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Port terminal safety: A conceptual paper on factors that affects occupational stress risk assessment in container terminal

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Abstract--A part of the supply chain that is very important to Malaysia is the port sector. A high-risk work environment is leading to a rise in occupational stress among port terminal workers. It is necessary for an organisation to correctly diagnose the aspects of the working lifestyle conditions that are perceived as risks by workers and to investigate the consequences of these risks in order for the organisation to be successful in the prevention of occupational stress problems. The aim of this conceptual paper is to investigate the factors that influence the safety practitioner's perception of safety and health risk assessment at port terminal. Data on safety and health that were collected in the past were analysed. Misunderstanding over the definition of a hazard and how to interpret a risk assessment matrix were both factors. This paper will scrutinize those factors and accomplish suggestions for how research should be done in Malaysia in the future.

Keywords--Misunderstanding over the definition, supply chain, occupational stress risk.

Introduction

Port industry is one of the commercial zones facing significant threats, which rise the risk taken by port terminal operators (Kaliszewski *et al*, 2020). This place is crucial and vital components in a way to meet national and international demands, to sustain living standards for each country's economy and any problem facing can cause negative impact and reputation. Mostly, port terminal involved logistical activities related to containerization includes container management, container transportation, cargo handling and container maintenance (Munim, Z.H., & Schramm, H.J., 2018; Zainuddin, N. et al, 2019).

Based on the current trends that have to fulfill Industrial Revolution 4.0, port terminal becoming have intense activities due to facilities that port operator offered but also ' a place of risk' where harm can be directed to workers and organization (Mohd Salleh, N.H. et al, 2021; Febriyanto, K. & Suprayitno, S., 2019). Apparently, the port management attempts to assess occupational health and safety (OHS) especially psychosocial factors in port terminal have been identified throughout activities but need to employ specific risk assessment methods and techniques that can be distinguished from other industries.

Employers are responsible for identifying possible OHS hazards and risk includes psychosocial hazard focusing on occupational stress in the work environment. Risk assessment is an essential and systematic process for identifying, assessing and mitigate the human activities on system with risky characteristics. Risk based thinking technique can be incorporated in management in a way to quantify and optimize the risk assessment process in facilitates the decision making.

Occupational stress is an inferior state through physically, mentally, and emotionally response happened when the workers perceives that the job demands invades their capabilities, resources, or needs (Basu, S., 2017; Landsbergis, P. A., 2017). The consequences from this situation can cause psychological and physical injury due to prolonged, severe and untreated occupational stress.

1. Problem Statement

Over the years, port terminal facing the globalization and dramatic changes such as higher job demands and working, labour issues, restructuring and problematic employment. The work nature of services organization that needs the workers to face numerous type of customer includes manners, actions and deeds which leads to occupational stress becomes a phenomenon.

Working in a stressful and intense environment can increase the risk of stress related injuries, illness and accidents. Besides, the consequences from the development of worker' feeling and experience in OHS, including the working conditions in port terminal sporadically discussed in systematic studies (Walters, D., et al, 2020).

Number of studies on occupational hazard factor that indicates significant to worker's health. In other side, the occupational stress are being studied and

explored extensively in a work environment across numerous country, but rarely found in Asia, particularly in Malaysia. It's important to make attention because different workers faced different level of occupational stress due to human not being possess similar kind of pressure (Yakub, N. W., & Sidik, S. M, 2014).

In Malaysia, few studies and surveys have indicated that this issue arises among workers in organizations are experienced occupational stress. This means that occupational stress could be a silent killer for many organizations in Malaysia of which port terminal, Penang is no exception. Previous research found a lack of accurate and comprehensive procedures in detect, evaluate, analyses and mitigate stress at work (Yaakub, N. et al, 2019).

Instead, as there is no specific risk assessment technique or fundamental framework to cope with occupational health and safety risk in general and port terminal in particular, this paper proposes an approach for risk assessment in port terminals (Schuller, K. 2019; Chirico, F. 2017).

