

THE IMPACT OF SAFETY CULTURE TOWARDS SAFETY
PERFORMANCE WITH MEDIATOR OF ISO9001 AND OSH
ADMINISTRATION

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A thesis submitted in
fulfilment of the requirement for the award of the
Doctor of Philosophy

Faculty of Mechanical and Manufacturing Engineering
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JULY 2020

I would like to dedicate this work to the soul of my father Saeed Ahmed Memon, May ALLAH S.W.T. bless him Jannat ul Firdos. I would also like to express my sincere gratitude to my siblings, friends and all those who were a source of knowledge for me.



ACKNOWLEDGEMENT

All praises are due to ALLAH Subhanahu Wa Ta'ala for inspiring me with strength and energy to achieve this modest study. I am deeply grateful to all those who have encouraged and supported me, discussed ideas and insights, which have contributed in various ways to complete my study.

I would like to express my deepest gratitude to my supervisors, Prof Dr Yusri Bin Yusof and Dr Md Fauzi Ahmad for their endless support, guidance, advice and encouragement throughout my dissertation.



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ABSTRACT

Manufacturing industries plays a significant role in the Gross Domestic Product (GDP) of the country. However, great number of accidents occur due to the lack of safety culture implementation in the manufacturing industries. Accidents at workplace are uncontrollable but preventable. It was reported by Malaysia Department of Occupational Safety and Health that that from 2012 to 2016, 25% of death accidents, 75% of permanent disability accidents, and 64% of non-permanent disability accidents occurring in all sectors of the country occurred in manufacturing industry alone. Therefore, it is necessary to develop a framework to reduce health and safety risks in Johor manufacturing industries as to create safe and healthy environment for the employees. Subsequently, safety performance (SP) and safety culture (SC) are the essential parameters for the development of safe environment within the manufacturing industries. Therefore, this study aims to examine ISO9001 and occupational safety and health administration as a mediator between safety culture (SC) and safety performance (SP) in manufacturing industries in Johor, Malaysia. This study used Statistical Package for Social Science i.e. SPSS for demographic analysis, data screening and exploratory factor analysis whereas Structural Equation Modelling (SEM) with Partial Least Square (PLS) Version 3.0 was used to evaluate the measurement and structural relationship. Data was collected through questionnaires, distributed to senior managers, safety managers, safety operators and safety subordinators. Total 412 questionnaires were distributed and 255 were received. It was found that SC has positive and significant effect on SP inline with ISO and OSHA. It was statistically observed that OSHA has strong mediating effect between SC and SP. In contrast ISO9001 has weak mediator effect between SC and SP. Hence, it was found through PLS that SC and SP have satisfactory influence on OSHA with t-value 3.386. Therefore, this research can positively be beneficial and act as a guide for the Johor manufacturing industries to enhance the safety performance through safety culture implementation.

