaviour among workers during the night shifts (Huang et al., 2007). This notion was also supported by Luria et al. (2008)

who found that most of the unsafe work behaviours are prevalent among night shift workers due to the absence of management.

It was found that the use of personal safety equipment increases proportionally with the academic level of workers whereby they are able to grasp the fact that the use of personal protective equipment is aimed to protect themselves (Demirer, Durat, & Hasimoglu, 2012). Guldenmund et al. (2012) related this factor to the disability of the workers with lower literacy levels to understand and interprete the technical terms and requirements of standard operating procedures, work instructions and also other safety notes.

2.4 Summary

The selections of the three variables are an important element in determining safety performance of an organization. Jiang, Yu, Li & Li (2010) had proven the existence of safety climate as a moderator between safety behaviour and safety performance, hence could be manipulated when both safety participation and safety behaviour is lower especially during the night shift (Hamalainen et al., 2012; Huang et al., 2007; Luria et al., 2012; Smith et al., 2006). An event of accidents would be costly for any industries and history has proved that majority of the accidents are caused by system and it's incompatibility to the persons who handles it.

Disasters, which occurred in the 20th century, notioned that the prevalence of factors, which causes the workers to engage in unsafe work behaviour, are often associated with the lack of a proper system and prioritization of safety over production pressures (Brown et al., 2000; Hayes, 2012).

The compatibility between safety and production had to be at an ambience to prevent accidents and incidents (Mc Lain et al., 2007). In addition, most of the researches proved that the components of most accidents can be traced to one or more of four levels of failure, which comprised of organizational influences, unsafe supervision, preconditions for unsafe acts, and the unsafe acts themselves (Arezes et al., 2008; Brown et al., 2000; Fugas et al., 2012; Hamalainen et al., 2012; Hale et al., 2010; Mullen, 2004).

Whilst several safe work behaviours have been reinforced via provision of monetary rewards and trainings, this fails to become habitual due to the lacks of other motivational factors such as the antecedents which are discussed in this chapter. This phenomenon is supported by Geller (2001).

Muniz et al. (2012) proved the existence of a strong empirical interaction among managements' commitments, safety performance, and organization's competitiveness. These antecedents could be intervened by establishing and implementing safety programs such as SMBWA (Luria et al., 2012), which could elevate safety behaviour among workers and strengthens managements role in providing a safe work environment as stipulated in section 15 of the OSHA Act, 1994 .

Manifestation of safety strategies which is expected to lead to safe work behaviour among workers are closely associated with the decisions and choices made at the organisational level by the top management (Seo, 2005). Safety climate, safety hazards and work pressures are within the controls of the top management and the lower management. These variables are 'system related' variables and proper intervention

would lead to an increased ‘person related variable’ that would be able to reduce unsafe work behaviour, which leads to accidents and incidents (Brown et al., 2000; Guldenmund, 2007; Neal et al., 2000; Seo, 2005).

The pertinence of investigating the manifestation of the psychosocial factors that explain safety behaviours is essential because it will enable the management of TESB in implementing relevant safety management strategy. This notion was supported by Fugas et al. (2012).

Improved safety climate has been proven as one of the interventions, which reduced the number of accidents and incidents in industries (Smith et al., 2006). This is used as a variable in this study as accidents and incidents would be costly to an organization. In addition, this is also a motivation factor, which boosts employees’ perception of the safety climate. When workers perceive that management is concerned with the hazards at work place, their safety efficacy and safe work behaviour increases (Brown et al.,2000; Geller, 2001; Seo, 2005).

It is utmost important and priority to understand the cultural behaviour of workers because their behaviour is a reflection of the safety culture, which originates from their homeland. The importance of workers cultural interactions have been a subject of research by Khader (2004). The research found that in a high risk industry, the elements of unsafe work behaviour could be caused by risk taking attitude of the workers at their homeland.

Workers from developing countries where safety is not given due consideration often display dismal safety behaviour. In essence, Fugas et al. (2012) discovered the influence of co-workers attitudes on the safety behaviour of the workers.

As a concluding note, Fugas et al. (2012) had even suggested that workers attitude, and perceived behavioural controls are imperative as essential factors, which would enable the elevation of safety climate and safety behaviour among them. Sustaining and creating a good work environment driven by a good team augmented by positive workmate's influences within teams would improve overall safety behaviour of an organization (Zhou et al., 2008).

CHAPTER 3

METHODOLOGY

3.0 Introduction

This chapter explains the constructs and the systematic analysis of the pertinent parameters, which affects the safety behaviour of workers of the organization. This chapter comprise of the logical construction of the safety behaviour model, data collection methodology, sampling methods and justifications, and research instruments selected for the study. Data screening and transformation techniques, analysis of variables, and hypothesis testing are elaborated. Parametric testing methodology had been adopted with assumption that the data is normally distributed.

3.1 Research Framework

The three facets of independent variables comprising of safety climate, perceived work pressure , safety participation and the dependent variable which is the safety behaviour is illustrated in Figure 3.1.

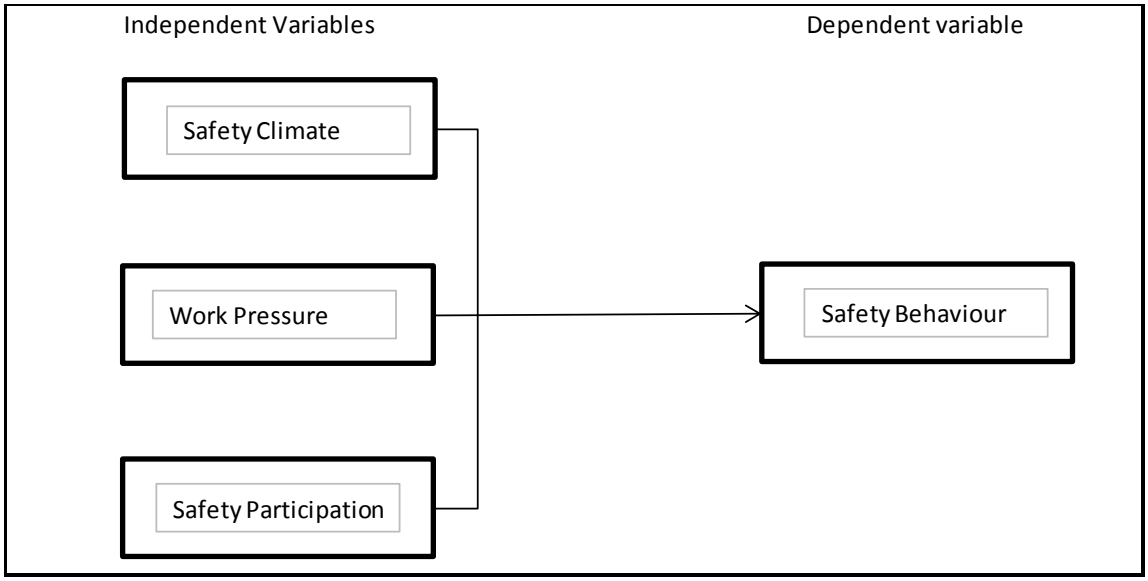

Figure 3.1

Research Framework

3.2 Hypothesis

Based on the research framework which is depicted in Figure 3.1 and literature review which has been completed, the following hypothesis has been derived:

H1a : There is a relationship between safety participation and safety behaviour.

H1b: There is a relationship between safety climate of the work place and safety behaviour.

H1c: There is a relationship between workers perceived work pressure and safety behaviour.

H2: There are differences in safety behaviour among workers in morning and night shifts.

H3: There are differences in safety behaviour among Malaysian and foreign workers.

H4: There are differences in safety climate perception among morning shift and night shift workers.

H5: There are differences in perceived work pressure among morning shift and night shift workers.

H6: There are differences in safety climate among Malaysian and foreign workers.

H7: There are differences in safety participation among morning shift and night shift workers.

H8: There are differences in safety participation among different academic levels of workers.

H9: There are differences in safety participation among Malaysian and foreign workers.

H10: Safety climate, safety participation and perceived work pressure influences safety behaviour of workers.

3.3 Research Design

This research was undertaken via the utilization of a non-experimental deductive correlational study. As this research was carried out in a manufacturing setting, this design was determined to yield the most information regarding knowledge of behavioural expectations and feelings of safety without using random sampling. Based on the flow chart depicted in figure 3.2, initial approval was obtained from the directors of TESB. Questionnaires' were designed and supervisors were given a brief explanation and interpretation of the questions. Reliability test of the questionnaires' design was

done via distributing and analysing the results obtained from the initial 30 questionnaires'. This is followed by a distribution of 160 questionnaires' to the workers and statistical analysis of the results performed in order to evaluate the results. The interpreted final results and proposals were reverted to the management for their future improvement

The flow chart for this study is illustrated as per figure 3.2

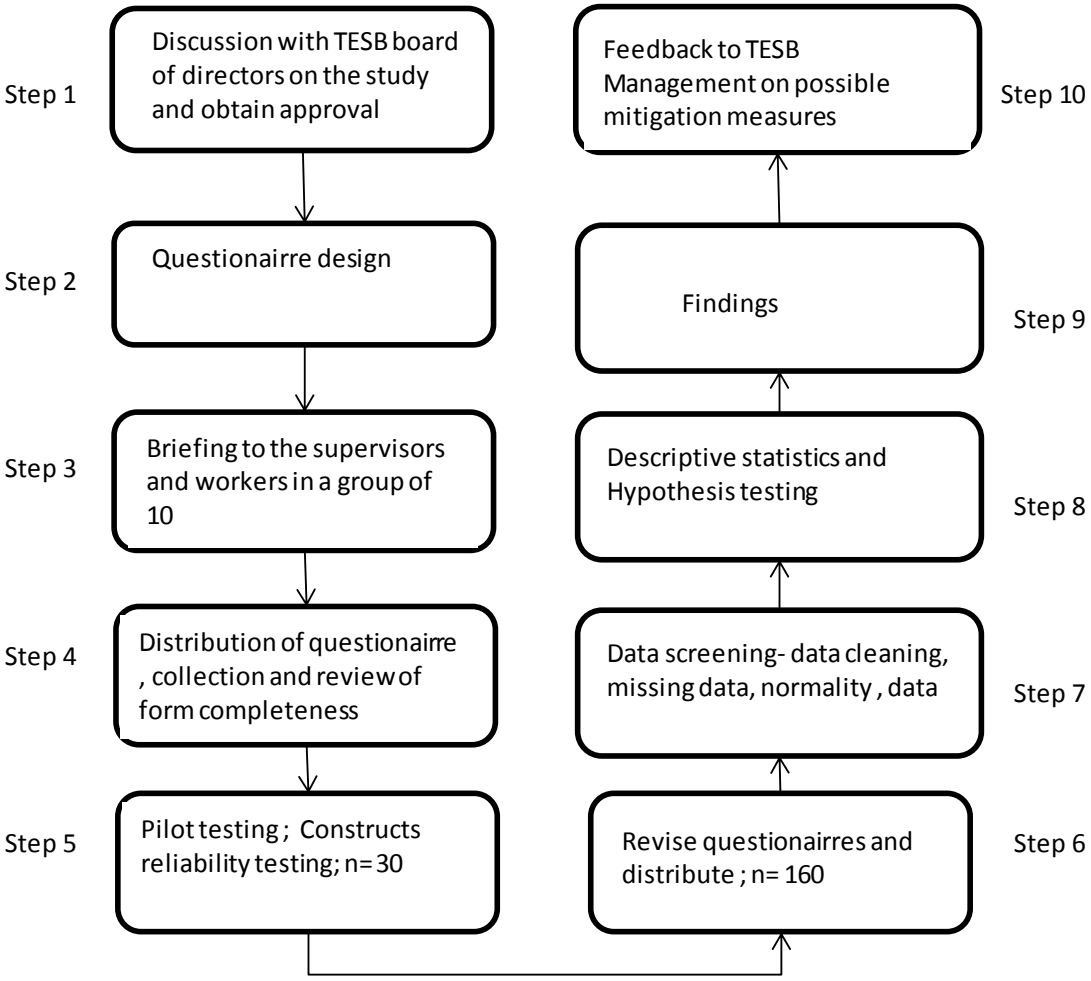

Figure 3.2

Flow chart of research design

3.4 Operational Definition

The operational definitions of the variables selected for this study are defined as follows:

