International Journal of Business and Technology Management
e-ISSN: 2682-7646 | Vol.3, No. 3, 36-43, 2021
http://myjms.mohe.gov.my/index.php/ijbtm

Enhancing Quality of Work Life via Safety Variables in Malaysian Manufacturing Industries: A Conceptual Framework

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Accepted: 15 August 2021 | Published: 1 September 2021

Abstract: *Work-related accidents and injuries continue to be a major problem in Malaysian manufacturing. The industry has made little progress in lessening deaths or serious injuries. In the past year, the fatal injury rate has only declined slightly, and the serious injury rate has remained unchanged (Department of Occupational Safety and Health (DOSH), 2021). As Malaysia aspires to become a developed nation by 2020, reducing occupational accidents and injuries is one of the key employments concerns it aims to address (Department of Occupational Safety and Health (DOSH), 2021). Employees who complete work will carry out their tasks better and show more dedication to their work and organisation. Thus, organisations must take heed at conquering their employees' hearts while investing in a Department of Occupational Safety and Health Management system aimed at avoiding and reducing workplace accidents by revising safety behaviours and incentives. This paper puts forth a conceptual framework to analyse the interplay between the safety climate, safety motivation, and safety behaviour to improve the quality of work life in the Malaysian manufacturing industry, which will help to develop more effective safety interventions in reducing accidents.*

Keywords: safety climate, safety behaviour, motivation, quality of work life

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1. Introduction

Emphasising on industrialisation is part of achieving Malaysia's long-term goal of becoming a fully developed country by 2020. This strategy requires large-scale investments, including new machinery, equipment, and technology. Although industrialisation is beneficial to the country, it brings with it some negative impacts, such as occurrence of industrial accidents and occupational stress diseases. These have caused not only huge economic loss, including loss of man-days and productivity, but also pain and suffering to those who are injured.

Wan (2016) reported that Malaysia is positioned as the world's top manufacturing location in the new suitability index, and the nation's manufacturing industry is an essential pillar and chief economic contributor. As an example, the Department of Statistics Malaysia (2021) documented that the importance of the manufacturing industry to the economy is reflected in its contribution to the Gross Domestic Product (GDP). Among the five main sectors which gave a significant contribution to the GDP from 2019 to 2021, the economic activities from the manufacturing sector registered the highest economic growth of 6.6% (see Table 1).

Table 1: Annual Growth of Five Main Economic Activities

Sectors	2019	2020	2020				2021
			Q1	Q2	Q3	Q4	
Agriculture	2.0	-2.2	-8.6	0.9	-0.3	-1.0	0.4
Mining & Quarrying	-0.6	-10.6	-2.9	-20.8	-7.8	-10.4	-5.0
Manufacturing	3.8	-2.6	1.4	-18.3	3.3	3.0	**6.6**
Construction	0.4	-19.4	-7.9	-44.5	-12.4	-13.9	-10.4
Services	6.2	-5.5	3.1	-16.2	-4.0	-4.8	-2.3

Source:
Publication, Infographics, Pocket Statistics as at Q3 2018
Department of Statistics Malaysia

In addition, the manufacturing industry has produced vast employment opportunities and skill upgrades in Malaysia. Data gathered from the Department of Statistics Malaysia (2020) revealed that manufacturing has contributed the most vacancies compared to other industries, with an increase of 5% in 2017 (see Table 2).

Table 2: Employed persons by selected industry in Malaysia, 2019 - 2029

Industrial Production Index (IPI)	Mining	Manufacturing	Electricity
Agriculture, Forestry, and Fishing	1,609.9	1,631.6	1.3
Mining and Quarrying	96.3	97.0	0.7
Manufacturing	**2,390.6**	**2,509.1**	**5.0**
Utility (Electricity, Gas, Water, and Sanitary Services)	77.9	62.1	-20.3
Construction	1,251.7	1,256.0	0.3
Wholesale and Retail Traders	2,428.5	2,481.1	2.2
Transport, Storage, and Communication	630.4	657.4	4.3
Hotel and Restaurant	1,260.7	1,320.2	4.7
Finance, Insurance, Real Estate, and Business Services	346.9	368.5	6.2
Public Services and Statutory Bodies	748.2	740.7	-1.0

Source:
Statistics, Time Series Data, Labor Force Survey (LFS)
Department of Statistics Malaysia