ABSTRAK

Industri pembuatan memainkan peranan penting dalam Keluaran Dalam Negara Kasar (KDNK) negara. Walau bagaimanapun, terdapat banyak kemalangan yang berlaku disebabkan kekurangan pelaksanaan dalam membudayakan aspek keselamatan di dalam industri pembuatan. Berdasarkan pemerhatian, didapati kemalangan di tempat kerja sukar untuk dikawal tetapi boleh dicegah. Jabatan Kesihatan dan Keselamatan Pekerjaan melaporkan terdapat peningkatan yang besar direkodkan dalam kemalangan maut berdasarkan purata 5 tahun sebanyak 25%, kecacatan kekal dengan purata 75% dan kecacatan tidak kekal sebanyak 64% dalam industri pembuatan, di negeri Johor, Malaysia berbanding sektor lain. Oleh itu, adalah perlu untuk membangunkan satu rangkakerja bagi mengurangkan kemalangan dalam bidang industri pembuatan di negeri Johor serta mewujudkan persekitaran yang selamat dan sihat bagi para pekerja. Seterusnya, prestasi keselamatan (SP) dan budaya keselamatan (SC) adalah parameter penting bagi pembangunan persekitaran yang selamat dalam industri pembuatan. Oleh itu, kajian ini memberi tumpuan kepada keberkesanan ISO9001 dan pentadbiran keselamatan dan kesihatan pekerjaan sebagai pengantara antara budaya keselamatan (SC) dan prestasi keselamatan (SP) dalam industri pembuatan di Johor. Kajian ini menggunakan pakej Statistik untuk Sains Sosial (SPSS) bagi analisa demografi, mengguna data dan analisa faktor penerokaan manakala Model Persamaan Struktur (SEM) dengan kaedah Partial Least Square (PLS) Versi 3.0 digunakan bagi menilai hubungan pengukuran dan struktur. Walaubagaimanapun, data telah dikumpulkan melalui soal selidik, yang mana diedarkan kepada pengurus kanan, pengurus keselamatan, pengendali keselamatan dan subordinat keselamatan. Sebanyak 412 soal selidik telah diedarkan dan 255 telah diterima. Ia melalui pengesahan empirikal bahawa SC mempunyai kesan positif dan signifikan terhadap SP selari ISO dan OSHA. Secara statistiknya diperhatikan bahawa OSHA mempunyai kesan pengantara yang kuat antara SC dan SP, manakala, ISO9001 mempunyai kesan pengantara yang lemah antara SC dan SP. Oleh itu, seperti yang diperolehi melalui PLS, SC dan SP mempunyai pengaruh yang memuaskan terhadap OSHA dengan nilai t 3.386. Oleh

yang demikian, kajian ini secara positifnya dapat memberi manfaat dan bertindak sebagai panduan bagi industri pembuatan di negeri Johor untuk meningkatkan prestasi keselamatan melalui pelaksanaan budaya keselamatan.



CONTENTS

	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	ABSTRAK	vi
	CONTENTS	viii
	LIST OF TABLES	xiv
	LIST OF FIGURES	xvi
	LIST OF SYMBOLS AND ABBREVIATIONS	xvii
	LIST OF APPENDICES	xviii
CHAPTER 1	INTRODUCTION	1
	1.1 Overview	1
	1.2 Background	2
	1.2.1 Safety culture in Malaysia manufacturing industry	3
	1.2.2 OSH Administration in Malaysia	4
	1.2.3 ISO9001 in Malaysia	6
	1.3 Problem statement	7
	1.4 Research objectives	10
	1.5 Research questions	10
	1.6 Scope of the research	11
	1.7 Significance of the research	11
	1.8 Thesis layout	12
CHAPTER 2	LITERATURE REVIEW	14
	2.1 Introduction	14
	2.2 An overview of the Malaysian Manufacturing Industry	14
	2.3 Safety Culture (SC)	15

2.3.1	Safety culture in manufacturing industry	16
2.4	Elements of safety culture	17
2.4.1	Management commitment	19
2.4.2	Communication	20
2.4.3	Priority of safety	20
2.4.4	Supportive environment	21
2.4.5	Employee Involvement	21
2.5	Safety Performance (SP)	22
2.6	Safety performance in manufacturing industries	23
2.7	Elements of safety performance	25
2.7.1	Equipment performance	26
2.7.2	Safety performance report	27
2.7.3	Employees performance	27
2.8	The ISO9001 family of International Standards	27
2.9	ISO9001 dimensions	30
2.9.1	Continuous improvement	32
2.9.2	Prevention of nonconformities	33
2.9.3	Customer satisfaction focus	35
2.10	Overview of OSH Administration	35
2.11	Benefits of OSH Administration	36
2.12	OSH Administration dimensions	37
2.12.1	Occupational Health Surveillance	39
2.12.2	Health and safety committees	40
2.12.3	Health and Safety Audits	40
2.12.4	Health and safety Policy	41
2.12.5	Health and Safety Training	41
2.13	Role of OSHA and ISO9001 in manufacturing industries	42
2.14	ISO9001 instead of OHSAS18001/ISO45001	42
2.15	Relationship between SC, SP, ISO9001 and OSHA	43
2.15.1	Relationship between SC and SP	43
2.15.2	Relationship between SC and OSHA	44
2.15.3	Relationship between SC and ISO	46
2.15.4	Relationship between OSHA and SP	47