Many industrial professionals and practitioners tend to misjudge issues relating to risk assessment, which is one of the main points of this study. Currently, the method identifying, assessing and controlling the hazard been introduced by Department Occupational Safety and Health is a main reference for industrial and organisation in Malaysia. A secondary problem is that the risk assessment guideline used by all industries in the First Schedule of the Occupational Safety and Health Act 1994 does not take into account the operational definition of likelihood and severity in risk matrix. However, the practitioner is unfamiliar and not uniformly on the correct method to assess the level of occupational stress efficiently.

The dominant issue to be brought off in this study is that numerous of industrial professionals and practitioners have a tendency to to make misjudgment on issue related to risk assessment commonly known as Hazard Identification, Risk Assessment and Risk Control. In addition to the main issue, all industries that specified in First Schedule, OSHA 1994 applying and referring the similar common risk assessment guideline without taking into consideration the operational definition of likelihood and severity in risk matrix. However, the practitioner is unfamiliar and not uniformly on the correct method to assess the level of occupational stress efficiently.

2. Purpose and Significant Study

This paper will identify the gaps and factors affecting port terminal risk management. The paper's questions as follows: i. What the occupational stress elements that industrial practitioner's take into considerations when dealing with risk assessment process; ii. How the insight and observation of practitioners are influence the accuracy of risk level; and iii. What is method used in risk assessment process in explanation on likelihood and severity of health problems in the workplace. The response to these questions, as well as the justification for it, is based on an initial search of the relevant literature, as well as the review of relevant documents, interviews, and observations.

This study has important implications because it explores factors that influence industrial practitioners' risk assessment views. These factors and reasons have an effect on the industrial practitioner's behaviour. This study presents a strategy for risk assessment in container terminals as there is currently no dedicated risk assessment method or framework to deal with safety hazards in general and ports in particular. As a result, this paper will investigate these aspects and provide suggestions for further study in Malaysia.

4.0 Theoretical Framework of The Study

It is necessary to provide a theoretical framework for industry practitioners' perceptions of risk assessment in this study, which merges workplace safety and health assessment data with matrices for risk assessment. The risk formula is the theoretical model that best describes how people develop their views of the world around them. ISO 45001:2018 defines risk as the impact of uncertainty on objectives. "Risk" refers to the probability of a potentially harmful event occurring, as well as the degree of harm or death that may result (DOSH, 2008). That vacuum in risk assessment will be filled by this new tool.

5. Limitation

This conceptual paper is bounded by a number of different components. To begin, the scope of this article is limited to the workplace health and safety statistics of a port container terminal. This establishes a boundary because it precludes the use of any other container terminal. Second, this study framework incorporates many risk assessment ideas in order to both explain and comprehend the process of risk assessment in the workplace. This conceptual study is constrained by certain analytic considerations. For instance, this article relies on occupational safety and health historical data that was gathered in the past by a researcher or academician from a certain container terminal port industry.

6. Literature Review

6.1 Occupational stress issues

Port industry faced continued challenges in most sectors included occupational safety and health sectors and issues. There are many activities involved handling and storage cargoes, loading or unloading of cargo into or out of containers, maintenances and stevedoring. Occupational stress has become a worldwide discussion and debate in various forms in every workplace. Although tremendous progress has been made to increase awareness about these challenges, there are still gaps in how well this information is put into practise (Kaliszewski *et al*, 2020; & Munim, Z.H., & Schramm, H.J., 2018).

It has been realized as universal concerns of workers and organizations in all parts of the world. A research specified that 53% of workers are expiring rising level of occupational stress, while 59% of workers responded that the job itself that initiate occupational stress. Work intensity, shift work, unpleasant working environment, lack opportunity for growth, lack support from supervisor and co-workers, role conflicts and ineffective organizational structure are main causes

that contribute to the occupational stress (Gangopadhyay, S., et al, 2017; Cezar-Vaz, M. R., 2018).

Occupational stress is a real problem that can negatively affect safety and health workers. Recent studies suggest that organization also may have a broad influence on workers safety and health. It has been linked to a number of negative outcomes (Ahmad, A. 2017; Leka, S. 2012). Inadequate information records reported to safety and health department will resulted to risk analysis not inconsistent.

6.2 *Risk Management*

Risk management is a dynamic instrument that must be continuous throughout the life cycle of an activity; it is based on intuition and past experience and requires a high degree of judgement. Risk is an unforeseen event that occurs in the course of operations or tasks. Risk management has three primary processes: identification, analysis and response towards risk (Abd. Halim, Z. et al, 2021; Shand, D., 2021).