3.4.1 Safety climate

Zohar (2008) & Zohar (2010) defined safety climate as the coherent set of perceptions and expectations that employees have regarding safety of their organization. However, Neal et al. (2000) defined safety climate as a specific form of an organizational climate, which describes individual perceptions of the value of safety in the work environment. Apart from these definitions, safety climate has been defined by Guldenmund et al. (2012) as a summary concept describing the employees' beliefs about all the safety issues. Definition of safety climate which was highlighted by Zohar (2008) & Zohar (2010) has been used for this project.

3.4.2 Safety Participation

Safety participation refers to the overall initiatives and endeavours by the workers to actively protect themselves and their co-workers via participating voluntarily in activities which enhances safe work practices (De Armond et al., 2011; Ford & Tetrick, 2011). In another context, safety participation has been defined as the workers involvement in helping co-workers', promoting the safety program within the workplace, demonstrating initiative, and putting endeavours into improving safety in the workplace (Neal et al., 2000). It has also been explained that safety participation is safety oriented behaviour that involves the individual participating in safety meetings, setting safety goals, providing safety suggestions within the organization and expanding effort to improve work place safety (Lu et al., 2011). Ford et al. (2011) had defined

safety participation as an element of safety performance. This research had referred to the definition of safety participation which was introduced by Neal et al. (2000).

3.4.3 Perceived work pressure

This variable is defined as an employee's perception that the organization encourages them to expedite production such as the increase in production cycle time while disregarding safe work procedures and system, neglecting scheduled maintenance of machines as an endeavour to fulfil production targets (McLain & Jarrell, 2007). In addition, perceived production pressure comprises of excessive workload, required work pace, and time pressure to complete tasks assigned (Seo, 2005). Brown et al. (2000) defined perceived work pressure as an employee's perception that the organization encourages them to work around safety procedures in order to achieve production quotas, keep up with the flow of incoming work and adhere to the targeted deadlines. This research refers to the definitions introduced by Brown et al. (2000) which are relevant to the steel industry.

3.4.4 Safety behaviour

Safety behaviour is defined as the initiatives, motivations and attitudes of the employees in creating a work environment which is safe for himself and also their colleagues (Brown et al., 2000; Geller, 2001; Khader, 2004; Mullen, 2004; Neal et al., 2000; Wiegand, 2007). In addition, safe work behaviour had also been explicitly defined as the frequency of personal behaviour intended to reduce risk and elevate safe work environment in the workplace (Mc Lain et al., 2007). The relevance of safety behaviour as an employee's compliance with safety routines which comprise of safety activities,

safety procedures and the administration of appropriate work practices to reduce exposure to potential hazards and injuries had been pointed by Fugas et al. (2012). The definition introduced by Fugas et al. (2012) is used for the purpose of this research.

3.5 The sampling procedure

The sampling procedure which had been utilized for this study was the simple random sampling approach. This approach enables every element in the population of the study has a probability of being selected as a subject. Data were collected using only quantitative techniques. This could be explained as follows :

3.5.1 The population of the study

The total population of this research is 250 personnel who are working in various departments such as Tooling and maintenance, quality assurance, quality control, production (stamping, degreasing, spot welding, and assembly), maintenance, store and warehouse, quality control, quality assurance, and top management. The highest number of population belongs to the manufacturing division at strength of 80 percent of the total work force. Majority of the production workers are male due to the nature of risk and physical requirements of the job scope. Male works are assigned for the stamping and degreasing process, while their female counterparts are assigned to assembly and quality control related works.

3.5.2 The sample of the study

The sample of the study was 160 personnel.Estimation of sample size in this case study had been taken by utilizing the methods developed by Kjercie & Morgan (1970). Based on the table developed by Kjercie & Morgan (1970), for a given population of 200, a

sample size of 132 would be adequate to represent a cross-section of the population. For this purpose a total of 160 questions were distributed to the workers.

3.6 The Development of Survey Instruments

The survey instruments comprised of survey questions had been developed and validated by Brown et al. (2000), Lu et al. (2011), Ford et al. (2011) & Seo (2005). Survey questionnaires have been selected with caution in order to avoid double barrelled items, lengthy items, items with difficult vocabulary or multiple negatives, and ambiguous pronoun references. Likert-type scales with verbal anchors of strongly disagree and strongly agree at points 1 and 6, respectively were used, which represents the following agreements; 1-Strongly disagree; 2-Disagree; 3-Slightly disagree; 4-Slightly agree; 5-Agree; 6- Strongly agree.

3.6.1 Selection of survey instruments and questionnaire design

The source of the survey instruments is illustrated in Table 3.1.

Table 3.1
Selection of survey instruments

No	Variables	Item	Source
1	Safety Climate	6	Lu & Yang (2011)
2	Safety Participation	6	Ford & Tetrick (2011)
3	Perceived Work Pressure	6	(3) Seo (2005) (3) Brown et al. (2000)
4	Safety Behaviour	7	Lu & Yang (2011)

Survey questions are distributed to the workers in production, planning and maintenance departments who form the core of the work groups.

This study is population-based and cross-sectional in design. All participants are required to respond within a particular time frame and were given only a single opportunity to respond. Data elicited from the questionnaire survey had been held true over time, especially in TESB environment.

Workplace accident was not selected as one of the variables for this research because the accident rates in TESB is relatively low and is a random event, which may not have been reported based on the insignificance of the injury. Hence this element would not be feasible for the model construct, taking into account the population of the work force where most workers would not have accidents in the last couple of years. This justification was also used by Brown et al. (2000) in constructing their socio technical model.

In addition, Mc Lain et al. (2007) suggested that safety management endeavours in an industrial set up which focuses primarily on hazards fail to eliminate the escalating accident due to the fact that accidents are caused by numerous factors such as safety climate, safety demands, workers behaviour, and technological advances which have been provided by the employer.

3.6.2 Reverse-scored Items and Back-translation

Back translation was not required in this study due to the fact that workers who are employed by TESB have a good knowledge of English language. Questionnaires adopted for this research contains reverse score items for questions 4 and 5 of supervisory safety climate as shown in table 3.2.

Table 3.2
Reverse score questionnaire

Variable	*Question Number*
Safety Climate	*4 and 5*
Safety Participation	*None*
Work Pressure	*None*
Safety Behaviour	*None*

For both the questions, the values have been reversed as original 1, reversed to 6 ; original 2, reversed to 5 and this sequence continues until the final original 6 reversed to 1. Senior line leaders from the respective country or origin were briefed by the researcher on the literal meaning of the questionnaires. Comprehensibility evaluation was done meticulously and upon obtaining a 100 % precision understanding of the questions, it was deemed translation was not required. The senior line leaders had a 45 minutes briefing in their own mother tongue with their workers to ensure that issues with regards to lacks of questionnaire understanding does not affect the reliability of the questions.

3.7 The pilot study

Pilot study is conducted to gauge the reliability of the research tools. Pilot study of the research was conducted at TESB and involved focus group of 50 workers, supervisors, and leaders from the following departments: quality control, metal stamping, degreasing, quality assurance, and tooling. A total of 5 questions per operational unit were distributed preceded by the 15 minutes of explanation by the researcher. The average age of the workers at the company is 45 years, almost 50 % foreign workers and 50 % locals. The average education level of the workers is secondary education. Cronbach's coefficient shall be used for this study. In this study, Cronbach's alpha which is 0.7 and above has been considered as to be an adequate level of reliability to test causal relations as cited by Muniz et al. (2012). Arezes et al. (2008) has also cited the acceptance of Cronbach's alpha of 0.7 and above as reliable.

3.8 The Administration of the Survey Instruments

3.8.1 The Data Collection Procedure

Survey questions were distributed during the morning and night shift.. The function of the author is as a moderator during the entire process. The following sequential steps were taken:

a) Step 1 – Permission sought from top management of TESB for the study. Permission from the respective department heads to interrupt normal routine of work in order to complete the questionnaires.
b) Step 2- Verbal comprehensibility tests to local and foreign senior line leaders with regards to the questionnaires. Distribution of questionnaires takes place only when the accuracy level of 100 % is achieved.

c) Step 3- Distribution of the questionnaires' via the respective senior line leaders and briefing to the workers.
d) Step 4- Briefing to the Senior line leaders, supervisors and managers on the elements of the questionnaires and expectations of the response.
e) This exercise is embellished with the support from the Managing Director of the organization. The leaders of the foreign workers who could converse well in English language and had been serving TESB for a tenure more than 5 years will be trained on the elements of the questions and responses expectations.
f) Collection of questionnaires from the respective departments and inspection of survey questionnaires to ensure that all sections have been filled up correctly.
g) Revert the erred forms to the respective participants confidentially (in the absence of the management) and recollect after correction.

Employee anonymity was established to ensure that the feedbacks received are not biased by their fear of reprisal from the management and superiors, thus a code number was used to track employees. The code numbers used corresponds with the employee's assigned work number. The number was an already established internal tracking system; therefore no participants' names were recorded on the surveys.

It remains an established fact that the reliability of this study was dependent upon sincere and honest responses of each subject. To maximize the integrity of the responses, voluntary participation in the survey, anonymity, and confidentiality were emphasized. Nobody other than the author was allowed to have access to the completed questionnaires. The author personally distributed all the survey questions to the leaders, who were responsible to collect the questionnaire's from each departments. To ensure

standardization of the survey, managing director and/ or management representatives were invited to attend and witness the survey administered by the author.

3.9Analysis of the Data

SPSS version 19 for windows had been utilized to perform statistical analysis. All the completed questionnaires had been manually inspected against unanswered items. In order to guarantee the maximum reliability of the scales proposed, Cronbach's alpha coefficient had been used for this study. In this study, Cronbach's alpha which is 0.7 and above has been considered as to be an adequate level of reliability to test causal relations as cited by Muniz et al. (2012). Arezes et al. (2008) has also cited the acceptance of Chronbach's alpha of 0.7 and above as reliable.