2.15.5	Relationship between ISO9001 and SP	49
2.16	Research hypothesis	50
2.17	Research framework	50
2.18	Previous review studies of SC, SP, ISO9001 and SP	52
2.19	Summary	55
CHAPTER 3	METHODOLOGY	56
3.1	Introduction	56
3.2	Research Approach	56
3.3	Questionnaire Design	59
3.3.1	Measurement Scale	60
3.4	Pilot Study	60
3.5	Questionnaire Survey	60
3.6	Analysis Methods	61
3.6.1	SPSS	61
3.6.2	Structural Equation Modelling (SEM)	61
3.7	Population	64
3.8	Sample size	64
3.9	Questionnaire design	66
3.10	Pre-testing (Validation from experts)	66
3.11	Pilot Survey	69
3.11.1	Reliability test	69
3.11.2	Validity	71
3.11.3	Exploratory Factor Analysis (EFA)	71
3.11.4	EFA and Reliability on OSHA constructs	72
3.11.4.1	Total Variance Explained In OSHA	72
3.11.4.2	Rotated component matrix results of OSHA	73
3.11.5	EFA and Reliability test on Safety Performance (SP)	75
3.11.5.1	Total Variance Explained Safety Performance	75
3.11.5.2	Rotated Component Matrix Results	76

3.11.6	EFA and Reliability test on ISO9001	77
3.11.6.1	Total Variance Explained for ISO9001	77
3.11.6.2	Rotated component matrix results	78
3.11.7	EFA and Reliability test on Safety Culture (SC)	79
3.11.7.1	Total Variance Explained for Safety culture	79
3.11.7.2	Rotated component matrix results	80
3.12	Common method bias	81
3.13	Summary	83
CHAPTER 4	DATA COLLECTION AND ANALYSIS	84
4.1	Introduction	84
4.2	Demographic information	84
4.2.1	Academic qualification	85
4.2.2	Industrial experience	85
4.2.3	Designation	85
4.2.4	Certification	86
4.3	Statistical analysis	86
4.4	SPSS	87
4.5	Data screening	87
4.6	Partial Least Squares Analysis PLS-SEM	87
4.7	Assessment of Measurement Model	88
4.7.1	Internal Consistency	90
4.7.2	Convergent Validity	90
4.7.3	Discriminant Validity	94
4.7.4	Assessment of structure model	99
4.7.5	Hypotheses testing	99
4.7.6	Direct effect	99
4.7.7	Direct effect without mediating (between SC and SP)	100
4.8	Model with mediating (Testing the mediating effect)	102
4.8.1	Assess the Variance Accounted For (VAF)	102

4.9	Coefficient of Determination (R^2)	103
4.10	Predictive relevance (Q^2)	104
4.11	Effect size (f^2)	104
4.12	Summary	105
CHAPTER 5	RESULT AND DISCUSSION	106
5.1	Introduction	106
5.2	Summary of the results	106
5.3	What are the significant effects between SC and OSHA, ISO9001 and SP for manufacturing companies in Johor state of Malaysia?	107
5.4	Does OSHA mediate the relationship between SC and SP among manufacturing companies in Johor state of Malaysia?	108
5.5	Does ISO9001 mediate the relationship between SC and SP among manufacturing companies in Johor state of Malaysia?	108
5.6	Discussion on the findings of direct effect	108
5.6.1	The relationship between SC and SP	109
5.6.2	The relationship between the SC and OSHA	110
5.6.3	Relationship between the SC and ISO9001	110
5.6.4	The relationship between the OSHA and SP	111
5.6.5	Relationship between the ISO9001 and SP	112
5.7	Discussion on the findings of mediation	112
5.7.1	OSHA mediating the relationship between SC and SP	113
5.7.2	ISO9001 mediating the relationship between SC and SP	113
5.8	Summary	113
CHAPTER 6	CONCLUSIONS	115
6.1	Conclusion	115

6.2	Research contribution	117
6.3	Managerial contribution	117
6.4	Limitation of study and for future work	118
	REFERENCES	119
	APPENDIX A	158
	APPENDIX B	165
	APPENDIX C	171
	VITA	172