Risk assessment is a crucial part of the method of risk management. It is commonly understood what can cause harm to people and what reasonable measures can be taken to prevent that harm. It is a crucial instrument for the creation of suitable controls to manage occupational risk factors. The International Organization for Standardization (Purdy, G. 2009; Leitch, M. 2010) outlines five steps in the process of risk management:

Step 1: Recognize and identify the risk

Step 2: Ranking or evaluation hazards

Step 3: Responding to a considerable risk by tolerating, treating, transferring, or terminating it

Step 4: Resource management and contingency planning

Step 5: Monitoring risk performance and reviewing the risk management framework

International Labour Organization has also formulated the following risk assessment for the workplace:

Step 1: List the potential hazards.

Step 2: Determine the potential level of severity (decide how and who might be harmed)

Step 3: Evaluate risk (and decide whether the existing precautions are adequate or whether more should be done)

Step 4: Document and notes the outcomes

Step 5 : Review the result of assessment and make any necessary changes

6.3 *Hazard and Risk*

A source of potential injury and negative impacts is a hazard, while the impact of uncertainty on objectives is a risk (ISO, 2009). Misidentification a hazard for a risk or a danger is one of the most common forms of fundamental term misperception. When hazard terminology is misinterpreted, it creates a substantial obstacle to the proper management of hazards in the workplace, which is something that must be avoided at all costs.

When seen from this angle, industrial practitioners take into consideration these risk groups as type of hazard, classification of hazards, and category of hazard. The issues and problems develop when the majority of industrial practitioners incorrectly identify the risk and do not comprehend the primary characteristics of each group. This fundamentally contradicts presumptions regarding causality and effect. Hazards can be described in one of four ways. An object or situation's actions, classification, consequences, and negative attributes are used to describe a hazard's severity.

6.4 *Risk Assessment Matrix*

A risk matrix is an easy-to-use tool for ranking and prioritizing the risk of events and determining whether or not certain risks can be tolerated. Typically, the risk matrix displays fundamental properties such as probability and severity. In addition, it employed discrete categories rather than numeric values. The risk is represented graphically and belongs to the set of probability and severity diagrams.

The implementation of risk acceptance criteria is one of the strategies utilized in risk management. The term "risk acceptance" refers to an organization's attitude toward an identified risk as well as the absence of preventative measures taken because the organisation is willing to accept the impact and probability of the risk.

There are three ways to assess the probability and consequences of a risk: qualitative, quantitative, and semi-quantitative analyses. The description of risk in a DOSH-implemented risk assessment may be quantitative or qualitative. However, it is up to the industry to choose the preferred method. On the basis of the severity of each risk, a general risk assessment matrix has been utilized to rank potential, current, and future risks.

Risk assessment techniques form both the data gathered and the predictors identified as causal, imposing patterns on the accident causes. The likelihood and severity of two predictors are graded using the risk assessment matrices. All risks are subject to the risk assessment matrix. The approach may be helpful in fostering discussion to distinguish between risk assessment matrices with high and low risk.

As required by the Occupational Safety and Health Act 1994 (Act 514), employers are responsible for ensuring that their employees and other related parties have a safe workplace. In order to carry out risk assessment and implement necessary corrective action in a systematic manner, Department Occupational Safety and Health developed the Hazard Identification, Risk Assessment, and Risk Control Guideline. The risk matrix that is being introduced is 5x5, and the likelihood scores are impossible, unlikely, improbable, conceivable, and most likely. Negligible, minor, serious, fatal, and catastrophic severity scores are available (Shaleh, M. K & Leman, A. M., 2016). This risk matrix was used broadly across all industries; however, with the port industry as the primary focus. It is essential to define the appropriate terminology of operational and conceptual for the likelihood and severity of the problem.

7.0 Methodology

This cross-sectional study will be conducted at the Penang port terminal using simple random sampling. The recruitment of 304 port workers will be chosen based on both inclusive and exclusive criteria. The ethical consent and approval was obtained from Medical Research Ethics Committee of the Medicine and Health Sciences Faculty. During the phase of data collection in which informed consent forms were being distributed, the Medical Research Ethics Committee of the Faculty of Medical and Health Sciences ensured that each participant voluntarily signed one of these forms.

