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EXPLORING THE LINK BETWEEN SAFETY VARIABLES AND WELL-BEING OUTCOMES IN MALAYSIAN MANUFACTURING SECTOR: A CONCEPTUAL FRAMEWORK

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Abstract:

In Malaysia's manufacturing industry, workplace mishaps and injuries are a big problem. This industry has made only minor developments in terms of reducing fatalities and significant injuries. The fatality rate has decreased marginally; however, the previous year's severe injury rate remains unchanged (Department of Occupational Safety and Health, 2021). In Malaysia's aspiration into becoming an advanced country by 2020, reducing occupational mishaps and injuries is one of the key employments concerns it aims to address. As a substantial determinant of mishaps and safety behaviour, the perception of the work setting is considered essential. Safety measures must emphasise the way employees view their work setting in order to improve safety plans and practices. Safety policy and procedures must bring about a shift in employees' mindsets and awareness of their immediate work setting in order to succeed in the intervention towards the shift in behaviour. This study proposes a conceptual framework to examine the interaction between safety climates, safety behaviour towards the quality of work-life, and psychological well-being within Malaysia's manufacturing industry that would assist in the advancement of more efficient safety interventions of reducing mishaps.

Keywords:

Safety Climate, Safety Behaviour, Quality of Work Life, Psychological Well-Being

Introduction

Presently, with globalisation, many nations are pursuing progress. Worldwide technological improvements have raised workers' responsiveness to safety matters, resulting in the recognition of workplace safety issues in headlines around the world (Stein & Scholz, 2020).

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Omairi and Ismail (2021) stated that unforgiving physical settings encountered in the manufacturing industry in Malaysia can aggravate the view of human error as being a contributory influence in mining mishaps.

As reported by Wan (2016), in the new suitability index, Malaysia was rated as one of the top manufacturing sites in the world, and the country's manufacturing industry is an essential backbone and contributor to the economy. For instance, the manufacturing industry is an important contributor to the Gross Domestic Product (GDP) of the country's financial revenue, as reported by the Department of Statistics Malaysia (2021). Among the five main economic activities which have underlined a significant contribution to the GDP from 2019 to 2021, economic activities (6.6%) from the manufacturing sector support the second highest to economic growth (see Table 1).

Table 1: Annual Growth of Five Main Economic Activities

Sectors	2019	2020	2020				2021
			Q1	Q2	Q3	Q4	Q1
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 of Q3 2018, Department of Statistics Malaysia

Furthermore, the manufacturing industry has been progressing in speed, determined by solid productivity with regard to sales value per employee, salaries and wages, and number of employees. For instance, Malaysia's manufacturing sales have increased by 2.2 per cent to RM339.4 billion in Q1 2020 (see Table 2).

Table 2: Manufacturing - Q1 2021

Indicators	Period	
	Growth YoY	%
Sales Value	RM339.4 billion	2.2%
Sales Value Per Employee	RM22,728.0 million	3.4%
Number of Employees	2,257,273 persons	1.2%
Salaries & Wages	RM150,368	1.0%

Source: Publication, Infographics, Pocket Statistics as at Q1 2020, Department of Statistics Malaysia

Although industrialisation, predominantly the manufacturing sector, is beneficial to the country, it has some negative impacts, such as industrial mishaps, occupational stress, and diseases. These incidents have caused a substantial economic loss, including the loss of work-days, and productivity, as well as pain and suffering to those injured. According to the statistics of incidents in Malaysia's manufacturing industry, the rate of mishaps is consistently alarming. This indicates that the manufacturing industry is among the crucial sectors which require a massive and swift revamp of the current procedures of on-site safety. The Department of Occupational Safety and Health (DOSH) stated that ten sectors have seen 1,948 occupational accidents since March 2021. The ten sectors are: 1) hotels and restaurants; 2) utilities, inclusive of electricity, gas, water, and sanitary services; 3) finance, insurance, real estate, and business services; 4) construction; 5) transport, storage, and communication; 6) manufacturing; 7)

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wholesale and retail trade; 8) public services and statutory authorities; 9) mining and quarrying; and 10) agriculture, forestry, and fishery. Of the 1,948 accident cases, 42 were fatalities, 1,831 were non-permanent disabilities, and 75 were permanent disabilities.