PTTHM
PERPUSTAKAAN TUNKU TUN AMINAH

LIST OF TABLES

1.1	Industrial accidents of manufacturing sector during last five years	9
2.1	Operational Definition of the Constructs (Dimension and Items of SC)	18
2.2	Items and sources of elements of SP	26
2.3	Items and sources of elements of ISO9001	31
2.4	Operational Definition of the Constructs (Dimension and Items of OSHA)	38
2.5	Critical Summary of safety culture, safety performance, OSHA and ISO9001	53
3.1	Criteria for Selection of SEM Approach (Hair <i>et al.</i> , 2014)	62
3.2	Questionnaire Administration	65
3.3	Krejcie and Morgan table for sample size determination	65
3.4	Summaries of comments and suggestions from expert	68
3.5	Level of reliability	69
3.6	Pilot Survey Result	70
3.7	KMO and Bartlett's Test for OSHA Constructs	72
3.8	Results of total variance explained for OSHA	73
3.9	Rotated Component Matrix for OSHA	74
3.10	KMO and Bartlett's Test for SP	75
3.11	Results of Total Variance Explained for SP	76
3.12	Rotated Component Matrix SP	76
3.13	KMO and Bartlett's Test for ISO9001	77
3.14	Results of Total Variance Explained for ISO9001 Efforts	78

3.15	Rotated Component Matrix Result for ISO9001 Efforts	78
3.16	KMO and Bartlett's Test for SC	79
3.17	Results of total variance explained for SC	80
3.18	Rotated Component Matrix for SC	81
3.19	Total Variance Explained	82
4.1	Academic qualification of respondents	85
4.2	Industrial experience of the respondents	85
4.3	Designation of the respondents	86
4.4	Certification of the participated organizations	86
4.5	Two steps of PLS-SEM for evaluating the model	88
4.6	Reliability and validity for Safety Culture	91
4.7	Reliability and validity for OSHA items	92
4.8	Reliability and validity for ISI-9001 items	93
4.9	Reliability and validity for Safety Performance	94
4.10	Discriminant Validity Based of Fornell-Lacker Criterion	96
4.11	HTMT Criterion	98
4.12	Testing the Direct Effect	100
4.13	Direct Effect without Mediating between SC and SP	100
4.14	Testing the Mediating Effect	102
4.15	Assess the Variance Accounted For (VAF)	103
4.16	Result of Predictive Relevance (Q^2) and R-squared (R^2)	104
4.17	Result of Effect Size (f^2)	105

LIST OF FIGURES

1.1	Occupational accident by the different sectors of Malaysia (DOSH 2018)	8
1.2	Occupational accident in different states of Malaysia (DOSH 2018)	8
2.1	Research framework	52
3.1	Research methodology flow diagram	58
4.1	Shows the measurement model (t-values are in brackets, P-values are without brackets)	89
4.2	Direct Effect without Mediating	101



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PERPUSTAKAAN TUNKU TUN AMINAH

LIST OF SYMBOLS AND ABBREVIATIONS

<i>AVE</i>	-	Average Variance Extracted
<i>CB-SEM</i>	-	Covariance-Based Structural Equation Modelling
<i>CFA</i>	-	Confirmatory Factor Analysis
<i>DOSH</i>	-	Department of Occupational Safety and Health
<i>EFA</i>	-	Exploratory Factor Analysis
<i>FMM</i>		Federal Malaysian manufacturing
<i>ISO</i>	-	International Standards Organization
<i>KMO</i>	-	Kaiser-Meyer-Olkin
<i>OSHA</i>	-	Occupational Safety and Health Administration
<i>OSHCs</i>	-	Occupational Safety and Health Committees
<i>PLS-SEM</i>	-	Partial Least Squares -Structural Equation Modelling
<i>PhD</i>	-	Doctor of Philosophy
<i>PLS</i>	-	Partial Least Square
<i>SP</i>	-	Safety Performance
<i>SC</i>	-	Safety Culture
<i>SPSS</i>	-	Statistical Package for Social Sciences
<i>SEM</i>	-	Structural Equation Modelling
<i>VAF</i>	-	Variance Accounted For
R^2	-	Coefficient of determination
q^2	-	Cross-validated redundancy
f^2	-	Effect size

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	Pilot Study Questionnaire	158
B	Actual Study Question	165
C	List of Publications	171