The statistics of accidents in the manufacturing industry in Malaysia displayed that the accident rate in this sector is still very high, indicating that the manufacturing industry is one of the key industries requiring a rapid and large-scale review of the present on-site safety practices. As of March 2021, the Department of Occupational Safety and Health (DOSH) reported 1,948 workplace mishaps in ten sectors. 1) hotels and restaurants, 2) public services (electricity, gas, water and sanitation services), 3) finance, insurance, real estate, and commercial services, 4) construction, 5) transportation, storage, and communications, 6) manufacturing, 7) wholesale and retail trade, 8) public services and statutory bodies, 9) mining and quarrying, as well as 10) agriculture, forestry, and fishery are the sectors involved. From the 1,948 accident cases, 42 were death cases, 1,831 were non-permanent disability cases, and 75 were permanent disability cases.

Of these ten industries, the manufacturing industry has the highest number of occupational mishaps, namely 1,420 (64%), with 10, 1,172 and 58 deaths, cases of non-permanent disability and permanent disability, accordingly. Following these are the agriculture, forestry, and fishing sectors, with 265 cases (14%) registered, including 0 death of cases, 262 cases of non-permanent disability, and three cases of permanent disability. Lastly, the number of registered work accidents in the finance, insurance, real estate, and commercial services industries ranked third-highest with 113 (65%), that is, five cases of death, 102 cases of non-permanent disability, and six cases of permanent disability (see Table 3).

Table 3: Occupational Accidents Statistics by Sectors as of March 2021

Sectors	Non-Permanent Disability	Permanent Disability	Death	Total
Hotels and Restaurants	40	1	0	41
Utility (Electricity, Gas, Water, and Sanitary Services)	43	0	0	43
Finance, Insurance, Real Estate and Business Services	**102**	**6**	**5**	**113**
Construction	43	4	23	70
Transport, Storage, and Communication	68	1	2	71
Manufacturing	**1,172**	**58**	**10**	**1,240**
Wholesale and Retail Traders	64	1	0	65
Public Services and Statutory Bodies	25	0	0	25
Mining and Quarrying	12	1	2	15
Agriculture, Forestry, and Fishing	**262**	**3**	**0**	**265**
Total	**1,831**	**75**	**42**	**1,942**

Source:
Statistics, Time Series Data, Labor Force Survey (LFS)
Department of Statistics Malaysia

In addition, the manufacturing industry recorded the highest incidence of occupational diseases and poisoning in 2020 at 82.3%. This was followed by the utilities (electricity, gas, water, and sanitary service) sector with 9.1% and 2.4% from the mining and quarrying sector (see Table 4). Hence, the manufacturing sector workers are more vulnerable to accidental risks.

Table 4: Occupational Disease and Poisoning Statistics by Sectors as of March 2021

Sectors	Percentage
Hotels and Restaurants	0.5%
Utilities	**9.1%**
Finance, Insurance, Real Estate, and Business Services	1.4%
Construction	0.3%
Transport, Storage, and Communication	1.4%
Manufacturing	**82.3%**
Wholesale and Retail Traders	0.3%
Public Services and Statutory Bodies	1.3%
Mining and Quarrying	**2.4%**
Agriculture, Forestry, and Fishing	1.3%
Total	**100%**

Source:
International Policy and Research Development Division
Department of Occupational Safety and Health (DOSH)

Manufacturing is a high risk industry due to the occurrence of high-risk accidents. Human factors or factors such as workers' negligence at work can also cause accidents (Dodoo & Al-Samarraie, 2019). Poor physical conditions of workers like fatigue, illness, alcoholism, and drug abuse can also affect work efficiency. The workers' experience such as the total hours of work and the training they have received can also be among the factors that determine the incidence of on-site mishaps. In addition, the workers' attitudes also influence the occurrence of accidents (Oah, Na, & Moon, 2018). For instance, workers who insist on using safety equipment, follow work procedures, believe that safety is unimportant, often give up, and get tired of certain types of work. They will lose their attention and focus when performing tasks. Therefore, they may not be able to safely handle the equipment and perform the work. These scenarios indicate there is lack of safety motivation among workers in manufacturing industry.