With ten fatalities, 1,172 non-permanent disabilities, and 58 permanent disabilities, the manufacturing industry reported the most critical number of job-related mishaps (1,420 cases), at a staggering 64% in comparison with the other aforementioned sectors. Next, the agriculture, forestry, and fishing sectors have seen 265 cases (14%), with no death case, but recorded a devastating 262 non-permanent disability cases and three permanent disability cases. Finally, the third-highest number of occupational accidents was documented by the insurance, finance, real estate and business services sector that had 113 (65%) cases, with five deaths, 102 non-permanent disabilities, and six permanent disabilities (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: International Policy and Research Development Division, Department of Occupational Safety and Health (DOSH)

In addition, the manufacturing industry recorded the highest occurrences of workplace disease and poisoning incidents in 2020, at 82.3%. This was followed by the utilities (electricity, gas, water, and sanitary services) sector with 9.1%, and 2.4% from the mining and quarrying sector (see Table 4). Hence, employees in the manufacturing sector are more vulnerable to the risk of accidents.

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%

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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)

The manufacturing sector poses a higher risk among other sectors or industries due to the frequent occurrences of mishaps. It should come to no surprise that carelessness and the disregard for safety among employees are determinants in the majority of accidents (Dodoo & Al-Samarraie, 2019; Ajmal et al., 2020). Employees' substandard physical conditions, including exhaustion, disease, alcohol and drug abuse, can influence their work competence as well. Another on-site factor of work mishaps to be considered is the overall number of work hours gained by the employees, inclusive of their gained experience and completion of training. In addition, the employees' attitudes also influence the occurrence of accidents (Oah, Na & Moon, 2018; Chenani et al., 2020). To illustrate, employees' reluctance of properly using safety equipment, the failure of adhering to work regulations, the assumption that safety is unimportant, the frequent postponement of tasks, and boredom with specific task can ultimately cause the loss of focus on the job. Accordingly, employees may mishandle equipment and risk causing unsafe work conditions. These scenarios indicate a lack of safety motivation among workers in the manufacturing industry.

Purpose of The Study

Engineers play a critical part in the progress of Malaysia's technical breakthroughs. Furthermore, they serve as a key to wealth generation and assist the country in becoming a global participant (Rahim, 2020). Engineers have substantially impacted the community, and every engineering project must be safe and beneficial to its users. Many scholars believe that circumstances which are linked both directly and indirectly to accidents do exist. Poor well-being outcomes that have been connected to accidents, poor health, and safety could indicate a serious issue.

The extensive employment of new employees and new technology, machinery, and equipment is linked to the rapid growth of manufacturing industries during an economic upswing. Employees may be exposed to new risks as a result of the use of new technology. Similarly, new employees might encounter a higher risk of mishaps because they are not familiar with hazards in the workplace environment. The manufacturing industry is defined by a heavy emphasis on output. Operational safety is lowered as a result of high-performance pressures and time constraints. Engineers must meet stringent deadlines to complete their tasks. As a result, they may persuade employees to make concessions, putting their safety at risk. Accordingly, manufacturing engineers are shouldered with the legitimate responsibility of developing and maintaining a secure work atmosphere for all personnel (Proven et al., 2020). The natural hazard of the manufacturing industry is highly receptive of business practices, especially in an already established capitalistic economy.

Industrial mishaps lead to numerous effects to the organisations involved, especially monetary deficits and non-monetary deficits such as a reduction in employees' motivation or a tarnished company image (Liu et al., 2018). Moreover, past studies came to a conclusion that workplace

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mishaps can be minimised if both the employer and employees share a commitment towards the maintenance of appropriate safety conducts (Toppazzini & Wiener, 2017). Consequently, safety conducts must be emphasised critically, while the workplace must be supervised regularly to minimise or eliminate industrial mishaps. However, decreasing output might mean the termination of recently employed employees who possess minimal experience or skills since they are generally more prone to workplace mishaps. Nonetheless, operating the factory floors only with more experienced and skilled employees in times of economic slump may actually decrease mishap occurrences.