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PERPUSTAKAAN TUNKU TUN AMINAH

CHAPTER 1

INTRODUCTION

1.1 Overview

In recent decades, our living standards have become more luxurious thus creating a heightened demand for products such as vehicles, electric parts, and food products. Consequently, manufacturing industries are increasing numbers to meet the heightened consumer demand. Industries must adhere to safety culture and occupational health and safety regulations as stipulated by ISO9001 to obtain the best performance in terms of safety of products and human life (Iliev *et al.*, 2016). Safety Culture (SC) is the best alternative to achieve manufacturing targets in a manner that minimizes the occurrence of accidents in the production process to almost zero. SC defines the employee's values, attitudes, beliefs and performances resulting from a cooperative commitment by higher authorities and other stake holders throughout an industry that properly prioritizes safety against other industry goals to allow business objectives to be undertaken without undue risk (Nordlöf *et al.*, 2015).

To create the best safety culture in the industry for achieving the best safety performance, there are a lot of mediators that can enhance safety performance such as TQM, OC, OP, OSHA, and ISO (Khurshid *et al.*, 2018). Occupational Safety and Health Administration is widely utilized in the manufacturing industry to keep the employees from dangerous conditions and provide the safety and healthy environment. OSHA offers great advantages in reducing the work-fatality rate and expressively concentrates on the overall grievance and disease rates in industries especially focusing on the manufacturing industry (Seong & Mendeloff, 2004). Whereas, ISO9001 is a group of international values on quality and quantity

excellence established to support industries in efficiently documenting the quality control system fundamentals to be executed to maintain a well-organized quality control system. The great advantages of ISO are customer's satisfactory, staff motivation and continual improvement (Ismyrlis & Moschidis, 2015). Therefore, in this research, OSH Administration and ISO9001 are utilized as a mediator to obtain the high SP of the manufacturing industry.

1.2 Background

At present, safety culture is the main contributor in safety management systems in manufacturing industry and had been recommended as one of the foremost contributors to fortunes and damages. Hence, the executive level is extra likely to promote an optimistic safety culture in their association in order to diminish human fatalities and property damage. The safety culture has been designated as employee safety contribution, supposed risk and emergency response, mutual sets of values, behaviour, norms that disturb safety behaviour. It is obvious that the administration has an essential impact on safety culture which rely on the description of a assurance to safety within the association (Reason, 2016).

In terms of the high-class management a 'safety vision' is required to fulfil the aims and objectives of their industries. The effectiveness of an industry is consistent with the techno-structural intervention theory, which lays emphasis on safety, productivity and relationships among employees. Techno-structural intervention approaches also focus on the level of contribution in the expansion and change of procedure in an industry. One of the best involvements that has been acknowledged is the socio-technical system, which focuses on safety circles; the factors which determine the safety effectiveness of industry through continuous improvement (Teizer, 2015).

Great number of effective manufacturing industries have contained SC and comprehended its irreplaceable influence (Ward et al, 2018). Hence, the status of SC as an operative pillar for attaining manufacturing superiority cannot be denied. The idea of manufacturing superiority is measured as a path to be the best producer while maintaining high standards for the protection of employee's life. It refers to the ultimate aim to provide the best protection facilities. According to Waterson (2018),

while evolving outlines, SC is a significant contributor for attaining high-class safety of manufacturing industries' products and workers. Depending on conditions, the mediating effect of OSHA and ISO9001 between safety culture and performance will give a negative or positive indirect effect on safety behaviour which is performed by the level of protection in an industry, and a positive or negative indirect effect on conventional culture on safety which is performed by a new manufacturing industry (Antonsen, 2017).

