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Influence of Work Safety and Work Stress on Productivity

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Abstract

Business competitiveness requires high-quality human resources. Human resources as labor in the industry must be protected by the Occupational Safety and Health (OSH) program. One important factor in increasing work productivity relates to work stress. If employees have the ability to deal with work stress, then work productivity will increase. This study aims to examine the effect of work safety and work stress on work productivity. This study uses survey method, using questionnaire as a tool in collecting primary data. The data analysis used is Structural Equation Modelling (SEM). The test results conclude that OSH and work stress have a positive and significant effect on work productivity. The effect of work safety and work stress on work productivity is 20.19% and 43.16% respectively. The results also show that employees' ability to overcome work stress has a more dominant influence than work safety.

Keywords : OSH, Work Stress, Work Productivity

1. Introduction

Chevron Pacific Indonesia (CPI) is a subsidiary of Chevron which is tasked with exploring oil in Riau. Before being taken over by Chevron, the company was named Caltex Pacific Indonesia. CPI employees are placed in 4 cities in Riau, namely Dumai, Duri, Minas and Rumbai. CPI is also the largest contracting oil company in Indonesia, with production reaching 2 billion barrels. In 2005, Caltex, as a subsidiary of Chevron and Texaco Inc. was acquired by Chevron together with Texaco and Unocal. So, the official name of PT Caltex Pacific Indonesia changed to PT Chevron Pacific Indonesia (CPI).

PT CPI, which is engaged in petroleum exploration, performs several stages of processes that use heavy equipment, chemicals, and high-temperature machines that have enormous potential to cause work accidents and work-related illnesses. Several stages of the work process in the Treat and Ship Operations section - Facility Operations starting from operating the Heat Exchanger Oil Treating Plant, operating the Gas Boot Oil Treating Plant, operating the FWKO Tank Oil Treating Plant, operating the Wash Tank Oil Treating Plant, operating the Shipping Tank Oil Treating Plant , conducts BS & W testing, conducts the Sand Trap and Waste Pit Water Treating Plant, operates API Separator Pit AB facilities and CD Water Treating Plant, operates Floatation Pit Water Treating Plant facilities,

performs Oil Content testing, conducts PH testing and generally performs Floatation Water Facilities Water Treating Plant.

PT CPI has obtained the Golden Flag in recent years. But the acquisition of the Golden Flag still requires that the OSH Management System be carried out properly. In addition, the ability of employees to overcome work stress is an important variable to increase work productivity. Therefore, the purpose of this study is to examine how much the influence of work safety and work stress on work productivity.

2. Literature Review

2.1. Work Safety

OSH is an effort to prevent the possibility of workplace accidents, work-related diseases, fire, blasting and environmental pollution. OHSAS 18001: 2007 (Occupational Health and Safety Assessment Series) states that OSH is all conditions and factors that can have an impact on occupational safety and health of workers and other people (contractors, suppliers, visitors and guests) at work.

The aim of OSH is to create a workplace that is safe, healthy and free from environmental pollution by maintaining and protecting the health, safety and security of workers so as to prevent or reduce accidents and occupational diseases, and ultimately to improve the system of efficiency and work productivity.

K3 is determined based on the Law and Regulation of the Minister of Manpower: Law No.1 of 1970, Law No.21 of 2003, Law No.13 of 2003, Minister of Manpower Regulation No. PER-5 / MEN / 1996

Work Safety Standards are safeguards as work safety measures such as:
1. Protection of the body covering the entire body
2. Engine protection
3. Security of electricity that must be checked periodically
4. Security of the room, including alarm systems, fire extinguishers, adequate lighting, good ventilation and adequate special evacuation routes.

2.2. Work Stress

Stress is an individual's reaction to an environmental force that effect an individual performance. Job related stress can be mostly immobilizing because of its possible threats to family functioning and individual performance. Stress exists in every organization either small or large, will make the work place and organization become complex due to its existence. Work place stress has significant effects over the employees' job performance, and the organizations in UK are trying to cope with this scenario, (R. Anderson, 2003). Overload: excessive work or work that is outside one's capability (Franch and Caplan, 1972; Margolis et al, 1974), Responsibility for people: Responsibility for people, well-being works, job security, and professional development (French and Caplan, 1972; Pincherle, 1972) Participation: Extent to which one has influence over decisions relevant to one's job (Kasl, 1973) Margolis et al, 1974). All the research findings above show concisely that work stress is largely determined by factors of overload, responsibility and participation. According to (Rose,2003) employees have tendency towards high level of stress regarding time, working for longer hours which reduces employees urge for performing better.