3.9.1 Data Screening

Data screening and transformation techniques had been adopted for this study to ensure that data had been correctly entered and that the distributions of variables that are to be used in analysis are normally distributed. Data screening is accomplished via analysing the frequencies and valid percentage of the variables. Normality is accessed by analysing the histogram, stem and leaf plot. Kurtosis and skewness is tested to investigate the degree of skewness of the variables being investigated. Observed data, which nears zero depicts there are no skewness of data.

Box plot analysis had been used to investigate any incidents of outliers, which could be corrected before the data is further analysed. Plot summary statistics of median, 25th and 75th percentiles and extreme scores (outliers) are investigated. Outliers are distinguished

by observed values which are located between 1 ½ and 3 box lengths from the upper or lower edge of the box.

3.9.2 The Reliability of the Instruments

The reliability study, which had been performed, is an indicator of the degree of internal consistency between the multiple variables (direct, indirect and intervening variables) that make up the scale. This represents the extent to which the indicators or items of the scale are measuring the same concepts. The average correlation of items within a test to ascertain whether the items are standardized tested using Cronbach's alpha. Validation of the subscales of the constructs for internal consistency had been determined. The acceptable coefficient of alpha shall be more than 0.7 as established by previous researchers (Brown, et al., 2000; Neal et al., 2000; Seo, 2005).

3.9.3 Descriptive statistics

Descriptive statistics had been utilized to explore the data collected and to summarize and describe the characteristics of the sample comprising of the demographic sample. Descriptive analysis for this research comprises of the demographic elements of the subject sample. The pertinent elements of work experiences, academic level, and service tenure are continuous variables; hence, mean standard deviation; maximum and minimum had been used to explore the data. The categorical variables, which comprised of gender, race, and academic status, working shift, nationality and injury experience, and frequency percentage of all samples had been analysed.

Pearson correlation had been used to determine the significance of correlation between all the independent variables (safety climate, safety participation and perceived work pressure) and the dependant variable (Safety behaviour). Scatter plots are drawn to determine whether assumptions of linearity and homoscedasticity were violated.

3.9.4 Hypothesis Testing

3.9.4.1 Independent sample t- test

The independent sample t-test had been used to test differences in means between two groups (Coakes, Steed, & Ong, 2010). The t-test is used because the dependent variable is a continuous interval scale variable (safety behaviour) and the independent variable is a two-level categorical variable (work shifts). The null hypothesis is tested by assuming that two population means were equal. The t-test and the test statistic used to generate p values has a Student's t distribution with n-1 degrees of freedom. Homogeneity of variance has been tested using Levene test for equality of variance. If the test is significant ($p < 0.05$), then the null hypothesis is rejected and the alternative hypothesis, which is the interest of this study is accepted because the variances are unequal.

3.9.4.2 One way ANOVA between groups

The difference of mean between two population means had been analysed using this technique (Coakes et al., 2010). One way ANOVA (Analysis of Variance) had been used to test the hypothesis that the means amongst more than two groups are equal, under the assumption that the sampled populations are normally distributed.

The null hypothesis for ANOVA is that the population means (average value of the dependent variable) is the same for all groups, thus there are no differences among the group means. The alternative hypothesis is that the average is not the same for all groups. A significant F test will allow the null hypothesis to be rejected.

The one-way ANOVA is used with an interval or ratio level continuous dependent variable (safety behaviour) and a categorical independent variable (safety climate, safety participation and perceived work pressure) that has different levels. The levels correspond to different groups based on the demographic variables.

3.9.4.3 Regression Analysis

Regression analysis had been used to examine the degree of variance in safety behaviour and the three independent variables (safety climate, perceived work pressure and safety participation). The variance had been determined from R square value and beta coefficient will verify the contributors ranking (Coakes et al., 2010).

3.10Approval from Topaz Evergreen Sdn. Bhd

Approval to conduct this research project was bestowed by Mr. Choong Siew Ken who is the Managing Director of TESB. The managing director recognizes the pertinence of this project in enabling prompt identification of behavioural factors, which could be identified as part of the improvement project. The author has pledged to abide by the safety requirements imposed by the organizations and committed to conduct the survey with minimal disruption to their manufacturing process.

3.11 Summary

The research tools, which are explained in this chapter, are utilized with assumption that the data is normally distributed. The questionnaires' were distributed once the permission was granted by TESB.

CHAPTER 4

RESULTS AND DISCUSSION

4.0 Introduction

This chapter provides the results of the research and a statistical interpretation of the research results. Statistical package for social science (SPSS) version 19 had been utilized. Data refining using descriptive statistics, reliability of constructs using Cronbach's alpha and ascertaining difference of means between sample groups via the utilization of independent t test and ANOVA are described. The correlation between the variables has been attempted. Finally multiple regressions have been tested to produce the best prediction of dependent variables from the independent variables.

4.1 Summary of data collection

The following responses were obtained from the participants

4.1.1 Number of returns

A total of 160 survey questions were distributed to the manufacturing site of Topaz Evergreen Sdn.Bhd. The total completed questionnaires which were successfully obtained from the participants are 150 which represent 93.8%. Higher yield of returns were obtained because the top management and respectable leaders of the various work groups were present during the exercise.

Table 4.1 shows that the summary of the distributed questionnaires' and the response obtained.

Table 4..1
Summary of sampling returns

	Number	*Percentage*
Sample	*132*	
Distributed	*160*	*100.0*
Questions get back	*150*	*93.8*

4.1.2 Normality test

Normality test presented in Table 4.2 shows both skewness and normality were within normal distribution, hence parametric tests could be attempted for further analysis of the data.

Table 4.2
Tests of Normality

Variable	*Skewness*	*Kurtosis*
Safety Climate	*-0.63*	*-1.33*
Safety Participation	*-0.40*	*-1.51*
Work Pressure	*0.22*	*-0.82*
Safety Behaviour	*-0.45*	*-1.50*

From Table 4.2 it is observed that skewness ranges from -1 to +1 which is within the acceptable range (Brown, 2012). Safety climate, safety participation and safety behaviour demonstrates a negative skew while, work pressure depicts a positive skew. The negative skewness values indicate a clustering of scores at the high end while the positive skewness indicates that values indicate that the distribution is rather peaked. However, the kurtosis is within the acceptable range of -3.0 to 3.0 (Brown, 2012).

4.2 The Demography of respondents

Table 4.3 illustrates that the majority of the workers are within the age of 23 years to 28 years old and between 29 years to 34 years old. The higher number of workers within this category is owing to the nature of work which requires strength and agility.

Table 4.3
Profile of respondents by age

	Frequency	Percentage
17years to 22 years	2	1.3
23years to 28years	70	46.7
29years to 34 years	56	37.3
More than 35 years	22	14.7
Total	150	100

Table 4.4 shows that the literacy rate among the respondents falls within secondary school level (47.3 %) and primary (29.3 %). There were fewer respondents who had obtained either certificate (8.7 %) or tertiary education (2.7 %). This is due to the nature of the job, which does not require general workers to obtain high levels of literacy with exception of the supervisors and managerial levels.

Table 4.4
Profile of respondents by literacy level.

	Frequency	Percent
Below primary	18	12
Primary	44	29.3
Secondary	71	47.3
Certificate or Diploma	13	8.7
College or higher	4	2.7
Total	150	100

Table 4.5 depicts that 55.3 % of the workers spend above 52 hours at their work place. This suggests that majority of the workers are contributing to over time works which could cause exhaustion.

Table 4.5
Respondents profile by work hours

	Frequency	Percentage
40 hours to 45 hours	47	31.3
46 hours to 51 hours	20	13.3
above 52 hours	83	55.3
Total	150	100

Table 4.6 depicted that the majority of respondents are males (68.7 %) compared to their female counterparts (31.3 %). This is attributed by the fact that steel industry such as Topaz Evergreen requires physical work, which requires a substantial number of male workers.

Table 4.6
Respondents profile by gender

Gender	Frequency	Percent
Male	103	68.7
Female	47	31.3
Total	150	100.0

Table 4.7 illustrates that the majority of the foreign workers are foreigners who comprised of 70.7 %. This unbalanced nationality is contributed by the unwillingness of Malaysian workers to be employed in a less comfortable working environment

Table 4.7

Respondents profile by nationality

Nationality	*Frequency*	*Percent*
Malaysia	*44*	*29.3*
Foreigner	*106*	*70.7*
Total	*150*	*100.0*

Majority of the foreigners are from Myanmar, which constitutes approximately 56 % of the total foreigners employed in Topaz Evergreen as depicted in Table 4.8.

Table 4.8

Profile of foreign workers

Country	*Frequency*	*Percent*
Bangladesh	*5*	*4.8*
Cambodia	*21*	*20.2*
Indonesia	*6*	*5.8*
Myanmar	*58*	*55.8*
Nepal	*16*	*13.5*
Total	*106*	*100.0*

Table 4.9 shows that the distribution of workers between morning and night shift is almost equal and accounts to 47.3 % and 52.7 % respectively. The slight difference in the numbers of morning shift workers is due to absenteeism.

Table 4.9

Profile of workers in shift

Shift	*Frequency*	*Percent*
Morning	*71*	*47.3*
Night	*79*	*52.7*
Total	*150*	*100.0*

4.3 The pilot survey

The reliability of the pilot survey conducted among a sample of 50 personnel yielded the following results depicted in table 4.10

Table 4.10
Pilot test reliability of scales

Variable	*Item*	*Cronbach Alpha*
Safety Climate	*6*	*.966*
Safety Participation	*6*	*.938*
Work Pressure	*6*	*.939*
Safety Behaviour	*7*	*.948*
Overall	*25*	

According to (Seo, 2005; Brown et al., 2000; Neal et al., 2000) the acceptable coefficient of alpha shall be more than 0.7, which would depict a good internal

consistency. In the current study, the Cronbach alpha coefficient was exceeded to 0.9, which shows good internal consistency of scales.

4.4 The reliability of the instrument

4.4.1 Internal Reliability

An examination of Cronbach's alpha from the final data shows that the instrument which has been adopted is reliable (Table 4.11). Values exceeding 0.7 shows that the items selected are standardized.

Table 4.11
Final test reliability of the instrument

Variable	*Item*	*Cronbach's Alpha*
Safety Climate	*6*	*.958*
Safety Participation	*6*	*.921*
Work Pressure	*6*	*.940*
Safety Behaviour	*7*	*.947*
Overall	*25*	

4.5 Descriptive statistics

i. Mean and standard deviation

The descriptive statistics of variables could be explained as per table 4.12.

The descriptive for this study depicted a lowest score with 3.19 for work pressure whilst safety behaviour scored the highest of 3.80. As for the standard deviation, the highest and lowest score have been observed for safety behaviour (1.21) and safety climate (1.11) respectively.

Table 4.12
Mean and Standard Deviation for safety climate, work pressure, safety participation and safety behaviour.