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Purpose of the Study

Engineers play a key role in the development of Malaysia's technological advancement. Furthermore, they are the key to wealth creation and help the nation to become an active participant in the world's economy (Rahim, 2020). Because the impact of engineers on people's lives is accompanied by enormous responsibilities, every engineering job should be safe and beneficial to its performers. Many scholars believe that circumstances that link both directly and indirectly to accidents exist. Poor outcomes of well-being have been shown to be related to accidents, as well as poor health and safety, which can cause major problems. Generally, the speedy growth of manufacturing sectors during an economic expansion is linked to the employment of a large number of new workers, new technologies, as well as new machinery and equipment. The adoption of new technologies may expose workers to new dangers.

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Similarly, new workers might encounter a higher risk of accidents because they are not familiar with the workplace environment hazard. The characteristic of the manufacturing industry is attached to its placement of great importance on production. Pressures of high-performance and limited time reduce the level of safety of operations. Engineers set fixed goals that must be completed within a specific time. Therefore, they can cause workers to opt for shortcuts and jeopardise safety. This has caused problems to engineers in the manufacturing industry, who are legally required to establish and maintain a safe work environment for each worker (Proven et al., 2020). The natural hazard of the manufacturing sector is very responsive to the business cycle, especially in mature capitalist economies.

In some fields of engineering, safety is always necessary, and in certain circumstances, engineers have a legal responsibility to ensure safety. Continued emphasis on the need for safety in dangerous environments can create a greater source of stress than the dangers themselves. Additionally, companies are working hard to increase production. During the process, engineers ignored safety procedures while trying to achieve performance goals (Sultana, Andersen, & Haugen, 2019). Due to performance pressure and limited time, engineers might involve in risky actions. These include shortcuts that jeopardise safety adherence and may result in mishaps.

As shown in Table 3, the manufacturing industry has documented the largest amount of accidents. This scenario would result in financial loss and non-monetary losses, such as affecting the reputation of the companies involved. Additionally, this scenario could worsen if limited research concerning engineers' well-being is conducted. Therefore, safety behaviours must be seriously addressed and promptly monitored at the workplace to prevent accident cases, so that engineers are able to maintain their excellent performance and increase their well-being with a strong safety motivation.

From the above discussion and examples given in the background of the study, the engineers in manufacturing sector are facing a challenge that can jeopardise their individual well-being. Therefore, it is worthwhile to carry out an investigation on the relationship between safety climate and safety behaviour regulated by safety motivation of professional engineers in the manufacturing industries in Malaysia on the quality of work life. Henceforth, this research seeks to answer the research questions as follows:

1) *To investigate the influence of safety climate on safety behaviour among professional engineers in Malaysian manufacturing industries.*
2) *To investigate the influence of safety behaviour on quality of work life among professional engineers in Malaysian manufacturing industries.*
3) *To investigate the moderating effect of safety motivation between safety climate and safety behaviour among professional engineers in Malaysian manufacturing industries.*

Proposed Conceptual Framework and Hypotheses

Figure 1 displays the proposed conceptual framework for the present research.

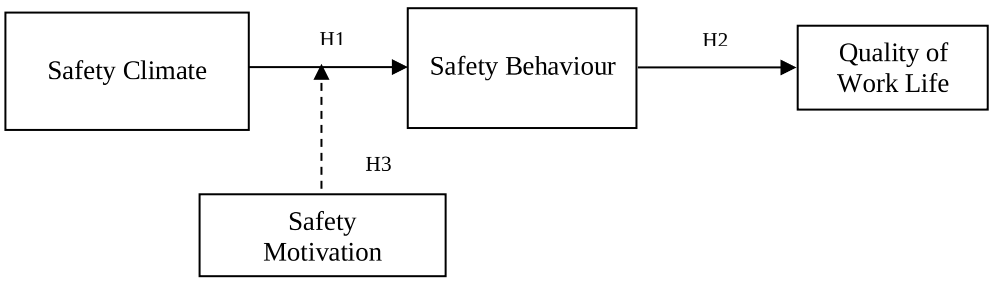

Figure 1: The proposed conceptual framework

Based on the framework, research hypotheses have been developed as follows:

H1: Safety climate has a significant relationship on safety behaviour.
H2: Safety behaviour has a significant relationship on quality of work life.
H3: Safety motivation moderates the relationship between safety climate and safety behaviour.

2. Methodology

Population and Sample Size

The investigation will be carried out among professional engineers registered with BEM. BEM defines professional engineers. As of 28th March 2019, there are 14,749 professional engineers in Malaysia (www.bem.org.my). They are from different fields, such as aviation, agriculture, construction services, civil engineering, electrical and electronic, as well as civil engineering and mining. However, the selected professional engineers are only employed from the manufacturing industry.