As depicted in Table 3, the manufacturing industry has the highest rate of accidents. This scenario would result in financial loss and non-monetary losses, such as affecting the companies' reputation. Additionally, this scenario could worsen if there was inadequate research conducted with regard to engineers' well-being. Consequently, on-site safety behaviours must be emphasised critically and supervised regularly to minimise or eliminate industrial mishaps; as a result, engineers will be capable of maintaining and increasing their performance excellence and well-being.

From the above discussion and examples given in background of the study, the engineers in the manufacturing sector face challenges that can jeopardize their well-being. It is worthwhile to evaluate the correlation between safety climate and safety behaviour, with safety motivation as the moderating variable, towards the quality of work life among professional engineers in the Malaysian manufacturing industries. Thus, in response to the research questions, the following are the aims of this study:

1. *To investigate the effect of safety climate on safety behaviour among professional engineers in Malaysian manufacturing industries.*
2. *To investigate the effect of safety behaviour on quality of work life among professional engineers in Malaysian manufacturing industries.*
3. *To investigate the effect of safety behaviour on psychological well-being among professional engineers in Malaysian manufacturing industries.*

Proposed Conceptual Framework & Hypotheses Development

Figure 1 depicts the study's proposed conceptual framework.

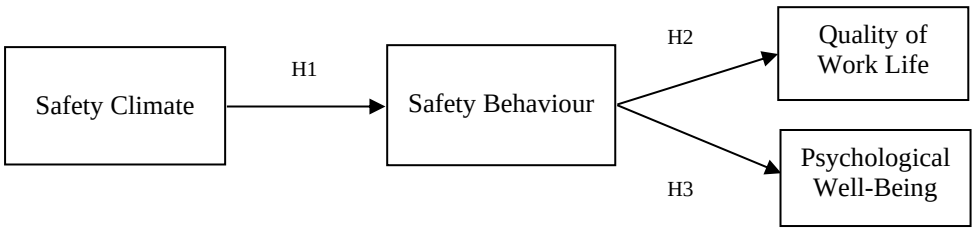

Figure 1: The Proposed Conceptual Framework

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Grounded on the framework, the subsequent hypotheses have been developed as follows: According to Neal, Griffin & Hart (2000), the increasing levels of safety climate will result in lower accident rates. Also, supported by Lyu et al. (2018), a safety climate can foster and promote safety behaviors. Therefore, this study considers the positive findings and expects that the safety climate has a positive influence on safety behavior. Thus, the following hypotheses are formulated:

H1: Safety climate is significantly correlated with safety behaviour

The determinant of quality of work life is from a healthy and safe work environment (Pacheco & Riaño-Casallas, 2017). In fact, wealth, productivity and protection of workers in the workplace are the goals of quality of life and safety as well as health in the workplace (Prodanova & Kundurzhiev, 2018). Therefore, this study considers the positive findings and expects that the safety behaviour has a positive influence on the quality of working life. Thus, the following hypotheses are proposed:

H2: Safety behaviour is significantly correlated with the quality of work life.

Nurcholis and Qurniawati (2020) found that, psychological well -being can be improved if safety behaviors are good and need to be experienced by employees. Consistent with findings from Ryff (1989), good psychological well -being tends to have good outcomes regarding attitudes and behaviors or following safety behaviors. Therefore, this study considers the positive findings and expects that the safety behaviour has a positive influence on the psychological well-being. Therefore, drawing on this idea, the following hypotheses are formulated.

H3: Safety behaviour is significantly correlated with psychological well-being

Methodology

Population and Sample Size

The study would be carried out on professional engineers listed under BEM. BEM defines professional engineers. As of 28th March 2019 in Malaysia, there are 14,749 professional engineers (www.bem.org.my) from diverse fields, i.e., aeronautical, agricultural, building services, civil, electric and electronics, and mining. However, this study would only include professional engineers from the manufacturing sectors.