	Mean	*Standard Deviation*
Safety Climate	*3.90*	*1.11*
Work pressure	*3.19*	*1.14*
Safety participation	*3.81*	*1.13*
Safety Behaviour	*3.80*	*1.21*

Note: All items used a 6-point Likert scale with 1=Strongly disagree and 6=Strongly agree

ii Education levels and safety behaviour

An analysis of cross tabulation between safety behaviour and education levels as presented in table 4.13 shows that safety behaviour is agreed as an important element of work practice among 48 workers with secondary academic levels which represents 52.7 %. Literacy level among the management of the organization are secondary, hence the percentage of management who agrees that safety behaviour is important is higher. A total of 11 new line of supervisor and managers who possesses a minimum of either a certificate or diploma and had regarded safety behaviour of workers as an important aspect of work practice (12.1 %).

Table 4.13

Cross Tabulation of Safety Behaviour and literacy level

	Safety Behaviour	
Education	*disagree*	*agree*
Below primary	*10 (16.9 %)*	*8(8.8 %)*
Primary	*22 (37.3 %)*	*22(24.2 %)*
Secondary	*23 (39 %)*	*48(52.7 %)*
Certificate or Diploma	*2 (3.4 %)*	*11(12.1 %)*
College or higher	*2 (3.4 %)*	*2 (2.2 %)*
Total	*59 (100 %)*	*91 (100 %)*

iii. Safety behaviour and length of service

An analysis of cross tabulation data of safety behaviour and length of service as presented in table 4.14 shows that a total of 15 workers representing 16.5 % within the service years of 6 to 10 years agrees that safety behaviour is important at work place. A total of 42 workers or 71.2 % of the workers who had worked in this organization for a period of 1 to 5 years disregard safety behaviour as an important element. The management team comprising of 3 employees or 3.3 % had worked for tenure of 11 to 15 years since the establishment of the steel manufacturing division had regarded safety as an important element of business operations. A total of 25 workers who had been employed for a tenure of less than 1 year or 27.5 % of the workers agrees that safety behaviour is important.

Table 4.14

Cross Tabulation of Safety Behaviour and length of service

	Safety Behaviour	
Years of service	*disagree*	*agree*
Less Than 1 year	*6 (10.2 %)*	*25 (27.5 %)*
1 to 5 years	*42 (71.2 %)*	*44 (48.4 %)*
6 to 10 years	*10 (16.9 %)*	*15 (16.5 %)*
11 to 15 years	*1 (1.7 %)*	*3 (3.3 %)*
More than 15 years	*0 (0 %)*	*4 (4.4 %)*
Total	*59 (100 %)*	*91 (100 %)*

4.6 Hypothesis testing

4.6.1 Correlation between safety climate, safety participation, perceived work pressure and safety behaviour

1) H1a There is a relationship between safety participation and safety behaviour of workers

2) H 1b There is a relationship between safety climate of the work place and safety behaviour

3) H1c There is a relationship between workers perceived work pressure and safety behaviour.

The results illustrated in table 4.15 depict a matrix of correlations and sample statistics of all the independent variables (safety climate, safety participation, and perceived work pressure) and dependent variable (safety behaviour).

Table 4.15
Correlation Matrix among Variables

	Safety Behaviour	Safety Climate	Safety Participation	Perceived Work Pressure
Safety Behaviour	1			
Safety Climate	.716(**)	1		
Safety Participation	.604(**)	.546(**)	1	
Perceived Work Pressure	-.535(**)	-.667(**)	-.394 (**)	1

** Correlation is significant at the 0.01 level (2-tailed).

Based on the results shown in table 4.15 a positive correlation between safety behaviour and safety participation has been obtained ($r = 0.604$, $p < 0.01$). Thus, hypothesis H1a ,i.e. Safety participation is correlated with safety behaviour of workers is proven, hence safety behaviour manifests positively among workers with respect to safety climate.

In addition the results obtained from this analysis shows the existence of a positive correlation between safety climate and safety behaviour of the work place ($r = 0.716$, $p < 0.01$). Thus Hypothesis H1b is accepted. Hence, sustaining a higher safety climate would improve the safety behaviour of the workers.

Apart from that, table 4.15 depicts a negative correlation between perceived work pressure and safety behaviour ($r = - 0.535$, $p < 0.01$). Thus, Hypothesis H1c is accepted, thus, when the perceived work pressure increases, safety behaviour would decline.

4.6.2 Safety behaviour and shift works

H2 : There are differences in safety behaviour among workers in morning and night shifts.

Results obtained as depicted in Table 4.16 shows a vast difference in response between morning and night shift workers.

Table 4.16

Safety behaviour and shift work differences

Shift	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Morning	*71*	*4.45*	*0.800*	*.095*
Night	*79*	*3.22*	*1.237*	*.139*

	Levene's Test for Equality of Variances		*t-test for Equality of Means*						
								95% Confidence Interval of the Difference	
	F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*	*Lower*	*Upper*
Equal variances assumed	*48.012*	*.000*	*7.134*	*148*	*.000*	*1.228*	*.172*	*.888*	*1.568*
Equal variances not assumed			*7.293*	*134.917*	*.000*	*1.228*	*.168*	*.895*	*1.561*

Based on independent t –test in relation to shift work variable, Levene's test was significant ($p = 0.00$, $p < 0.05$) and so the equal variances not assumed estimates are interpreted. Consulting the t- value, df and two-tail significance, and significant differences between morning shift and night shift workers behaviours are apparent ($p = 0.000$, $p < 0.05$). Thus there is significant difference in safety behaviour among morning and night shift workers $t(135) = 7.293$, $p = 0.000$, $p < 0.05$, thus workers in morning shift have better safety behaviour compared to their night shift counterparts.

4.6.3 Safety behaviour differences based on nationality

H3 : There are differences in safety behaviour among Malaysian and foreign workers

Table 4.17

Respondents safety behaviour based on nationality

Nationality	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Malaysia	*44*	*4.74*	*.309*	*.047*
Foreigner	*106*	*3.41*	*1.239*	*.120*

	Levene's Test for Equality of Variances		*t-test for Equality of Means*						
								95% Confidence Interval of the Difference	
	F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*	*Lower*	*Upper*
Equal variances assumed	*223.728*	*.000*	*7.033*	*148*	*.000*	*1.332*	*.189*	*.958*	*1.707*
Equal variances not assumed			*10.328*	*131.619*	*.000*	*1.332*	*.129*	*1.077*	*1.588*

Results obtained as depicted in Table 4.17 shows a difference between Malaysian and foreign workers. Based on independent t –test in relation to shift work variable, Levene's test was significant ($p = 0.000$, $p < 0.05$) and so the equal variances not assumed estimates are interpreted. Consulting the t- value, df and two-tail significance, and significant differences between Malaysian and Foreign workers behaviours are apparent ($p = 0.000$, $p < 0.05$). Thus there is significant difference in safety behaviour among Malaysian and foreign workers $t(132) = 10.33$, $p=0.000$, $p < 0.05$, thus, Malaysian workers have better safety behaviour compared to foreigners. However, this result has to be interpreted with caution owing to the uneven number between Malaysian and foreigners whose strength are 44 and 106 workers respectively.

4.6.4 Safety climate and shift work

H4 : There are differences in safety climate perception between morning shift and night shift workers.

Table 4.18
Respondents safety climate based on working shifts

Shift	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Morning	*71*	*4.34*	*.795*	*.094*
Night	*79*	*3.50*	*1.206*	*.136*

Independent Samples Test

	Levene's Test for Equality of Variances		*t-test for Equality of Means*						
								95% Confidence Interval of the Difference	
	F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*	*Lower*	*Upper*
Equal variances assumed	*71.461*	*.000*	*4.958*	*148*	*.000*	*.837*	*.169*	*.503*	*1.170*
Equal variances not assumed			*5.064*	*136.186*	*.000*	*.837*	*.165*	*.510*	*1.164*

Based on the results displayed in table 4.18, independent t –test in relation to shift work variable, Levene's test was significant ($p = 0.000$, $p < 0.05$) and so the equal variances not assumed estimates are interpreted. Consulting the t- value, df and two-tail significance, and significant differences between morning and night shift workers behaviours are realized ($p = 0.000$, $p < 0.05$). Thus there is significant difference in safety climate among morning and night shift workers $t(136) = 5.06$, $p = 0.000$, $p <$

0.05, thus, workers in morning shift have better safety climate perception compared to their night shift counterparts..

4.6.5 Shift works and perceived work pressure

H5 : There are differences in perceived work pressure between morning shift and night shift workers.

Table 4.19

Respondents work pressure based on shift works

Shift	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Morning	*71*	*3.65*	*.825*	*.098*
Night	*79*	*2.68*	*1.191*	*.134*

Independent Samples Test

	Levene's Test for Equality of Variances		*t-test for Equality of Means*						
								95% Confidence Interval of the Difference	
	F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*	*Lower*	*Upper*
Equal variances assumed	*36.669*	*.000*	*-5.704*	*148*	*.000*	*-.965*	*.169*	*-1.299*	*-.631*
Equal variances not assumed			*-5.813*	*139.275*	*.000*	*-.965*	*.166*	*-1.293*	*-.637*

Based on independent t –test in relation to shift work variable shown in table 4.19, Levene's test was significant ($p = 0.000$, $p < 0.05$) and so the equal variances not assumed estimates are interpreted. Consulting the t- value, df and two-tail significance,

significant differences between morning and night shift workers behaviours are realized ($p = 0.000$, $p < 0.05$). Thus there is significant difference in perceived work pressure among morning and night shift workers $t(139) = -5.813$, $p = 0.000$, $p < 0.05$, thus, workers in morning shift have a higher work pressure compared to night shift workers.

4.6.6 Safety climate among foreign and Malaysian workers

H6 : There are differences in safety climate between Malaysian and foreign workers

Table 4.20

Respondents safety climate based on nationality

Nationality	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Malaysia	*44*	*4.59*	*.440*	*.066*
Foreigner	*106*	*3.61*	*1.177*	*.114*

Independent Samples Test

	Levene's Test for Equality of Variances		*t-test for Equality of Means*						
								95% Confidence Interval of the Difference	
	F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*	*Lower*	*Upper*
Equal variances assumed	*247.042*	*.000*	*5.367*	*148*	*.000*	*.981*	*.183*	*.620*	*1.343*
Equal variances not assumed			*7.423*	*146.943*	*.000*	*.981*	*.132*	*.720*	*1.243*

Based on independent t –test in relation to shift work variable as shown in table 4.20, Levene's test was significant ($p = 0.000$, $p < 0.05$) and so the equal variances not

assumed estimates are interpreted. Consulting the t- value, df and two-tail significance, significant differences between Malaysian and Foreign workers behaviours are proven ($p = 0.000$, $p < 0.05$). Thus, there is significant difference in safety climate among Malaysian and foreign workers $t(147) = 7.423$, $p = 0.000$, $p < 0.05$, thus, Malaysian workers have better perceived safety climate compared to foreigners. However this result has to be interpreted with caution owing to the uneven number between Malaysian and foreigners whose strength are 44 and 106 workers respectively.

4.6.7 Safety participation among shift workers

H 7 : There are differences in safety participation between morning shift and night shift workers.

