Determinants Of Occupational Stress In Container Port Industry – An Application Of Structural Equation Modelling Approach

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Abstract

Background: The effects of globalization may be seen in every facet of human existence, including the ways in which employment and organisations are carried out. These changes not only cause strain and stress on people working for corporate organisations, but they also do so for those working in port container terminals. In spite of stringent regulations and a lot of attention being directed towards reducing risks in the physical environment, the port industry's attempts continue to be associated with accidents, injuries, and illnesses despite the fact that there is a lack of information and a focus on psychosocial factors. The relationship between the occupational stress level (OSL) and its risk factors was assessed using a sample of 304 port workers in Malaysia.

Method: The Job Content Questionnaire (JCQ) was administered in its Malay-validated form. IBM SPSS Amos Version 26.0 was used to conduct a Structural Equation Modelling (SEM) analysis to examine the model's structural linkages.

Result: The result score for occupational stress level among port workers was significant, with a P-value less than 0.05. The SEM analysis used a multivariate technique that combines aspect component analysis and regression, and simultaneously examines the interrelationships between latent constructs. The analysis results indicates an excellent good fit of the data to the predicted model. The social support component accounted for 32% of the variations in OSL. Task, recognition, exposure, company culture, and customer response were associated positively with occupational stress.

Conclusion: Workers at ports are exposed to numerous risk variables that could cause occupational stress, which is determined by the structural equation modelling approach.

Keywords: occupational stress, structural equation modelling, port industry

Introduction

Background and Literature Review

Stress is the term used to describe a threat to the bodily and/or psychological balance of an individual (Simionato & Simpsom, 2018). The so-called "stress response," which is the

activation of central and peripheral neuroendocrine processes responsible for a variety of adaptive reactions and behaviours, is brought on by the disruption of homeostasis. Stress is frequently misunderstood and misjudge, leading to difficulties that might be avoided. Hans Selye (1956) introduced the idea of stress to modern society. Lack of study been done to concentrate on solutions to improve working environments, even though the Palmer, S. et al (2004) has been committed to identifying the origins of workplace stress and its links to detrimental health and organisational effects.

These adjustments have affected the workers' well-being and increased workloads. One of the main categories of workplace safety and health hazards is psychosocial hazard (Chirico et al., 2019 & Chen et al., 2018). Sub-hazards are the types of hazards that cause either short or long-term strains. It is referred to as occupational stress or work-related stress when it pertains to the workplace. There is no profession that is stress-free. One of the main health risks of the industrial job is work related stress. Occupational stress was defined as the adverse physiological and psychological responses that arise when the necessities of the job do not cope or match the worker' abilities, resources, or needs.

The stresses that are placed on employees continue to rise as a direct result of ongoing shifts in the character of work in industrialized countries and ongoing organisational restructuring and outsourcing (Peckham et al., 2017). It happens when a worker's abilities to cope with the demands of the workplace are out of harmony with those of the workplace itself (Soelton et al., 2020; Meng & Wang, 2018). It is also a huge and costly problem, and that the challenge for the organisations is to manage occupational stress in order to reduce the expenses associated with health care and boost productivity. At the level of the organisation, high levels of occupational stress have been related to high levels of absenteeism among

workers as well as low levels of productivity (Singh et al., 2020). The ability to pay attention and concentrate, make decisions, and use good judgement are all diminished by stress (Wickens et al, 2017).

Recently, the growth and extension of the port terminal in Malaysia have been a beneficial development in terms of the country's transportation prospects (Pallis, 2017; Fri et al, 2021). In addition, the implications that result from the accumulation of workers' experience in terms of safety and health, including the working conditions in container terminals, are rarely addressed in studies that are designed to be systematic. The individual's mental health and overall wellbeing are both significantly influenced by the individual's location of employment. Employees typically clock between eight and ten hours per week at their place of employment. Having a workplace that is safe and healthy not only increases productivity but also makes work more enjoyable and gratifying In Western nations, researchers and theorists have established and scientifically evaluated their theories and hypotheses regarding the effects of occupational stress. As a result of the huge cultural and economic shifts being experienced in developing nations like Malaysia, occupational stress and the health problems that result from it are becoming increasingly important concerns. It was discovered through study and theory gaps that there were certain holes in Malaysia's ability to manage occupational stress and it required certain resources.