A standardized questionnaire (Job Content Questionnaire) was used that adopted in Bahasa Malaysia. The questionnaire consists of three (3) sections, such as; Section A: Socio-demographical information; Section B: Occupational stress based on current job activity and Section C: Experiencing occupational stress in the 12 months. The Malay version was validated by Hadi *et al* (2006) and was found to have excellent reliability for social support (0.84), psychological job demand (0.61) and decision latitude (0.75).

The Statistical Package for the Social Sciences (SPSS) software, version 25.0 for Windows, will be utilised in order to arrange and examine the gathered information. To determine association between occupational stress and the other variables related. This program is suitable for analysis of social science data from questionnaires.

8.0 Findings

First Inquiry:

What are the occupational stress elements that industrial practitioners take into considerations when dealing with risk assessment process?

The safety professional's perception of the appropriate hazards to describe is influenced by two main factors.

8.1 Hazard definition

Referring to ISO 45001:2018 and MS 1722:2011, there are different definitions of hazard. According to the ISO 45001 standard, a hazard is any aspect of your process that might have an impact on the well-being of your employees, while a risk is the likelihood that harm will come to them (Uzun, M. et al, 2018; Neag, P. N., et al, 2020). A hazard is defined as a source, situation, or act that has the potential to cause harm in the form of human injury or ill health as well as damage to property, according to the MS 1722:2011 standard (Awang, N. et al, 2019). The extent of the risks that are assessed will be affected in various ways depending on how hazards are defined.

8.2 Hazard description

The description of a hazard may be based on an objects or situation's activities, classification, outcome, and negative qualities. There is uncertainty among safety professionals regarding the correct terminology for describing workplace hazards. Which of the following accurately describes the risks associated with the port environment and equipment in context occupational stress? Examples: ergonomic hazard, physical hazard, the factors related or influenced to work related stress, and failure to wear protective proper personal protective equipment.

Second Inquiry:

How the insight and observation of practitioners are influence the accuracy of risk level?

The majority of practitioners have divergent perspectives regarding the level of risk accuracy. It is common for them to misunderstand the concept and interpretation of probability levels. Moreover, there are issues with selecting the appropriate risk matrix for their workplace. It is essential to determine whether risk assessments are complete and accurate. It is also essential to ensure that no new hazards have been introduced or that previously low-priority hazards have been elevated by workplace changes. It is advisable to regularly review the assessment to ensure that the control methods are effective.

Third Inquiry:

What is method used in risk assessment process in explanation on likelihood and severity of health problems in the workplace?

There will be use of qualitative, quantitative, and semi-quantitative methods of analysis. A competent individual or group of individuals who have a comprehensive understanding of the situation being evaluated should conduct assessments. Ranking or prioritising hazards is one way to determine which risk is the most significant and, consequently, which should be managed first. Priority is typically determined by considering employee exposure and the likelihood of incident, injury, or illness.

By assigning risks a priority, you create a ranking or a list of actions. Ranking hazards necessitates familiarity with workplace activities, the urgency of situations, and, most importantly, the application of objective judgement. The risk

matrix illustrates the correlation between probability and severity. Utilizing a common risk assessment matrix, risk is ranked according to the level of each risk. The axes separately represent likelihood/probability and severity/consequence. There are numerous types of risk matrices, including 5x5, 4x5, 3x3, and more, depending on the needs of the organisation. The explanation of risk level according to stage colour.

9.0 Conclusion

The findings had an impact on the conclusion reached regarding the factors that play a role in risk assessment in the port terminal industry. In order for the managerial and top management to use HIRARC to make the best decision possible, it is essential for them to have a solid understanding of the specific criteria that should be used when evaluating potential dangers in the workplace. At port container terminals, risk assessments should be carried out and the most serious threat should be ranked in order of importance so that effective control measures can be developed.

10. Future Research Suggestion

The preliminary findings justify the following recommendations for directions to take in subsequent research:

The first recommendation is to conduct more research on the various industries listed in OSHA 1994's First Schedule.

The effectiveness of control measures should be further investigated, according to recommendation number two. It is necessary to create an appropriate risk matrix for control measures.

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