Management support helps in reducing or increasing stress in employees, (Stamper & Johlke, 2003) apparent organizational assistance, management support work as a cushion which acts positively in decreasing work related stress in employees. (Ivancevich & Donnelly, 1975) studied the link between anxiety stress with satisfaction and performance of employees, that lower anxiety stress improves performance of employees which he studied in different managerial level of an organization. Management role of an organization is one of the aspects that affect work-related stress among workers (Alexandros-Stamatios et. al., 2003).Workers in an organization can face occupational stress through the role stress that the management gave. Role stress means anything about an organizational role that produces adverse consequences for the individual (Kahn and Quinn, 1970). Management will have their own role thatstands as their related. Role related are concerned with how individuals perceive the expectations other have of them and includes role ambiguity and role conflict.

Several studies have highlighted the deleterious consequences of high workloads or work overload. According to Wilkes et al. (1998) work overloads and time constraints were significant contributors to work stress among community nurses. Workload stress can be defined as reluctance to come to work and a feeling of constant pressure (i.e. no effort is enough) accompanied by the general physiological, psychological, and behavioral stress symptoms (Division of Human Resource, 2000). Al-Aameri AS. (2003) has mentioned in his studies that one of the six factors of occupational stress is pressure originating from workload. Alexandros- Stamatios G.A. et al. (2003) also argued that "factors intrinsic to the job" means explore workload, variety of tasks and rates of pay. In this study, work stress is measured from a positive side, namely the ability of employees to overcome the stressful work.

Rapidly changing global scene is increasing the pressure of workforce to perform maximum output and enhance competitiveness. Indeed, to perform better to their job, there is a requirement for workers to perform multiple tasks in the workplace to keep abreast of changing technologies. The ultimate results of this pressure have been found to one of the important factors influencing job stress in their work (Cahn et al., 2000). A study in UK indicated that the majority of the workers were unhappy with the current culture where they were required to work extended hours and cope with large workloads while simultaneously meeting production targets and deadlines (Townley, 2000).

2.3. Work Productivity

The definition of productivity basically includes a mental attitude that always has the view that life on a day is better than yesterday and tomorrow is better than good today. Technically, productivity is a comparison between the results achieved (output) and the overall resources needed (input). Productivity contains an understanding of the comparison between the results achieved with the role of labor unity in time (Riyanto, 1986: 22).

From the definition above, it can be concluded that work productivity is the ability of employees to produce compared to the input used, an employee can be said to be productive if he is able to produce goods or services as expected in a short or appropriate time.

3. Methodology

The following are indicators of latent variables used in the study:

Table 1
Operationalization of Research Variables

Variabel	Indikator
Occupational Safety and Health	1. I attended OSH training (X1) 2. The use of personal protective equipment (PPE) is monitored when in the field (X2) 3. Work safety procedures at my company are complete and comprehensive (X3) 4. Work safety rules or procedures are always implemented in my company (X4)
Work Stress	1. I am not easily surprised (X5) 2. I am not easily offended (X6) 3. I have no difficulty concentrating (X7)
Work Productivity	1. I always complete assignments and work before the targeted time 2. I always actively provide input and ideas for the progress of the company 3. I want to show potential companies that I have

Functional relationships of research variables are described as follows

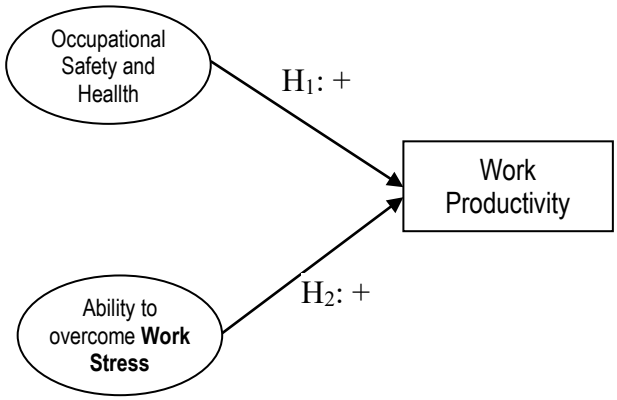

Figure 1.
Functional relationships of research variables

Research Hypothesis
Based on the identification of problems, as illustrated in Figure 1 above, the research hypothesis can be formulated as follows: Work safety and work stress have positive effects on work productivity. The estimation method used is the Structural Equation Modelling (SEM).

4. Research Results and Discussion

In this section we will present Confirmatory Factor Analysis (CFA), estimate results and test hypotheses. In SEM the research variable is unobservable so that each indicator is used to define the latent variable of the research. The description of each research variable can be explained as follows.

4.1. Occupational Safety and Health

Occupational Safety and Health can be explained from four indicators, namely job training indicators (X_1), protective equipment (X_2), OSH procedures (X_3), and OSH implementation (X_4). By using SEM, the results of AMOS processing show the results of constructing occupational safety variables as presented in Table 2 below.