Stress at work is a contributing factor in the development of critical problems in a variety of workplaces. Comparing to many other occupational health problems, regulating occupational stress is considered as more challenging. Because of this, it is generally accepted as a component of occupational safety and health that need to be given priority, particularly with regard to the significant health difficulties that have been thoroughly

documented, namely mental and physical health issues (Basu, Qayyum & Mason, 2017). The term "port" can be used to refer to any inland location that contains freight or container handling facilities. The port's operations, such as alliance and supply, impermanent storage, customs authorization, and the linkage between different forms of transportation, are made possible by the facilities that have been built (Maglic, 2020; Dinu et al., 2018). Occupational stress in the workplace has emerged as a topic of discussion and controversy across the globe, including in the industries of Malaysia. Although great progress has been made to improve the understanding regarding this topic, there are still gaps in the implementation of this knowledge in actual practises due to the fact that these gaps have not been addressed.

The following is a list of possible causes that contribute to occupational stress:

i.   Roles in the organisation, including an excessive amount of responsibility, an increase in competition, a lack of role clarity or conflicting roles, and role ambiguity (Yousaf et al., 2019);

ii. Organizational structure and climate, including ineffective communication, poor work design, and a lack of support from higher management (Travers et al., 2018; Winnubust, 2017);

iii. Relationships at work, including a lack of participation from workers, a lack of support from supervisors and co-workers, and a negative social environment;

iv. Progression in one's professional life, including job insecurity and a shortage of chances for advancement or promotion (Gallie et al., 2017);

v.   Environment: an unfavourable setting or a physically hazardous state, such as excessive loudness, crowded conditions, or air pollution (Javaid et al., 2018; He et la., 2017);

vi. Intrinsic job responsibilities, including excessive workload, pressure to finish off

work in a shift, work intensity, and working under pressure (Health and Safety Authority, 2017);

vii. Irregular work schedules, including but not limited to long work hours, shift work, long or irregular hours, and insufficient break time (Javaid et al., 2018).

The aim of this study was to use structural equation modelling (SEM) to analyze the association between occupational stress level (OSL) and its risk factors.

Methodology

Research Design
A cross sectional design was chosen for this study and conducted among port workers in container terminal, Penang, Malaysia

Research Protocol
The Research and Ethics Committee of Universiti Putra Malaysia, Serdang Selangor, examined and approved the study protocol. Port Human Resources granted permission to conduct the study, and the personnel were also given a formal assurance of anonymity.

Sample Size
The single proportion formula with a confidence interval of 95 percent was utilised in order to execute the task of estimating the sample size. The prevalence of occupational stress in a previous study of a population with similar characteristics was used as the basis for the determination of the sample size. The final determined sample size was 310, and this was done after taking into account a margin of error of 5 percent as well as non-response.

Research Instrument
Questionnaires are crucial instrument for obtaining essential information from respondents. Socio-demographics refers to the characteristics of the population studied, including age, ethnicity, work duration , monthly pay, level of education, and marital

status. It was found in previous studies, the sociodemographic risk factors, such as income and level of education, can affect an individual's health outcomes. The JCQ was utilized in the process of data collection from the respondents. Robert Karasek (1979) was the one who initially invented it, and Rusli Nordin was the one who translated it into Bahasa Melayu (Edimansyah et al 2006). It was through the JCQ centre website that permission was secured from the original author, Robert Karasek. The modified version derived from Rusli Nordin has been implemented (Edimansyah et al 2006). It has been validated using JCQ testing on the Malaysian Industrial Population (Yusoff et al., 2017). The JCQ is based on stress theory, which is a questionnaire-based instrument to measure the content of a respondent's job duties in a generally applicable manner that is applicable to all jobs (Sang et al, 2018). JCQ addresses significant problems in the workplace that are frequently disregarded because of their inaccessibility. The JCQ was divided into two subcategories: physical and psychosocial stress which its sub set psychological of stress. The physical and psychological stress subcategory contained eighteen items, whereas the psychosocial stress subcategory contained seventy one items. These item domains addressed four major domains: psychological demand (work demand), choice latitude (job control), job insecurity, and social support. The scores assigned to these items varied from one to four on a Likert scale. These ratings denoted "strongly disagree," "disagree," "agree," and "strongly agree," or "often," "occasionally," "rarely," and "never."(Kassim et al., 2018; Zuliza et al., 2017).