For actual data-gathering, the minimum sample size for this research will be determined using the "10 times" rule of thumb recommended by Hair, Black, Babin, and Anderson (2010). Hair et al. (2010) suggested that the minimum requirement for the sample size is to have observations that are at least five times the number of variable items to be analysed. In this

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research, the total amount of items that measure all variables is 57. Therefore, the lowest acceptable sample size is five times the items, or 285 respondents.

Sampling Technique

The purposive sampling technique is employed in this study. This technique selects a particular type of people who are able to give the required information. They are chosen because they are the only people who have the necessary information or meet certain criteria established by the research (Sekaran & Bougie, 2010). In this study, professional engineers that conform to the inclusion criterion as follows are chosen:

1) registered as professional engineers with Board of Engineers Malaysia (BEM);
2) accumulated at least 50 hours of Continuing Professional Development (CPD) activities in the year 2020; and
3) currently employed in manufacturing industries only.

Data Collection Procedure

For data collection, self-administered survey will be utilised. The respondents are professional engineers registered with BEM. As every of them requires to accumulate at least 50 CPD hours each year to renew their practice certificate, they are compulsory to take part in CPD activities. Based on the scheduled activities, the questionnaires will be distributed and emailed. The schedule of these activities will be obtained from the website of the Institute of Engineers Malaysia (IEM).

Before each CPD activity, the researcher will approach the venue management to explain the research objectives and seek permission for the placement of the questionnaires and email them throughout the activity. After permission is obtained, the time to distribute the questionnaires will be arranged.

Instrument

The instruments used are adopted from various previous studies with acceptable reliabilities (Cronbach's alpha). After obtaining permission from the authors, four established tools will be utilised to gather data: (1) Zohar and Luria (2005) for Safety Climate scale, (2) Neal and Griffin (2006) for both Safety Motivation and Safety Behaviour scales, and (3) Sirgy et al. (2001) for Quality of Work Life scale. Ratings are made on 5-point Likert-type scale (1=strongly disagree; 5=strongly agree) for all the measurement items. Before collecting data, five members of the expert panel will review these tools. All involved experts have a minimum of five years' experience in research methods. They will receive a copy of the instruments and instructions for reviewing all questions, making changes, and adding or removing related items. The expert review will result in the revision, addition and deletion of some questions, or possibly the revision of the Likert scale.

Data Analysis

In the first phase, the Statistical Package for Social Sciences (SPSS) version 25 will be used for data analysis. SPSS statistical analysis will check the data based on coding, outliers, and normality. In addition, SPSS will generate descriptive statistics, showing the characteristics of the data in the form of frequency distribution, maximum, minimum, mean, standard deviation, and variance of all variables. Then, in the second stage, Partial Least Squares (PLS) will be applied together with SmartPLS 2.0 M3 to test hypothesis. According to this procedure, the research model will be analysed in two stages using PLS regression, namely (1) the evaluation of the structural model and (2) the evaluation of the structural model. In the first stage, the validity and reliability of all the model measures should be tested. In the second stage, the structural model is assessed by approximating the paths between the constructs model, determining its significance, and evaluating the models' predictive strength.

3. Conclusion

This research aims to present empirical evidence for the body of knowledge on the connection between safety climate, safety behaviour, and unsafe behaviour.

In particular, this study endeavours to shed light on perception on safety climate towards online safety behaviour and quality of work life which has been under-researched within Malaysian context. The present research also offers great value in proposing safety behaviour, which can be utilised to fine-tune the relationship between safety climate and the quality of work life in the Malaysian manufacturing environment.

For practical contributions, this type of conceptual framework, if verified empirically, would benefit parties like the government and National Institute of Occupational Safety and Health NIOSH, companies in the manufacturing industries, and researchers. For instance, the government, especially NIOSH, can enhance the safety and health standards in the workplace to elevate the quality of human resources and the overall development of the nation. The success of human resources will speed up the attainment of national goals. Next, the manufacturing industries can enhance the worker's quality of life via the development of safety and health at the workplace. This could motivate workers to be more productive in raising company productivity, and work should be designed to provide engineers with power and control, and give tasks that utilise their skills to raise satisfaction and decrease stress. Finally, researchers might be inspired to explore more and improve the safety and health issues of any company besides suggesting that having job resource would lead to positive psychological outcomes. When more research is conducted, more solutions can be found.

Acknowledgement
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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