Table 4.21

Respondents safety participation based on shift works

Shift	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Morning	*71*	*4.13*	*1.020*	*.121*
Night	*79*	*3.53*	*1.155*	*.130*

Independent Samples Test

	Levene's Test for Equality of Variances		*t-test for Equality of Means*						
								95% Confidence Interval of the Difference	
	F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*	*Lower*	*Upper*
Equal variances assumed	*15.550*	*.000*	*3.340*	*148*	*.001*	*.597*	*.179*	*.244*	*.951*
Equal variances not assumed			*3.363*	*147.960*	*.001*	*.597*	*.178*	*.246*	*.948*

Based on independent t –test in relation to shift work variable shown in table 4.21, Levene's test was significant ($p = 0.001$, $p < 0.05$) and so the equal variances not assumed estimates are interpreted. Consulting the t- value, df and two-tail significance, significant differences between morning and night shift workers behaviours are realized ($p = 0.001$, $p < 0.05$). Thus, there is significant difference in safety participation among morning and night shift workers, $t(148) = 3.363$, $p = 0.001$, $p < 0.05$, thus, workers in morning shift have a higher safety participation compared to night shift workers.

4.6.8 Safety participation and academic levels

H 8 : There are differences in safety participation between academic level of workers.

Table 4.22
Test of Homogeneity of Variances
Safety Participation

Levene Statistic	*df1*	*df2*	*Sig.*
2.223	*4*	*145*	*.069*

Table 4.23
ANOVA
Safety Participation

	Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*
Between Groups	*14.953*	*4*	*3.738*	*3.092*	*.018*
Within Groups	*175.286*	*145*	*1.209*		
Total	*190.239*	*149*			

Note : Secondary academic level $p < 0.05$, mean 4.050

A one way analysis of variance (ANOVA) was utilized to examine whether the safety participation dimensions differed amongst the 5 groups. Table 4.22 shows that Levene's test for homogeneity of variances was not significant ($p = 0.069$, $p > 0.05$), thus, the population variances for each group were approximately equal. This proves that the homogeneity assumptions have not been violated.

Based on the data displayed in table 4.23, given that $p = 0.018$, $p < 0.05$, the null hypothesis is rejected and the alternative hypothesis that states that the safety participation is different between workers of different academic levels. The post-hoc (Tukey HSD) depicts that below primary and secondary academic levels have significantly different safety participation, $F(4,145) = 3.092$, $p < 0.05$.

This shows that workers with secondary academic levels have a better safety participation (mean value of 4.05) compared to workers who only possess an academic qualification below primary levels (mean value of 3.09).

4.6.9 Safety participation among foreign and Malaysian workers

H9 : There are differences in safety participation between Malaysian and foreign workers.

Table 4.24

Respondents safety participation based on nationality

Nationality	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Malaysia	*44*	*4.62*	*.550*	*.083*
Foreigner	*106*	*3.48*	*1.140*	*.111*

Independent Samples Test

		Levene's Test for Equality of Variances		*t-test for Equality of Means*						
									95% Confidence Interval of the Difference	
		F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*	*Lower*	*Upper*
SP	*Equal variances assumed*	*126.110*	*.000*	*6.352*	*148*	*.000*	*1.145*	*.180*	*.789*	*1.501*
	Equal variances not assumed			*8.274*	*144.664*	*.000*	*1.145*	*.138*	*.871*	*1.418*

Based on independent t –test in relation to shift work variable shown in table 4.24, Levene's test was significant ($p = 0.000$, $p < 0.05$) and so the equal variances not assumed estimates are interpreted. Consulting the t- value, df and two-tail significance, and significant differences between Malaysian and Foreign workers behaviours are proven ($p = 0.000$, $p < 0.05$). Thus there is significant difference in safety participation among Malaysian and foreign workers $t(145) = 8.274$, $p = 0.000$, $p < 0.05$, thus, Malaysian workers have better safety participation compared to foreigners. However this

result has to be interpreted with caution owing to the uneven number between Malaysian and foreigners whose strength are 44 and 106 workers respectively.

4.6.10 Regression analysis

H10 : Safety climate, safety participation and perceived work pressure influences safety behaviour of workers

Multiple regression analysis demonstrated that safety behaviour were predictive of actual levels of safety climate and safety participation among workforce. Table 4.22 depicts that both independent variables of safety climate, perceived work pressure and safety participation explain 58.1 % of the variance (R Square) in safety behaviour of employees.

Table 4.25
Model Summary[b]

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
1	*.762*[a]	*.581*	*.573*	*.79512*

a. Predictors: (Constant), WP(work pressure), SP(safety participation), SC (safety climate)

b. Dependent Variable: SB(safety behaviour)

Note : *Predictors: (Constant), WP, SP, SC,* Significant at 0.000

The overall results indicate that safety climate and safety participation explains the safety behaviour among workers in TESB.

4.7 Summary of hypothesis testing results

The summary of the results obtained are presented in table 4.26. The entire hypotheses have been proven.

Table 4.26

Summary of Hypothesis

No	Hypothesis	Results
H1	1) H1a There is a relationship between safety participation and safety behaviour. 2) H 1b There is a relationship between safety climate of the work place and safety behaviour 3) H1c There is a relationship between workers perceived work pressure and safety behaviour.	Accepted
H2	There are differences in safety behaviour among workers in morning and night shifts.	Accepted
H3	There are differences in safety behaviour among Malaysian and foreign workers.	Accepted
H4	There are differences in safety climate perception among morning shift and night shift workers.	Accepted
H5	There are differences in perceived work pressure among morning shift and night shift workers.	Accepted
H6	There are differences in safety climate among Malaysian and foreign workers	Accepted
H7	There are differences in safety participation among morning shift and night shift workers.	Accepted
H8	There are differences in safety participation among different academic levels of workers.	Accepted
H9	There are differences in safety participation among Malaysian and foreign workers.	Accepted
H10	Safety climate, safety participation and perceived work pressure influences safety behaviour of workers	Accepted

4.8 Discussion

Several hypotheses were tested to explore the relationship between safety behaviour, safety climate, perceived work pressure, and safety participation. This phenomenon could be explained as follows :

4.8.1 Safety climate, perceived work pressure, safety participation and safety behaviour

There have been many assumptions on reasons why workers indulge in unsafe work behaviour. There are numerous antecedents of unsafe work behaviour such as the perceived safety climate of the workers, their levels of participation in safety activities and production pressure to produce defect free products within a short lead time. Management is responsible for implementing the safety management systems including planning, organizing, providing safety policies and working procedures. It is a common practice in industrial sectors that productivity bonuses led workers to achieve higher production at the cost of safety.

The negative correlation between safety behaviour and work pressure obtained in this study shows that workers contemplate and commit unsafe acts because they have been rewarded for doing so. This untoward behaviour had been proven by Choudhry et al. (2008). This researcher had proven that the production expediency lowers safety climate, thus causing safety behaviour to decline.

Pressure to produce defect free products do not augur well as it dispels compliance to safe work systems as supported by Das et al. (2008); Keren et al. (2009). The outcomes of this research had proven that increased work pressure discourages safety participation, thus, badly affecting workers safety behaviour. This interesting phenomenon could be explained as follow; production expediency creates an atmosphere of unfavourable safety climate which signals the workers that safety could be compromised at the cost of safety.

The relevance of this notion had been highlighted by numerous researchers (Brown et al., 2000; Krause et al., 1999; Mitropoulos et al., 2009). In essence, it is imperative to promptly ascertain the antecedents that had the most considerable influence on safety behaviour, in order to develop a strategy to apprehend the effects. The outcomes of this study which points to the positive correlation between safety behaviour and safety climate is consistent with the findings of Zhou et al. (2008). Thus, improving safety climate would improve overall safety behaviour of the workers and eventually reduce accidents and injury rates as highlighted by Smith et al. (2006).

Apart from that, safety related behaviours are critical, because they reflect the actual behaviours performed by individuals to maintain a safe workplace. One of the manifestations of safety behaviour is safety participation. There are compelling reasons which points to the lower safety participation among workers who consider the safety climate is lower. Prevalence of hazards is one of the reasons which cause a lower safety climate among workers as highlighted by Arezes et al. (2007); Brown et al. (2000); Clarke (2006); Cooper et al. (2004). Workers who perceive that hazards are prevalent at

their work place and lacks intervention from management possessed a lower perceived safety climate.

This is shown from the results of this study which points to a decline in safety behaviour when safety climate is low. This finding is consistent with the findings of Arezes et al. (2008); Brown et al. (2000); Parboteeach et al. (2008). Managements' key focus on profitability, expediency and efficiency would discourage workers from voluntarily participate in safety related activities and systems. Coercive participation would have detrimental effects on workers safety participation due to the fact that workers compelled to work safely would revert to their previous behaviour once the management's presence at the work place is removed as pointed by Arezes et al. (2007); Brown et al. (2000); Clarke (2006); Cooper et al. (2004); Das et al. (2008); Keren et al. (2009); Turner et al. (2007).

It is also interesting to note that planned behaviour among workers at workplaces are influenced by their perceived work pressure (Fogarty et al., 2010). Apart from that, Turner et al. (2012) discovered that an increase in work pressure and high job demands lowers safety participation, as employees might forego effortful behaviours to improve safety to ensure that tasks are accomplished as per management's expectations. This is consistent with the research findings of Keren et al. (2009) who found that productivity, a major challenge to safety climate level due to the tension between productivity and safety as operational goals, affects safety behaviour of the employee.

Perceived work pressure remains an important facet which determines perceived safety climate of an organization as shown in this research. Based on the negative correlation between perceived work pressure and safety climate, it is imperative to ensure that production pressure is sustained at levels which are acceptable and within the limitations of the employees, a notion shared by previous researchers (Brown et al., 2000; Kapp et al., 2012; Mc Lain et al., 2007; Mitropoulos et al., 2009). Workers who are unable to tolerate extreme work pressure would eventually resort to circumventing safety procedures as an endeavour to expedite production process flow, a notion shared by Das et al. (2008).

In addition, Seo (2005) discovered that improving safety climate would augur well as an instrument which would decrease work pressure among employees in the risk reduced establishment. The robustness of these findings is further enhanced by similar findings of Mitropoulos et al. (2009) who discovered that the demand and capabilities with regards to production pressure had to be in an equilibrium, failing which safety behaviour would decline.

This study had shown the existence of a positive correlation between safety behaviour and safety participation which is consistent with the findings from previous researchers (DeArmond, et al., 2011; DePasquale et al., 1999; Ford et al., 2011; Guldenmund et al., 2010; Ham et al., 2012; Hale et al., 2010; Mitropoulos et al., 2009; Shang et al., 2012; Walker, 2010).

It is also important to note that positive safety climate and safety participation would be an antecedent to an employees' safety behaviour (Brondino et al., 2012). Hence, in a

high risk manufacturing environment such as TESB, it would be utmost important to ensure that safety climate is elevated to ensure better safety participation among TESB workers, thus culminating in an improved safety behaviour.