Validity and Reliability

Construct validity was created via factor analysis (FA). The concepts of elements is categorized as practical are validated by using this technique. It identifies the elements that are most appropriate to each component in the approach. In this study, the Bartlett test was utilized to estimate regarding the likelihood of factor analysis stability, whereas the Kaiser-Meyer-Olkin (KMO) test was utilized to discover whether or not the sample size was sufficient for the analysis. It also been used to assess the suitability of using factor analysis on data. The KMO value that is required should be higher than 0.6. (Hogue et al, 2014). Bartlett's Test of Sphericity is a correlation matrix comparison tool that is used to compare an observed correlation matrix to the related model that is being tested (Aldrich, 2018). If the significance level has small values (less than 0.05), this indicates that a factor analysis can be used and is appropriate for the data that was collected. In this study, all available data are evaluated using structural equation modelling (SEM) analysis with the Bartlett's Test and KMO test. Variable collinearity indicates the degree of correlation between a single variable and another variable. The variables represent occupational stress risk factors. Kaiser-Meyer-Olkin sampling adequacy (KMO=0.882) is outstanding, above the minimum value of 0.6. (Bahkia et al, 2019; Hogue et al, 2018).

Data Collection

The leader of the respondent group was required to confirm the meeting's scheduled date and time. The questionnaire set sheets were arranged according to a port administration-approved timetable. The respondent signed the consent letter after examining the information sheet. After providing respondents with information about the study, questionnaires were distributed. All questionnaires were administered. The Job Content Questionnaire (JCQ) contained questions on socio-demographic factors that were answered by respondents. After questionnaires have been returned, the researcher compiles and encloses them in an envelope. Each session has its own envelope to prevent the loss of respondent information. The population under study works three 8-hour shifts per day.

Data Analysis

SPSS Version 25.0 and AMOS Version 26 were used to analyse the data (IBM). SEM specifies and tests linear connections between seen, directly measurable variables and latent, indirectly observable variables. SEM may examine both the factor structure of a latent variable and the complicated interaction between several variables, including direct and indirect relationships. Using this method, the structural link between variables and latent constructs was studied by combining component analysis and multiple regression analysis. (Hallikainen, Alamaki, & Laukkanen, 2019; Rahi, & Abd Ghani, 2018). The stages of modelling with the structural equation model (SEM) analysis are as follows:

i. The creation of a theory-based model using AMOS software;
ii. The arrangement of a path diagram to illustrate the variable's causality;
iii. The transformation of a path diagram into structural equations; and
iv. The proposed selection of the matrix type and estimation technique.

SEM was used to explore the risk factors and mediating effects of occupational stress level. The root mean square approximation error (RMSEA<0.08), the normed Chi-square ($\chi2/df < 3$), the model's quality of fit was evaluated using the goodness-of-fit index (GFI> 0.90) and the comparative fit index (CFI> 0.90). Both of these indices met the criteria for success. Correlating error terms is a method to improve fitting when backed by a strong theoretical rationale, as stated by the modification indices provided by the AMOS in Table 1.0. This method is supported by the fact that it is a method to improve fitting.

Table 1.0 Categories of model fit and level of acceptance

Category	Type of Index	Acceptance Level	Sources
1. Absolute fit	Discrepancy Chi-Square	P < 0.05	Lai & Green (2016)
	Root Mean Square of error Approximation	RMSEA < 0.08	Taasoobshirazi & Wang (2016); Lai & Green (2016)
	Goodness of Fit Index	GFI > 0.90	Ainur et al, (2017)
2. Incremental fit	Comparative Fit Index	CFI > 0.90	Cheng & Wu (2020); Taasoobshirazi & Wang (2016);
3. Parsimonious fit	Chi-square/Degree of Freedom	Chi-square/df < 3.0	Ainur et al, (2017)

Research Ethical
Universiti Putra Malaysia had granted their approval on an ethical level for this research project on the condition that it included human subjects as respondents. Permission from the organisation is required in order to prevent any misunderstandings and to maintain confidentiality, particularly with regard to the name of the organisation and also successfully in obtaining permission to use this questionnaire from the individuals who own the copyright to the JCQ questionnaire. Every participant was made alert and responsive that their participation in this study was wholly voluntary and that there was a chance that it could compromise their rights or interests in some way. Additionally, consent letters were drafted in order to obtain permissions from respondents before the research was conducted.