According to Hair, Black, Babin, and Anderson (2010), the smallest sample size for actual data collection in a study should be determined in accordance with the "10 times" rule of thumb. Hair et al. (2010) suggested that the smallest sample size should be at a minimal of five times more than the number of variable items required for assessment. Since this study has 57 items for measuring all variables, the number is multiplied by 5; thus, the adequate minimum sample size consists of 285 respondents.

Sampling Technique

The purposive sampling technique was employed in this study. Specific types of people who can supply the required information are selected in this strategy. They would be chosen owing to being the only ones with the necessary information or if they meet the study's criteria.

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(Sekaran & Bougie, 2010). In this study, professional engineers that conform to the inclusion criteria as follows were chosen:

1. listed as professional engineers under the Board of Engineers Malaysia (BEM);
2. amassed a minimum of 50 hours in Continuing Professional Development (CPD) activities in 2020; and
3. currently employed in manufacturing industries only.

Data Collection Procedure

Self-administered questionnaires would be incorporated for data collection. Selected respondents are professional engineers registered with BEM. For the renewal of their practising certificates, the professional engineers must acquire a minimum of 50 hours in CPD activities each year. The questionnaires would be distributed and emailed according to the scheduled activities. This activities' schedule would be retrieved from the Institute of Engineers Malaysia (IEM)'s website. Before each CPD activity, the researcher would 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 was obtained, the time to distribute the questionnaires would be arranged.

Instrument

The instruments used are adopted from various previous studies with acceptable reliabilities (Cronbach's alpha). Four established instruments would be utilised for data collection upon gaining the respective authors' permissions: (1) Zohar and Luria (2005) for Safety Climate scale, (2) Neal and Griffin (2006) for Safety Behaviour scales, (3) Sirgy et al. (2001) for Quality of Work Life scale and (4) Berkman (1971a, 1971b) for Psychological Well-Being scale. Ratings apply the 5-point Likert-type scale (1 = strongly disagree; 5 = strongly agree) for every quantified item. The instruments would also be checked by an expert panel of five members before the actual data collection could be carried out. The experts would be given a copy of the instruments and instructions to assess all questions, to revise, and to modify or remove applicable items. The experts' assessment might be in the form of amendments, additions, or removal of certain questions or even a revision to the Likert-type scale.

Data Analysis

For the first phase of data analysis, the Statistical Package for Social Sciences (SPSS) version 25 would be utilised. Data were examined via SPSS statistical analysis; the coding, outliers, and normality were analysed. SPSS would also generate descriptive statistics to show the data's characteristics in a frequency distribution, maximum, minimum, mean, standard deviation, and variance. In the second phase, hypothesis testing would be done by means of Partial Least Squares (PLS) with SmartPLS 2.0 M3. In accordance with the approach on PLS regression, a research model analysis was executed in two steps: (1) to assess the measurement model; and (2) to assess the structural model. The initial step requires that every measure in the model is confirmed for validity and reliability. Subsequently, the structural model was evaluated by approximating the routes between the constructs, establishing their importance, and assessing the model's extrapolative robustness.

Conclusion

This study intends to provide an empirical evidence to the body of knowledge with regard to the link among safety climate, safety behaviour, and unsafe behaviour. Particularly, the present study endeavours to enlighten the perception of safety climate towards safety behaviour and

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the quality of work life, which have been inadequately researched within the Malaysian context. The current study also provides an enrichment value by proposing a safety behaviour, which can be used as a moderator in the connection between safety climate and the quality of work life in Malaysian manufacturing settings.

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

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References

Ajmal, M., Isha, A. S. N., Nordin, S. M., Kanwal, N., Al-Mekhlafi, A. B. A., & Naji, G. M. A. (2020). A Conceptual Framework for the Determinants of Organizational Agility: Does Safety Commitment Matters?. *Solid State Technology*, *63*(6), 4112-4119.