This is consistent with previous research supporting the importance of safety climate in predicting safety behaviour of employees (Kapp et al., 2012; Muniz et al., 2012; Neal et al., 2000; Zohar, 2010). The importance of safety participation which is an element of safety performance is correlated with safety behaviour as highlighted by DeArmond, et al. (2011); DePasquale et al. (1999); Geller (2001); Luria et al. (2012); Shang et al. (2012).

Thus improving the safety climate of an organization should be paramount for an organization which contemplates reducing accidents as most of the accidents of the decade are often associated with worker's unsafe act among night shift workers (Hamalainen et al., 2012; Smith et al., 2006).

A proactive safety behaviour determined by improved safety climate would prove to be important determinants of accidents and incidents as proven by Fugas et al. (2012). Manipulating factors determining safety climate within an organization would enable management to effortlessly manage workers because forced participation would diminish good safety behaviour (Shang et al., 2012). These findings are also supported by Lu et al. (2005); Smith et al. (2006); Turner et al. (2012); Zohar (2008); Zohar (2010). Robust correlations between safety climate and safety behaviour of workers proven in this research is consistent with the findings by Cooper et al. (2004) and Hayes et al. (1998), who discovered the fact that workers with high perception of safe work

environment often complied with safety behaviour, which is expected by an organization.

The robust correlations between safety behaviour and safety climate proves that workers would behave in unsafe behaviour when safety climate declines. Improving safety climate in this industry would elevate safety behaviour of the workers because accidents and incidents would cause a temporary halt of production. This notion had also been shared by Cooper et al. (2004) and Zohar (2010). Hence, it remains top priority to steel organizations to improve their safety climate, which could improve safety behaviour among workers, thus, leading towards lower accidents and incident rates among workers. Inadequate provision of personal protective equipment is able to reduce safety climate of the production shop floor.

This is due to the fact that workers would have to fend off the hazards without proper protective equipment, thus, placing them in a vulnerable situation. Consequently, they would resort to violating safe work systems because the essential items such as protective equipment had been regarded as unimportant by the employer. In this connection, Mc Lain et al. (2007) attributed these effects to the lacks of resources available to the workers to protect themselves and perform job efficiently. Hence, it is imperative to improve safety climate in order to instil safe work behaviour amongst workers.

Thus from this research, it is paramount that safety participation and safety climate have improved as an endeavour to elevate safety behaviour consistent with the findings of Brown et al. (2000); Fugas et al. (2012); Shang et al. (2005).

Hence, the correlation results acknowledge the findings of Brown et al. (2000) who emphasized the relationship between safety participation augmented by safety behaviour and its successful abatement of negative effects from work pressure. According to Zohar (2010) elevating safety climate in an organization would improve safety behaviour among workers, which could be an area of improvement at TESB, thus, when workers believe they have the necessary resources to work safely, their behaviour at work is expected to be safer which is a notion shared by Fugas et al. (2012).

4.8.2 Shift work and safety behaviour

This study has examined the safety behaviour of workers in a metal stamping steel industry. Shift works are unavoidable in Malaysian industry, which faces an acute shortage of workers. Employers had resorted to 12 hours with two rotating shifts; hence workers safety behaviour becomes paramount in such circumstances. In addition, it is a profound fact that a significant number of disasters such as Chernobyl, Three Mile Island, and the Exxon Valdez had occurred due to the workers negligence during the night shifts (Hamalainen et al., 2012). Night shifts workers are at risk of falling asleep involuntarily during their work. Workers who are deprived of sleep are at risk of disobeying safety rules due to the inconveniences caused by adhering to safety requirements. In addition the hours of peak drowsiness leads to reduced mental alertness, operational errors, and elevates chances of accidents and incidents. This explains the low safety behaviour of the night shift workers discovered in this study and consistent with the findings of Huang et al. (2007). Apart from that it is also notable that lack of social interaction between workers during night deprive them the essence to self-

inflict safety behaviour among themselves. Workers in night shifts would probably underreport injuries and near misses due to the lacks of social interaction, which would further aggravate undesirable safety behaviours. This argument is also supported by Jiang et al. (2010).

Management staffs in industries often do not work in shifts, thus it remains the onus of the workers and their respective supervisors to ensure that safety procedures are complied. This study shows that safety behaviour among night shift workers tend to be much lower than their night shift counterparts. This notion is supported by the research conducted by Huang et al. (2007) who found that the absence of management and supervision during night shifts further aggravates unsafe acts and unsafe work behaviour among workers.

Prevalence of unsafe work behaviour among night shift workers are caused by the perception of night shift workers who presume that management is complacent towards this shift group, a notion which was also supported by Brown et al. (2000). Hence, the presence of management at planned intervals would bear positive results. This is consistent with the findings of Luria et al. (2012) who had proven that the presence of management during morning shifts instils a certain degree of safety compliance among workers, thus reinforcing safety behaviour. Apart from that the potential impact of working for a safer company may not be that strong for day shift worker as their perceptions of injury risk are generally low.

Another common explanation to this unfavourable phenomenon is the fact that night shift workers perceive a high level of risks owing to the nature of their working environment at night with less interaction of people or rest time. This is consistent with the findings of Huang et al. (2007); Luria et al. (2010). Numerous authors have also found a direct relationship between safety climate and safety behaviour (Lu et al., 2005; Smith et al., 2006; Turner et al., 2012; Zohar, 2008; Zohar, 2010)

It is imperative that workers safe work behaviour and participation are improved as an endeavour to curb unsafe work behaviour and unsafe acts ,consistent with the findings of Fugas et al. (2012); Hale et al. (2010); Smith et al. (2006).

4.8.3 Nationality and safety behaviour

A particular concern for the safety behaviour and well-being of the foreign workers are appropriate because this group of workers often engage in unsafe acts, which seems to be a norm at their home country. Results from this study had shown that foreign workers who are employed from developing countries possesses lower safety behaviour and disregard safe work practices compared to Malaysian workers.

Malaysian workers have been found to conceive better safety behaviour compared to their foreign counterparts due to the existence of good work practices, which are regulated. Newly employed foreign workers would require time to unlearn the negative work cultures and adopt the good ones. This is one of the interesting facts, which was highlighted by researchers (Fang et al., 2006; Geller, 2001; Khader, 2004; Luria et al., 2010).

Malaysian industries are highly dependent on foreign workers for manual labour, hence, employers resort to employ workers from developing countries as an endeavour to reduce operating and overhead costs.

Hence, safety behaviour remains as an important element which needs to be addressed promptly due to the fact that unsafe work behaviour could lead to penalty by the authorities and exposed to huge liabilities, which had to be borne by the employers. This findings are supported by numerous researchers who realized that workers from developing countries places less priority in safe work behaviour (Brown et al., 2000; Fugas et al., 2012; Fang et al., 2006; Neal et al., 2000; Seo, 2005).

These findings are important as Hamalainen et al. (2006) who had pointed that multinational corporation might migrate to labour intensive manufacturing with dangerous work offered to nationalities, which are majority low-income countries who are not concerned with low salaries and poor enforcement of safety regulations.

This is also consistent with the findings of Luria et al. (2010) who had proven the notion that employees with different employment status such as temporary workers would explicit low safety behaviour. Foreign workers are often employed in Malaysia for a limited time, hence, during their tenure; they are primarily concerned with increasing their financial gains, hence, are least concerned of safety. This is a notion which was also shared by Guldenmund et al. (2012).

4.8.4 Shift work and safety behaviour

Safety climate and shift workers are both situational factors related to safety. Understanding safety climate perceptions from workers point of view is paramount as it serves as a determining factor, which distinctly segregates dimensions of safe and unsafe work environment. The importance of these dimensions had been supported by Jiang et al. (2010); Lu et al. (2005). It is imperative for night shift workers to perceive a higher safety climate because night shift workers in companies with a strong safety climate would report a lower level of perceived risk injuries and risks. Absence of management during night shift operations further reduces safety climate of the night shift workers as workers are left unattended.

This is also a notion shared by Huang et al. (2007), which is consistent with the findings of this research. Confirming and contradicting findings within the extent of safety climate among workers in shift and nationality yielded good results consistent with the literatures of previous researchers (Brown et al., 2000; Cooper et al., 2004; Geller, 2001; Mc Lain et al., 2007; Mullen, 2004; Neal et al., 2000; Seo, 2005; Smith et al., 2006; Zohar, 2010). It was found that workers in morning shift have better perception of safety climate compared to their night shift counterparts.

This finding is supported by Brown et al. (2000) and Huang et al. (2007), who found that the support and presence of management creates a sense of good safety climate among workers. This result highlights the importance of the organizational engagement for workers' safety.

This is a pertinent finding because it has been proven that night shift workers in a strong safety climate environment would perceive lower risk of being injured at work than other night shift workers working in a weak safety climate (Huang et al., 2007). These findings are well justified because night shift workers perception of high level of risk emanates from the nature of working environment at night such as less interaction of people or rest time.

Nevertheless, a stronger safety climate significantly diminishes negative perceptions on the risks faced at work place. A lower safety climate would take its toll at accident rates in industries because a lower risk perception among workers would negatively influence them from utilizing personal protective equipment as supported by Arezes et al. (2008), thus it is significant for the management of TESB to initiate endeavours in order to analyze the root cause of poor safety climate among night shift workers.

It is imperative that this analysis is expedited because statistics have proven that the higher probability of disasters of the decade such as Chernobyl, Three Mile Island, and the Exxon Valdez had occurred during the night shifts (Hamalainen et al., 2012).

4.8.5 Nationality and safety climate

Workers perception of safety climate is an antecedent influencing workers social behaviour at work. Hence, workers with lower perceived safety climate tend to display unsafe work behaviour. This is explained by the fact that when safety climate declines, the relevance of safety compliance, level of risk at the work place, management attitudes to safety, and the effect of safe conduct on social status declines.

This is one of the important findings which were highlighted by several researchers' such as Fang et al. (2006); Williams et al. (2000); Zohar (2008); Zohar (2010). This research finding pointed to the fact that Malaysian workers possess a higher perceived safety climate compared to foreigners. Safety climate of foreign workers were found to be lower. The ratio of foreign workers is higher within this industry which raises concerns among management to promptly apprehend this situation. A robust safety climate will ensure that workers voluntarily comply with safety rules and regulations. Hence, interventions which are targeted at night shift workers in this organization would have positive results in this steel industry, which are dependent on foreign workers. This result supports the notion presented by Zohar (2008) & Zohar (2010).

In addition, foreign workers primary concerns are inclined towards financial gain; hence their short tenure enables them to adapt to lower safety climates. The results obtained from this study illustrates that employees diversity explains heterogeneity of safety perceptions, thus significantly affecting their perceived safety climate. This is consistent with the research findings of Guldenmund et al. (2012) and Luria et al. (2010). Apart

from that, Huang et al. (2010) had used this argument to explain the perception difference between workers and the possible interventions, which are feasible to be implemented.

This is a pertinent element for researchers of safety behaviour because workers who are exposed to poor safety climate have been known to circumvent safety procedures and regulations. Their main concern would be camouflaged by management's negligence towards instilling and enforcing work place safety via reducing risks and hazards at work place. This was also proven by several safety behaviour researchers (Arezes et al., 2008; Brown, 2000; Fugas et al., 2012; Neal et al., 2000; Seo, 2005). In addition, the findings from this research concluded that endeavours to elevate safety climate could be used to reduce injury rates in the environment of a steel industry, a notion which is also shared by Smith et al. (2006).