Result and Discussion
The Structural Equation Model (SEM) is used to determine if these items and constructs are related (structural model). Its application as a multivariate procedure that combines aspect factor analysis and regression, and simultaneously examines the interrelationship

among latent constructs. The results of the Confirmatory Factor Analysis (CFA) displayed fitness indices, factor loading, and R^2 for each item. In CFA, the correlation between the construct and occupational stress level (OSL) is simultaneously calculated.

After the risk factor was identified as a contributor to the occupational stress level, it was analysed when the requirements for explanatory factor analysis were met. Structural equation modelling is the confirmatory study, which means that the theory is put to the test. The exploratory study served to validate the confirmatory methodology. The indexes' fitness demonstrated that this study's data were suitable for the model's structure. The evaluation of construct validity revealed that all categories (absolute fit, incremental fit, and parsimonious fit) met the minimum standard. As suggested by Baistaman et al., 2020; Awang, Afthanorhan, & Rahim, (2020); Roquelaure et al., 2020; Rahman et al., 2017 the index's fitness was measured using statistics based on chi squares; the GFI, AGFI, RMSEA, and TLI; the GFI; and the AGFI.

When developing a structural equation model, the probability chi-square statistics proved to be the most fundamental measure of overall fit. In general, it is thought to be acceptable when a p-value is more than 0.05 and a standardized chi-square value (χ^2 /df) is less than 3. This was indicated in previous research, and it was found that this was the case (Stein et al., 2017). It is recommended that indices' fitness levels, including GFI, AGFI, CFI, and NFI, be at least 0.90, as highlighted further. This value would indicate a satisfactory fit and be regarded as acceptable. In addition, few studies stated that when RMSEA was less than 0.05, it was deemed a good fit. This is due to the fact that values between 0.05 and 0.08 would indicate a reasonable fit. In the meantime, Tehranchi et al., 2018 proposed that an RMR value not exceeding 0.08 would indicate a good fit as per shown in Table 1.1.

Table 1.1 Assessment for Construct Validity

Category Name	Type of Index	Value of Index	Description
Absolute Fit	RMSEA	0.065	The necessary level is achieved
Incremental Fit	TLI	0.979	The necessary level is achieved
Parsimonious	Chi-square/Df	2.442	The necessary level is achieved

The path of regression between social support and occupational stress level showed that social support contributed 32% to the estimation of stress. The task also provided a 25% contribution. It indicates that occupational stress used to have indirect effects on the individual and the organisation as per shown in Figure 1.0.
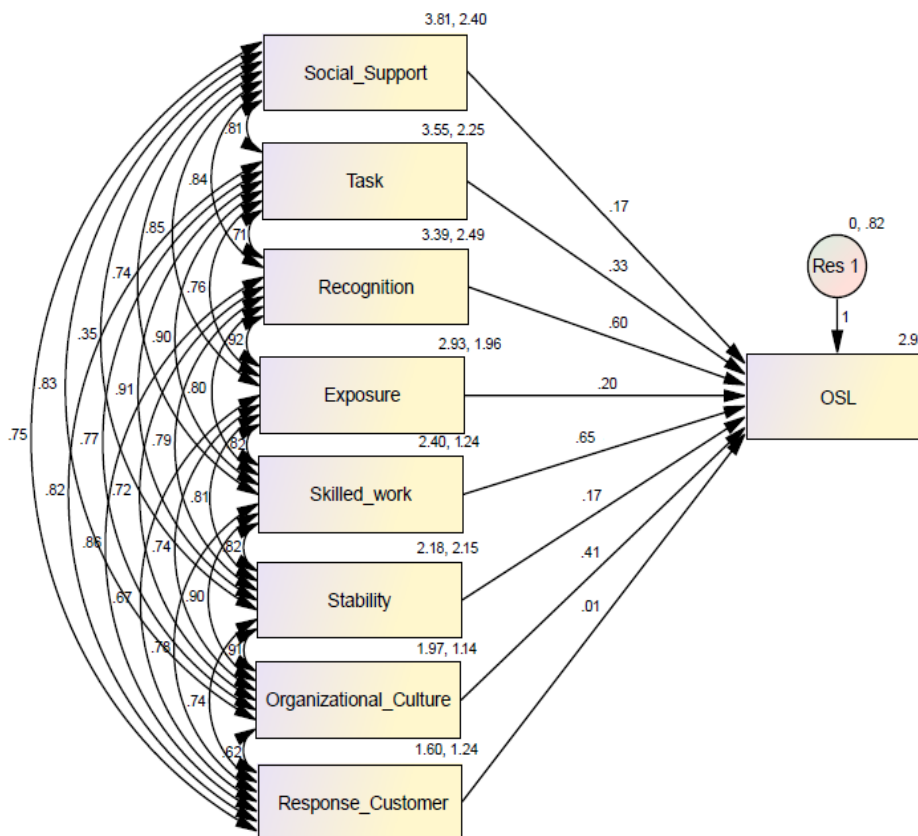
Figure 1.0 The Standardized Path Coefficient for the structural model