1.2.1 Safety culture in Malaysia manufacturing industry

During 2018, the workplace accidents in Malaysia described exemplified that the big number of non-permanent and permanent disabilities were implicated by the manufacturing industry (DOSH Malaysia, 2018). Safety culture plays a key role in a workplace incident. Primarily, a workplace with a poor safety culture fosters an environment where errors are more frequently made, and violations are increasingly tolerated. This, in turn, exposes weaknesses resulting from active and latent failures within the system. Moreover, a workplace with a poor safety culture could be characterised by its management's failure to acknowledge, or address, the gaps within their safety systems. As a result, these weaknesses linger, and possibly worsen, over a long duration of time. Thus, increasing the likelihood of a potential harmful event to occur, possibly resulting in injury and/or death. Based on this understanding, an "ideal" safety culture has been conceptualised as "the 'engine' that drives the system towards the goal of sustaining the maximum resistance towards its operational hazards" Robson 2007. In practice, this means that safety culture has significant predictive value for prevention efforts in the Occupational Health and Safety (OHS) setting.

Notwithstanding the theoretical importance of the safety culture concept, recent studies have called for the translation of this research into intervention efforts that can guide organisations in improving their workplace safety culture (Leitão and Greiner, 2016; Newnam et al., 2016; Vu and De Cieri, 2016). Several notable publications have attempted to translate safety culture theory into intervention research within the workplace safety culture context (Zohar, 2002; Zohar and Luria, 2003). Furthermore, evaluate OHS management systems interventions (Robson et al., 2007),

patient safety culture improvement strategies (Morello et al., 2013) and active behavioural change safety interventions (Mullan et al., 2015). However, evaluate workplace intervention studies that were aimed at improving workplace safety culture

1.2.2 OSH Administration in Malaysia

The background of the Malaysian industries happens when the Malaysian government established a policy to promote an integrated manufacturing sector to strengthen its manufacturing industries and minimize reliance on other industries, such as, agriculture, construction, mining, etc. Such advancements have particular objectives which are to recognize the constraint of ingresses, the decrease of expenditures in overseas argument, the formation of employment and the establishment of the manufacturing segment (MGCC- Market Watch 2011). These organizations essentially provisions a great amount of Small and Medium Enterprises (SMEs) providing mechanisms, parts, equipment, tools and products produced in Malaysia (Zadry, 2005). Every organization in Malaysia should adhere to safety standards to decrease grievances in an organization. For this reason, personal performances are closely monitored by administration to evade from situations of staff prosecuting their company. The performance standards that initiated in Malaysia for ensuring satisfactory safety performance was named Occupational Safety and Health Act 1994 (Occupational Safety and Health Act 1994), (NIOSH Malaysia, 2008). Based on this act, every corporation can enhance their safety performance through OSHA prescribed approaches that can be applied in the company.

Department of Occupational Safety and Health (DOSH), expected enormous duties in implementing safety and health of workforce at the factory to that of self-regulation, whereby all investors at the organization would undertake duty for safety and health at the organization with decisive duty conferred in the organization (Yon, 2007; Soehod, 2007). Underlying the self-regulation ideas are the identical ideologies of employee participation and joint assurance from organization and workers (Khoo, N. K., Hussin, H., & Abdullah, N. (2018). Malaysia has also executed the idea of self-regulation (Yon, 2007; Soehod, 2007) about two eras after it originated into fashion in the 1970s. It is contended that the organization of the concept of self-regulation differs from one area to another (Hovden, Lie, Karlsen & Alteren, 2008). The modifications

are separated into different behaviours with identical ideologies of self-regulation manifested in context of attention and purposes:

- (i) Whether the development of occupational safety and health groups (OSHCs) that include management and non-management members is dependent upon certain influences (size of firm, type of industry, etc.);
- (ii) Whether OSHCs are a characteristic feature of the self-regulatory system;
- (iii) The scope of privileges and influences conferred in members of OSHCs.