Overall , perception of a weak safety climate had been found to trigger the onset of unsafe work behaviour at TESB. This is evidenced by the results obtained in recent researches (Brown et al., 2000; Fang et al., 2006; Fugas et al., 2012; Hayes, 2012; Luria et al., 2010; Neal et al., 2000; Seo, 2005; Starren et al., 2012; Zhou et al., 2008; Zohar, 2012). Hence, improving safety climate of the steel industry would remain paramount as one of the interventions, which could successfully reduce the number of accidents and incidents at work place. This was reiterated in research done by Smith et al. (2006).

Findings from this research further support the use of safety climate measures as useful diagnostic tools in ascertaining employee's perceptions of safe work behaviour.

4.8.6 Shift work and perceived work pressure

It is an established fact that workload and production pressures affect work behaviour of employees. Disruptions to production process, which are non-routine. Further aggravate the build-up of work pressure among workers. This study had provided a valuable insight into the factors which causes an elevated work pressure among morning shift workers. Production pressure are often the influence of several factors such as production expediency, short lead time orders, inadequate time frame for workers training and product conformity issues, were several factors, which impede safety behaviour among workers. Consistent with these findings, several researchers had highlighted the conflicts between production and safety orientation (Arezes et al., 2007; Das et al., 2008; Keren et al., 2009; Turner et al., 2007).

The findings from this research agrees with the literature, which had been reported by Mitropoulos et al. (2009); Seo (2005). Perceptions of production pressure to prioritize expediency over safety are prevalent in high risk steel industries. An increase in production volume would subsequently cause an increase in production pressure thus causing accidents and incidents. Due to the fact that this factor is unavoidable in steel industries whose manufacturing forecasts are influenced by volatile steel prices, the workers perceived work pressure need to be ascertained at the earliest and apprehended, a notion which was shared by Brown et al. (2000). The fact that morning shift workers

experience higher work pressure provides an opportunity for the management to introduce intervention programmes such as enhancement of behavioural based safety programs. Failure to curb such issues would compel workers to violate safe work practices as an endeavour to comply with the cycle time of manufacturing. This notion cannot be denied as Das et al. (2008) had pointed out this element as a factor which should be apprehended before in becomes rampant at work place.

One of the strategies to reduce accidents at work place is via controlling work pressures and matching skills with task demands which could lead to an equilibrium between safety and productivity which was supported by Mitropoulos et al. (2009). Work pressure distinctions between morning shift workers and nigh shift workers and its ability to cause an elevation of accident and incident rates are apparent in some of the recent researches (Fogarty et al., 2010; Geller 2001; Mc Lain et al., 2007; McGonagle et al., 2010; Seo, 2005).

Hence, perceived production pressure inflated by an excessive workload, pitch/cycle time of production, and dead line pressure appears to be a causal factor to both accidents and unsafe work behaviours at steel industries. This is consistent with the research finding of several researchers' (Clarke, 2006; McGonagle et al., 2010; Seo, 2005).

In this connection, management of the steel industry needs to emphasize on sustaining a reasonable degree of equilibrium between safe work practices, production output and quality as pointed out by Das et al. (2008); Kapp (2012); Mitropoulos et al.(2009).

4.8.7 Shift work and safety participation

There is a widespread recognition of the safety issues that are associated with working the night shift. This is probably due to the fact that most of the major accidents had occurred during the night shift operations such as Chernobyl, Three Mile Island, and the Exxon Valdez. Hence, it is important to understand the levels of safety participation of behaviour of workers at a factory because the worker's safety participation is a reflection of their commitments to work in a safe manner without jeopardizing themselves and their fellow workers.

It is also important to examine the regular activities for the worker during a normal working day. Industries in Malaysia are plagued with high turnover of workers and the need to continuously cost down overhead costs. In this connection it is inevitable to observe lone workers in an industry. Lone workers are often left unattended and with the absence of co –workers, their accountability to work safely remains a challenge. This was similar predicament which was highlighted by Geller (2001). This research finding depicts higher safety participation among morning shift workers due to the presence of management and supervisors.

This is consistent with the findings of Luria et al. (2012). In addition, when employees realize that co-workers and management pay attention to their behaviour at work, it is possible for them to control and improve their safety participation, which in turn, can improve self and colleagues' safety behaviour. This notion was supported by Jiang et al. (2010). In addition the presence of management team during morning shifts have coercive effects on workers willingness to participate in safety related activities. This

effects were similar to the findings highlighted by Brown et al. (2000); Huang et al. (2007); Nohammer et al. (2010).

4.8.8 Academic levels and safety participation

Education level is also an important influencing factor for safety participation and linked to the overall safety climate of an organization. Employees with education levels below primary school have far less positive perceptions of the safety climate, which eventually reduces their safety participation.

The findings of the study showed there was a significant relationship between employees' education levels and safety participation. It can be inferred that highly paid supervisors and technicians were more educated, thus more aware of workplace hazards and of their roles in controlling such hazards through actively and voluntarily participating in safety programs. Researchers' (Fam et al., 2012) have discussed extensively the relationship between education level and safety participation of the workers. Pertinent factors such as reporting unsafe work behaviour requires workers ability to identify hazards and risks at work place and requires basic secondary education as highlighted by Fam et al. (2012); Zhou et al. (2008); Walker (2010). Operators who are recruited in steel industries possess an education level of lower secondary and primary school.

This is because Malaysian steel industries are labour intensive with highly educated workers often reluctant to work in this non conducive work environment. Hence, this group should be the focus of safety training as pointed by Fang et al. (2006); Walker

(2010) & Zhou et al. (2008). In addition, workers academic status is one of the important parameters which would influence the workers ability to grasp safety instructions and enhance compliance to safety rules and regulations.

Comprehension of workers would be widely affected by their ability to understand and interpret safety rules and regulations. This is one of the notions pointed by Demirer, Durat & Hasimoglu (2012); Fang et al. (2006). These authors found that the necessity of safety adherence is proportional to the education level. Hence higher educated people often regard safety compliance as a pertinent priority. Apart from that ,workers who work at lower hierarchy in an organization such as production operators often possesses lower education as per the job specifications which raise concerns with regards to their adherence to safety programmes and procedures.

The findings from this study proved that workers possessing secondary academic levels have a better safety compared to workers who possess an academic qualification below primary levels. This research finding depicted increased safety participation when academic levels of the employees elevates which is consistent with the findings reported by Luria et al. (2012). Workers with higher academic qualification are often safety conscious, which is consistent with the findings of Walker (2010) & Zhou et al. (2008), who had discovered that the level of safety participation is dependent on workers education levels. It is common that manual labourers who are engaged in steel industries do not possess skills related certificate of competency, hence making them vulnerable and exposed to hazards in high risk work environments such as the steel industry. Hence, it remains paramount for industries to apprehend this situation via requiring

workers to possess minimum technical competency for hazardous works, a notion which had been supported by Guldenmund et al. (2012).

In addition, several researchers had proven that workers literacy can be utilized as a parameter to predict employees safety participation (DePasquale, 1999; Geller, 2001; Luria et al., 2012; Shang et al., 2012). It is also believed that workers are deprived of safety participation due to their inability to understand training materials and communication language. Foreign workers from developing countries such as Bangladesh, Nepal, Myanmar, Vietnam are at a loss when it comes to the subject of conversing in English and local Malay language, thus hampering them from learning the safety procedures, work instructions and standard operating procedures. This has been noted as an element requiring prompt intervention by Fang et al. (2006); Gravel et al. (2011).

In conclusion, the steel industry workers are employed from various developing countries to reduce overhead costs and ensure business sustainability. However, these workers possess diverse general educational and culture which could influence the extent of risk taking and resistance to pain or suffering and the degree of participation.

4.8.9 Nationality and safety participation

Safety participation of workers often reflects their overall safety behaviour at work place. Foreign workers who are employed for a short tenure prior to returning to their homeland normally are more financial oriented and involvement is safety activities are deemed a waste of time. The tangible benefits which could be reaped via involvement in safety related programs outweigh their focus on financial gain.

The findings of this research pointed towards this direction which had also been supported by Brown et al. (2000); Brondinho et al. (2012); Gravel et al. (2011); Guldenmund et al. (2012). This research had proven that Malaysian workers possess better safety participation compared to foreigners. This is consistent with the findings of Gravel et al. (2011), who discovered that language barriers had served as an impeding factor, which reduces safety participation among foreign workers. This is a notion, which was also shared by Guldenmund et al. (2012) who discovered the inadequate understanding of the language of the country in which they work and levels of literacy affects safety behaviour among foreign workers. Hence it is paramount to encourage safety participation among workers via improving their perceived safety climate of their work place.

This is one of the efforts which would yield good results with respect to safety participation as proven by Brondino et al. (2012)**.** In this connection, workers habits, which had evolved from their homeland contribute to the degree of safety participation and safety efficacy among workers (Khader, 2004).

Poor working habits are known to reduce safety participation among employees and are commonly prevalent among workers who are accustomed to poor working conditions at their homeland. This notion is supported by Krause et al. (1999); Khader (2004). Khader (2004) had highlighted the fact that workers from developing countries where safety is not given due consideration often display dismal safety behaviour. In a high risk industry this is detrimental as it will also effect or influence peers and co-workers.

Safety rules abiding local workers could be influenced into disobeying safety rules and regulations by the foreign workers who are a majority at production shop floor. These concerns had been raised by several researchers (Brondino et al., 2012; Brown et al., 2000; Geller, 2001). This research finding had also been supported by Fugas et al. (2012), who emphasized the effects of co-workers attitudes on the safety behaviour of the workers.

Enhancing safety participation among shift workers and those varying in nationality needs to be enhanced as this would work in tandem with efforts to implement behavioural based safety (BBS) programs in TESB which was also highlighted by Krause et al. (1999).

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.0 Introduction

This chapter provides an overall conclusion of the research findings and recommendation on endeavours which should be initiated in order to elevate the safety behaviour of the workers in the Malaysian steel industry. The significance of the findings and implications to the industry are discussed in a systematic and comprehensive manner. It is envisaged that the possible interventions and remedial actions which are proposed at the end of this chapter could be implemented by this and other organizations, which are dependent on foreign workers for product realization processes.

5.1 Summary of key findings

A total of 10 objectives of this study had been analysed via the establishment of 10 hypotheses. The results of the entire 10 objectives could be represented as follows:

The first objective was established to examine the relationship between safety participation, safety climate, and work pressure and safety behaviour. It was found that safety behaviour is positively correlated with safety participation and safety climate, and negatively correlated with work pressure.

The second objective was established to investigate the differences in safety behaviour between morning and night shift workers. This study found that workers in morning shift possess a better safety behaviour compared to their night shift counterparts.

The third objective was established to investigate the differences of safety behaviour between Malaysian and foreign workers. It was found that Malaysian workers have better safety behaviour compared to foreign workers.