According to Table 1.3, all variables including social support (0.034), task (0.003), recognition (0.041), exposure (0.005), organisational culture (0.018), and customer response (0.015) are significant, with the exception of skilled work (0.698) and stability (0.279). P-values less than 0.05 were considered statistically significant.

Table 1.3 Regression result analysis

Variable	Path	Variable	Estimate	S.E.	C.R	P	Result
OSL	<---	Social Support	.171	.101	1.091	**.034**	**Significant**
OSL	<---	Task	.336	.107	0.136	**.002**	**Significant**
OSL	<---	Recognition	.605	.052	4.92	**.041**	**Significant**
OSL	<---	Exposure	.203	.049	4.742	**.005**	**Significant**
OSL	<---	Skilled work	.653	.137	.388	.698	Not Significant
OSL	<---	Stability	.173	.160	1.084	.279	Not Significant
OSL	<---	Organizational Culture	.409	.173	2.361	**.018**	**Significant**
OSL	<---	Response From Customer	.013	.118	.107	**.015**	**Significant**

Table 1.4 demonstrated the results of variable data analysis. The R square contribution value between variable and occupational stress is outlined in the table below. The contribution of social support, tasks, recognition, and organisational culture to the estimation of occupational stress was greater than 20 percent. Exposure, skilled work, stability, and customer response were estimated to contribute less than 20% of occupational stress.

Table 1.4 Regression relation between variables

Independent Variable	Dependent Variable	R^2	Explanation R^2
Social Support	Occupational Stress Level (OSL)	0.32	Social support contribute 32% of the estimation in OSL
Task	OSL	0.25	Task contribute 25% of the estimation in OSL
Recognition	OSL	0.24	Recognition contribute 24% of the estimation in OSL
Exposure	OSL	0.11	Exposure contribute 11% of the estimation in OSL
Skilled work	OSL	0.15	Skilled work contribute 15% of the estimation in OSL
Stability	OSL	0.14	Stability contribute 14% of the estimation in OSL
Organizational Culture	OSL	0.24	Organizational culture contribute 24% of the estimation in OSL
Response From Customer	OSL	0.19	Response from customer contribute 19% of the estimation in OSL

The conceptual framework relating to occupational stress was analyzed, particularly with regard to the question of whether or not it was at variance with the observed phenomena. This situation was noticeable from the sample, which included an analysis of the theoretical model to determine whether or not it was compatible with the dataset (Bahkia et al., 2019). A good and significant association was discovered between three essential aspects of the safety climate and the functioning of the safety system. Analysis of factors and reliability were carried out, which led to the findings of supervisor safety behaviour, a safety training programme, and coworkers' safety behaviours (Abdul Rahman et al, 2017). These findings suggested that management of container terminals should concentrate on three critical aspects of safety in order to reduce the number of injuries and accidents.

A class of multivariate techniques, which included factor analysis and regression, was integrated using this strategy as the framework. Therefore, enable the study to be analysed simultaneously in order to examine the inter-relationships among the constructs that can measure indirectly variable (Baistaman et al., 2020; Tehranchi et al., 2018). The atmosphere of the workplace plays a crucial part in both the health and safety of the personnel. According to the findings of a study, the amount of physical labour was linked to a person's sense of their vulnerability to disease and injury. Few research have used structural equation modelling to evaluate the perception of risk or occupational stress as a factor (Abdul Rahman et al, 2017).