According to section 30 of OSHA Act of 1994, organizations with 40 or more workers are mandated to create OSHCs. In addition, Guideline of the Occupational Safety and Health (Safety and Health Committee) Principles 1996 (OSHCR 1996) specifies that the configuration of OSHCs must at the very least have same number of management and non-management members which is fundamental for the joint nature of OSHCs (Ummu Kolsome Farouk, Stanley Richardson, and Arul Jeganathan Solucis Santhapparaj, 2011). A shared inspection of the Occupational Safety and Health Act 1994 and the OSHCR 1996 reveal that the OSHC is a characteristic feature in the OSH self-regulatory system implemented in Malaysia. The validation for OSHCs is founded on the philosophy that occupational safety and health are best attained through authorizing directors and non-managers pushing to implement obedience with values. In many developed countries they are observed as the keystone of safety and health strategies (Eaton & Nocerino, 2000). An organization method is well-defined by Bakri, Mohd Zin, Misnan and Mohammed (2006) as a deliberate, recognized and demonstrable technique of handling dangers and perils at the organization in an organized way, and should be recognized as an integral part of the overall organization system. The investigators propose that such a system will permit firms to comply with employee's responsibilities under the Occupational Safety and Health Act 1994. However, the achievement of a system idea is reliant upon changeable issues one of which is employee participation (Saksvik & Quinlan, 2003). The emphasis has been on manufacturing industries because the Social Security Organization's Annual Report of 2009 and the DOSH Annual Report of 2009 designate that the manufacturing sector has the highest number of work-related accidents.

In addition, the assessment of the OSHC as a potential information creation vehicle in the area of OSH at the workplace may validate its centrality in the Malaysian self-regulatory model. A discovery of the types of activities relatively least performed by OSHCs despite legislative sanctions may also be indicative of the extent of

employee involvement and hence the pulse of the self-regulatory system in Malaysia, and is reflective of whether the path towards a systems approach in Malaysia (Soehod, 2007) would be smooth or strewn with impediments along the way.

Based on the mentioned lack and gaps, the current study found a problem on the SC implementation mediated by OSHA and ISO9001 on the achievement of SP. Subsequently, this research proposes a fundamental framework to examine; firstly, the direct effect of SC implementation on management commitment, communication, priority safety, supportive environment and employee's involvement, and secondly, the effect of OSHA and ISO9001 on SP.

1.2.3 ISO9001 in Malaysia

ISO 9001 is known as a quality management standard that sets out necessities for industries quality management systems. ISO 9001 version highlights a stronger focus on the industry's stakeholders, its context and has another high-level of quality structure Psomas, Fotopoulos, Kafetzopoulos(2011).

Malaysian manufacturing industries, Shaharudin, *et al.*, (2018) and Wahid, R. (2019), found seven clauses of the ISO9001 QMS that are most difficult to achieve. These include corrective and preventive actions, design control, management responsibility, statistical techniques, process control, document and data control, and a quality system Yahya and Goh, 2001. This has prompted the need to find the critical factors to ensure the effective implementation of the ISO9001 QMS amongst manufacturing firms in Malaysia. Furthermore, past studies on the effectiveness of the ISO9001 QMS amongst manufacturing firms in Malaysia are very limited, with most of the studies on QMS being concentrated on the construction (Keng & Kamal, 2016), oil and gas (Al Turki & Faris, 2010), and education sectors (Daud et al., 2012). Therefore, this study is significant in view of its contribution to fill the knowledge gap in the highly important manufacturing sector of Malaysia, which has contributed significantly to the country's GDP growth, job employment, investment, and exports Wan (2016).

Currently, there exist a lack of information about the utilization of ISO certification either the old or new version of ISO9001 certification in Malaysian manufacturing industries, thus prompting the need to have quality processes as well as

well-defined procedures in place (Castello et al., 2019). Industries which are certified with ISO9001 are improve SC and SP. It examines the adoption of ISO9001 across Malaysian manufacturing industries and revisit the on-going debate on the perceived usefulness of ISO9001 certification, particularly in terms of its influence on SC implementation and SP.

1.3 Problem statement

Currently, a great number of manufacturing industries have been greatly used to meet user demand. These manufacturing industries play a vital role in the GDP. However, due to the lack of safety implementation a large number of accidents take place in the manufacturing industry, which in turn affects the employee's life and performance in terms of productivity, quality and safety of manufacturing industry.

It was reported by Department of Occupational Health and Safety (DOSH) that in year 2018 the highest number of accidents occurred in manufacturing industries as compared to the other sectors such as mining, construction, agriculture, forestry and utilities, as shown in Figure 1.1. This shows that there is a lack of safety culture implementation in the Malaysian industries including manufacturing industries. Apparently, accident at workplace is not controllable but it could be preventable by implementing safety culture. To prevent accidents in the manufacturing industries, the safety culture needs to be promoted for the improvement of safety performance.



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