Berkman, P. L. (1971a). Life stress and psychological well-being: A replication of Langer's analysis in the midtown Manhattan study. *Journal of Health and Social Behaviour, 12*(1), 35-45.

Berkman, P. L. (1971b). Measurement of mental health in a general population survey. *American Journal of Epidemiology*, *94*(2), 105-111.

Chenani, K. T., Nodoushan, R. J., Madadizadeh, F., & Rostamzadeh, S. (2020). Investigation of the relationship between organizational climate and safety climate in one manufacturing industry. *International Journal of Occupational Hygiene*, *12*(4), 366-375.

Dodoo, J. E., & Al-Samarraie, H. (2019). Factors leading to unsafe behavior in the twenty first century workplace: a review. *Management Review Quarterly*, *69*(4), 391-414.

Hair, J. F., Anderson, R. E., Tatham. R. L., & Black, W. L. (1992) Multivariate analysis with readings. New York, NY: MacMillan.

Liu, R., Cheng, W., Yu, Y., & Xu, Q. (2018). Human factors analysis of major coal mine accidents in China based on the HFACS-CM model and AHP method. *International Journal of Industrial Ergonomics*, *68*, 270-279.

Lyu, S., Hon, C. K., Chan, A. P., Wong, F. K., & Javed, A. A. (2018). Relationships among safety climate, safety behavior, and safety outcomes for ethnic minority construction workers. *International Journal of Environmental Research and Public Health*, *15*(3), 484.

International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972
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DOI 10.35631/IJIREV.38001

Neal, A., & Griffin, M. A. (2006). A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels. *Journal of Applied Psychology*, *91*(4), 946-953.

Neal, A., Griffin, M. A., & Hart, P. M. (2000). The impact of organizational climate on safety climate and individual behaviour. *Safety Science*, *34*(1-3), 99-109.

Nurcholis, G., & Qurniawati, M. (2020). Psychological well being, Stress at Work and Safety Behaviour at Sea of Seafarer on Shipping Company. *Technium Soc. Sci. J.*, *12*, 137.

Oah, S., Na, R., & Moon, K. (2018). The influence of safety climate, safety leadership, workload, and accident experiences on risk perception: A study of Korean manufacturing workers. *Safety and Health at Work*, *9*(4), 427-433.

Omairi, A., & Ismail, Z. H. (2021). Towards Machine Learning for Error Compensation in Additive Manufacturing. *Applied Sciences*, *11*(5), 2375.

Pacheco, I. C. V., & Riaño-Casallas, M. I. (2017). Contributions of occupational health and safety to the quality of working life: An analytical reflection. *Ciencia y Tecnología para la Salud Visual y Ocular*, *15*(2), 85-94.

Prodanova, Y. P., & Kundurzhiev, T. G. (2018). Health And Safety At Work As Predictors Of Quality Of Working Life: Empirical Studies Among Workers In Medical Establishments. *Eastern Academic Journal*, *4*, 207-214.

Proven, D. J., Woods, D. D., Dekker, S. W., & Rae, A. J. (2020). Safety II professionals: How resilience engineering can transform safety practice. *Reliability Engineering & System Safety*, *195*, 106740.

Rahim, N. B. (2020). The Interaction between Protean Career Orientation, Career Goal Development and Well-Being Outcomes: Evidence from Professional Engineers. *Gadjah Mada International Journal of Business*, *22*(1), 24-48.

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology*, *57*(6), 1069.

Sekaran, U., & Bougie, R. (2010). Research Methods for Small Business. *A Skill Building Approach*.

Sirgy, M. J., Efraty, D., Siegel, P., & Lee, D. J. (2001). A new measure of quality of work life (QWL) based on need satisfaction and spillover theories. *Social Indicators Research*, *55*(3), 241-302.

Stein, V., & Scholz, T. M. (2020). Manufacturing Revolution Boosts People Issues: The Evolutionary Need for 'Human-Automation Resource Management in Smart Factories. *European Management Review*, *17*(2), 391-406.