The atmosphere of the workplace is one of the most significant factors that contribute to occupational stress. The majority of employees are very concerned about the huge psychological danger that is posed by stress in the workplace. Because of the excessive psychological loads that it inflicts, occupational stress was a legitimate cause for concern (Gerbisa et al, 2020). These loads led to a variety of unfavourable outcomes, which could occur either at the level of the individual or the organisation. According to the findings of other surveys, the effects of occupational stress on employees' physical health, health behaviours, and mental health are all negative. There are not nearly enough research done on the occupational stress experienced by port workers. Occupational stress was found to be significantly associated with job demands and poor interpersonal relationships (Gebisa & Sintayehu, 2020); job insecurity (Mathangi, 2017), work hours, job position, not only does it have an impact on the employees, but it also has a negative impact on the operation of the firm and the income of families (Abera, 2016).

Occupational stress, which was also known as interpersonal relationship stress, comprised of a low degree of co-worker support, inadequate managerial acknowledgment, and continual bullying among the employees. This was because occupational stress was also known as interpersonal relationship stress (Morke et al., 2018). In addition to having a number of different aspects, this danger had a greater propensity for mental rather than physical complexity (Knaak, Mantler, & Szeto, 2017). In addition, dangers in the workplace were found to be negatively connected with both the physical and psychological health of employees (Jespersen et al., 2016). The strain at work often leads to increased occupational stress, which in turn causes people to be extremely cautious and attentive to their day-to-day activities. The worker's job trade needed them to make decisions that were both operational and tactical, as well as strategic, and these decisions

prevented them from making mistakes that were inescapable in their career.

Stress at work is an inevitable and necessary component of modern life, especially when it comes to dealing with the demands of one's profession. When the response to professional stress is out of proportion to the difficulty of the task at hand, complications can begin to arise. When stress is not effectively managed, it may result in higher levels of employee dissatisfaction, sickness, absenteeism, high turnover, low productivity, and difficulty providing clients with outstanding service (Morke et al., 2018; Basu et al., 2017). Even while not all potential risk factors were shown to have a substantial association with occupational stress, there was still a clear and present danger that risks could materialise. As previously indicated, risk factors can include an excessive amount of work, strong emotional demands, a lack of autonomy, and role conflict. The feeling that one's workload is too stressful can boost one's desire to leave their current workplace (Fri et al., 2021). According to this research, the vast majority of workers at the port have permanent jobs, and the results of statistical analysis indicate that the stability risk factor does not significantly contribute to occupational stress.

The physical surroundings of the workplace, which may include factors such as a high level of noise, high or low lighting, smoke, heat, and a poor ventilation system, are known to have an impact on emotions and contribute to stress (Bayona et al., 2020). In addition, a workplace that has bad physical architecture could be considered to have poor working conditions because it can make it more difficult for employees to communicate with one another. This is especially true with site offices. As a direct consequence of this, unfavourable workplace relationships would develop, which could cause stress (Peckham et al., 2017). In addition, jobs that demand employees to put in long hours could contribute to the employees' declining health as well as the stress they

experience on the job. For instance, a worker whose performance at work may suffer if they do not obtain the recommended amount of sleep each night. Therefore, the state of the activities that take place at work may be linked to the psychological and physiological well-being of workers. According to the findings of one study, there is growing evidence that employees' physical health could suffer if they were to work in an atmosphere that was repetitious and degrading (Soelton et al., 2020).

Conclusion

The structural equation modelling approach reaches the conclusion that port workers are exposed to a high number of risk factors that have the potential to contribute to occupational stress. It was shown that there was a substantial link between occupational stress and social support, task, recognition, exposure, corporate culture, and response from the client. The findings of this study can serve as baseline data for larger and more in-depth investigations on the effects of occupational stress on port workers who are employed in port container terminals.

Recommendation

The report and the findings of this study were presented to the management of the company. On the basis of the findings, it was emphasized that there is an urgent need for respective management to recognize the existence of occupational stress level and its contributing factors among port workers, and it was recommended that comprehensive stress management programme be implemented in order to reduce occupational stress among these workers.

Study Strength and limitation

This study utilized validated and published Malay versions of the JCQ questionnaires to assess occupational stress, organisational work characteristics, and particular job factors among its respondents. However, this study was conducted just at one container terminal

port and consequently does not reflect all Malaysian port workers at other terminal port.

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