The fourth objective was established to investigate the differences of safety climate perception between workers in morning shift and night shift. It was found that the workers in morning shift have better perception of safety climate compared to their night shift counterparts.

The fifth objective was established to investigate the differences of perceived work pressure between workers in morning shift and night shift. This study found that workers in morning shift have a higher perceived work pressure compared to night shift workers.

The sixth objective was established to investigate the differences of safety climate between Malaysian and foreign workers. This study found that Malaysian workers have better perceived safety climate compared to foreign workers.

The seventh objective of this study was established to investigate the differences of safety participation between workers in morning shift and night shift. Results obtained from this study found that workers in morning shift have a higher safety participation compared to night shift workers.

The eighth objective of this study was established to investigate the differences of workers academic levels and safety participation. Results obtained from this study shows that workers possessing secondary academic levels have a higher safety participation compared to workers who possess an academic qualification below primary levels.

The ninth objective of this study was established to investigate the differences of safety participation between Malaysian and foreign workers. The results from this study shows that Malaysian workers have better safety participation compared to foreign workers.

The tenth objective was established to ascertain whether safety climate, safety participation and perceived work pressure influences safety behaviour of the workers. Results obtained from this study shows that safety climate, safety participation and perceived work pressure influences safety behaviour of workers.

5.2 Research Contributions

One important insight that could be gathered from these results is that the existence of poor safety climate, safety participation and safety behaviour among foreign workers in this industry. However, it is also apparent that safety climate could be manipulated to improve safety behaviour and safety participation of workers. This is supported by the results of research by Jiang et al. (2010), who had established safety climate as a moderator between safety behaviour and safety performance. The outcomes of this research and the subsequent proposed countermeasures are timely and are important for the Malaysian manufacturing industry as statistics evidenced that most of the manufacturing industries is heavily dependent on foreigners sourced from developing countries where safety and health are not given due consideration. This is the notion which was highlighted by Luria et al. (2010). The pertinent contributions from this research could be divided into the following factors:

5.2.1Managerial Implications

The results of this research have several managerial implications. First, the robust finding that safety climate perceptions matches actual levels of safety participation and safety behaviour among workers strongly suggests that TESB should focus its primary safety improvement efforts in curbing unsafe situations and conditions as well as enhancing workers safety behavior at all organizational levels, rather than concentrating on improving people's attitudes, beliefs, and perceptions of safety. It is the reductions in the frequency of unsafe behaviors and their antecedents (i.e., unsafe conditions, and perceived work pressure) that contributes to the reduced opportunity for accidents to occur.

The effects of work pressure and planned behaviour among employees were a notion proven by Clarke (2006) and Fogarty et al. (2010). Based on these findings, it is proven that production expediency does cause a significant decline in safe work behaviour among workers. This effect is prominent among foreign workers.

Several contributions can be drawn from the key findings of this study. First safety climate is an important factor which would influence safety behaviour among shift workers and foreign workers at TESB. The robustness of relationship between safety climate and safety behaviour could be manipulated to the advantage of TESB via implementing senior management commitments and policies and elevating supervisory or co-worker practices as suggested by Zohar (2008) and Zohar (2010). In this connection management of TESB could increase their commitments with respect to the creation of a good team working environment and the encouragement of positive workmate's influences within teams, which is a notion shared by Zhou et al. (2008).

This could be enhanced by the involvement of top management as evidenced by Hale et al. (2010); Khader (2004); Wu et al. (2008).

Second, in addition to this it is paramount to elevate active employees participation so that management and workers get more involved in actual prevention strategies implementing health and safety measures such as safety culture of the work place similar to the endeavour proposed by Geller (2000) and Krause et al. (1999). Behavioural based safety is dependent on the feedback received from workers, hence a poor participation as shown in this research would cause failures in implementation of BBS is TESB as suggested by Williams et al. (2000).

The findings of the study showed there was a significant relationship between employees' academia and their participation level. This can be inferred that employees, who are more educated, are more aware of workplace hazards and of their roles in controlling such hazards through active participation in safety programmes. This is consistent with the findings reported by Fam et al. (2012).

Employing people with a higher or moderate education level by management would ensure better safety participation and safety behaviour among employees as pointed out by Zhou et al. (2008) & Fang et al. (2006). In this connection, It is recommended that an education level of primary school or higher may be one of the criterion used for recruiting, or that those employees with education levels below primary school should be the focus of safety training.

Apart from that, enhancing safety cultures and providing a better communication methodology between foreign workers and management would facilitate the elevation of safety participation and safety behaviour of the employees as shared by Lind & Rahnasto, (2008); Guldenmund et al. (2012).The work cultural differences, combined with individual differences and regulations are inexhaustible, hence, it is important to train competences that increase leaders' as well as team members' intercultural effectiveness and awareness. An assimilation of work cultures of foreigners into the Malaysian work culture would be beneficial in terms of reducing the perceived risk among them. This is a notion which was shared by Starren et al. (2012).

5.3 Limitations and Future Research Directions

This research was limited to examining safety climate, safety behaviour, safety participation and perceived work pressure within a particular steel industry in Malaysia. This focus gives us a homogeneous sample of responses from the same environment, allowing for initial tests of instrument reliability and defensible interpretations of dimensionality.

There exists a wide scope for future research on these variables in different steel industries such as metal melting and casting, assembly, and fabrication. In addition, this research had not taken in consideration the effects of safety trainings and employees acquired safety related skills which could be an element of antecedent of safety behaviour. The factors which could cause a decline in safety participation has not been included as a variable in this research which would comprise comprehensibility,

previous trainings attended prior to arrival in Malaysia and the level of safety and health implementation at their country of origin.

Another limitation of this research has to do with the sample composition. Future research should analyze potential differences between job positions

5.4 Suggestions for Future Research

Future researches is worth extended to the high risk industries within the metal industry which could comprise of high risk industries such as metal casting, cold forming, fabrication of steel structures, forging of metals, extrusion , galvanizing, annealing, and precious metal extractions.

In addition, future research should pay attention to understanding the factors affecting safety participation such as safety organization, safety policy, safety promotion, levels of safety awareness and it's interrelationships with foreign and Malaysian workers.

The comprehension of local language and it barriers, which may hinder participation of foreign workers, is worth established. This is in view of the research findings which evidenced the lower safety participation, perceived safety climate and safety behaviour among foreign workers.

Implementing robust education and training programs would elevate safety participation among workers as supported by DePasquale et al. (1999) and Shang et al. (2012).Future research should focus on analysing factors, which could improve competency and

comprehensibility of workers and it's effects on safe work behaviour. In addition, it would also be worth to include safety compliance as one of the analytical variable.

In addition, the influence of managerial interventions, which is an important element, determining safety culture of an organization need to be included as a variable in future researchers as shared by Khader (2004).

It would be particularly important to compare different jobs and different hierarchical levels of management and their effects on safety behaviour and safety participation of workforce.

5.5 Recommendations

Based on the findings and results from the tested hypothesis, several interventions are suggested, which could elevate overall safety behaviour of workers at TESB.

5.5.1 Suggestions for Implementation

The results obtained from this research project surrounding all the four variables of safety climate, safety behaviour, safety participation and perceived work pressure is certainly non exhaustive. However, it is believed that this preliminary research agenda constitutes a first step at better understanding the determinants of safety behaviour among foreign workers and locals in a high risk industry. In essence, the following suggestions are made to further elevate the future research for providing more insights into determinants of safety behaviour among foreign workers.

a) The results regarding status of the workers (foreign and local) shows significant difference, which would affect workers safety behaviour. Hence it is imperative for the management to enforce safety practices, policies, procedures to fit diverse categories' of employees, and to reinforce less salient issues**.**

b) Safety participation among foreign workers whose strength exceeds 50 percent of the work force in TESB could be further enhanced by improving their comprehension and literacy levels with regards to the local language, a notion which was shared by Guldenmund et al. (2012) and Gravel et al. (2011).

c) A behavioural based safety programmes could be implemented at Topaz as suggested by Geller (2000); Williams et al. (2000) and an endeavour to elevate safety participation among workers.

d) It is imperative to implement an OHSAS or MS 1722 system in TESB with or without certification as these systems could systematically enhance safety participation and safety behaviour of an organization. This is one of the intervention techniques shared by Hale et al. (2010) and Muniz et al. (2012).

5.5.2 An Overall Action Plan to Implement

Table 5.1

Overall Behavioural based safety programs for TESB

No	Overall Behavioural Based Safety Programs (BBS) for Topaz Evergreen Sdn.Bhd	Duration
1	Train Managers and Supervisors on the principles and practical applications of BBS to improve safety culture.	1 month
2	Establish a Steering Team to manage the BBS process.	concurrent
3	Provide training to foreign and Malaysian employees .Train all employees to observe unsafe and safe work behaviours .	2 months
4	Employees begin observing co-workers and providing safety feedback.	3 months
5	Steering Team members collect observation cards, enter observation information into a data base, and analyze the results.	6 months
6	Monthly BBS data is provided to managers/supervisors/employees through safety meetings, bulletin boards. The Steering Team identifies improvement activities from the data.	concurrent after completion of trainings
7	Periodic assessments of BBS progress are conducted. The process is streamlined and adjusted as needed.	During management reviews

Table 5.1 is an overall Behaviourally Based Safety (BBS) which is proposed for TESB. This safety program comprise of a 7 phase implementation. The duration of implementation is 6 months. The review of project effectiveness is to be conducted at the end of 6 months project tenure. It is envisaged that BBS would serve as a pertinent intervention in ensuring the elevation of safety behaviour among shift workers as well as Malaysian and foreign workers.

5.5 Summary

Whilst the various disciplines of risk aversion strategies have been implemented, this has not taken into account the important elements of perceived safety hazards, safety culture, production demand and pressures which motivates the workers into indulging in unsafe acts via ignoring safety norms, cultures and guidelines (Brown et al., 2000; Fugas et al., 2012; Fang et al., 2006; Fogarty et al., 2010; Neal et al., 2000; Seo, 2005). Zohar (2008) notions that safety climate interacts with other elements of expediency, process flow, adherence to production schedules and profitability.

Night shift workers especially the foreign workers generally have a lower safety climate, which eventually leads to rampant unsafe work behaviours, and leading towards accidents and incidents. This is commonly attributed by the lack of supervision in night shift and the work culture of foreign workers who are accustomed to their native land work culture, which places less emphasis on safety. This is a notion which was proven by Huang et al. (2007); Luria et al. (2010).

Employees who are motivated to comply with safety requirements are more likely to engage in safety compliance behaviour's, thus employees who are motivated to involve themselves in safety participatory activities are also more likely to be motivated to participate in safety activities (Parboteeach et al., 2008). This is one of the behavioural intervention programme, which could be implemented at TESB. The safety behaviour and safety participation of night shift workers remains as a pertinent variable due to the

fact that most of the disasters and accidents usually occurs during night shifts when the supervision is at minimal, a notion shared by Hamalainen et al. (2012).

Although the research which had been presented is certainly not exhaustive, it is believed that this research agenda constitutes a first step at better understanding the determinants and antecedents of safety behaviour in safety behaviour of multicultural teams and organizations.

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