Table 2
Loading Factor of Occupational Safety and Health Variable

Indicator	Symbol	*Loading Factor*	Size of Effect
Work Training	X_1	0,635	40,32%
Protective equipment	X_2	0,304	9,24%
OSH Procedure	X_3	0,445	19,80%
OSH Implementation	X_4	0,335	11,22%

Occupational Safety and Health (OSH) Variable is constructed by indicators with loading factors of 0.635, 0.304, 0.445 and 0.335 respectively. Based on the loading factor, it can be seen that work safety variables can be explained sequentially by each Work Training indicator (X1) of 40.32%, Protective equipment (X2) of 9.24%, OSH Procedure (X3) of 19.80 %, and OSH Implementation (X4) of 11.20%.

4.2. Work Stress Variable

Variable work stress can be explained from three indicators namely indicators not easily surprised (X5), Not easily offended (X6), dan easy concentration (X8).

Work stress variables have indicator loading factors of 0.446, 0.675 and 0.498 respectively. Based on the loading factor it can be seen that the work stress variable can be explained sequentially by each not easily surprised indicator (X5) of 19.89%, Not easily offended (X6) by 45.56%, and easy concentration (X7) of 24.80%.

The results of constructing work stress variables are presented in Table 3 below.

Table 3
Loading Factor and Effect Indicator to *-construct*
Work Stress Variabel

Indicator	Symbol	*Loading Factor*	Size of Effect
Not easily surprised	X_5	0,446	19,89%
Not easily offended	X_6	0,675	45,56%
Easy concentration	X_7	0,498	24,80%

Estimated Results

After the model is analyzed through confirmatory factor analysis, then each indicator in the fit model can be used to define latent constructs, so that full SEM models can be analyzed. The results presented in Figure 2 and Table 4.

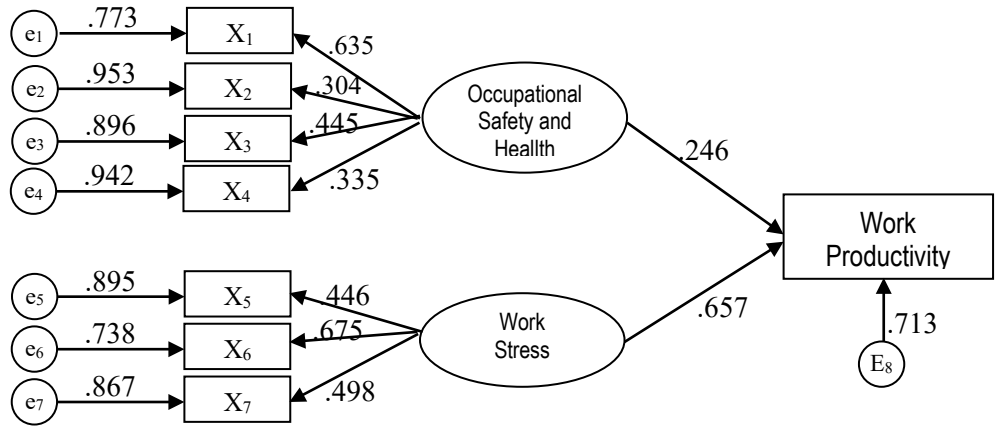

Figure 2.
Parameter Estimation Results with *Structural Equation Modelling*

Table 4.
Standardized Regression Weight Structural Equation Modelling

			Std. Estimate	S.E.	C.R.	P	Label
X1	<---	Occpational S & H	0,635	0,118	6,780	0,0000	par_1
X2	<---	Occpational S & H	0,304	0,083	4,855	0,0008	par_2
X3	<---	Occpational S & H	0,445	0,072	5,472	0,0000	par_3
X4	<---	Occpational S & H	0,335	0,110	6,991	0,0033	par_4
X5	<---	Work Stress	0,446	0,079	2,342	0,0000	par_5
X6	<---	Work Stress	0,675	0,153	6,915	0,0001	par_6
X7	<---	Work Stress	0,498	0,161	5,950	0,0030	par_7
Work Productivity	<---	Occpational S & H	0,246	0,135	0,081	0,0421	par_8
Work Productivity	<---	Work Stress	0,657	0,081	5,198	0,0000	par_9

The *goodness of fit* presented in Table 5 below.

Table 5.
Testing Feasibility Index

Goodness of Fit	Fit Criteria	Research result	Model Evaluation
χ^2 (*chi-square*)	P ≥ 0,05	6,834	Good
Significant probability	P ≤ 0,05	0,009	Good
RMSEA	< 0,08	0,015	Good
ECVI	ECVI < ECVI Independence	0,362 < 0,665	Good
AIC	AIC<AIC Independence	22,834 < 43,867	Good

From some of the criteria above, it can be stated that the model built is fit with the research data, as indicated by the goodness of fit criteria in Table 6.

Hypothesis Testing

The effect of work stress on work productivity can be stated in the following equation model:

Work productivity = 0,246 Work Safety + 0,657 Work Stress

The influence of each variable can be stated briefly as follows.

Table 6.
Size of Influence and Hypothesis Testing

Variable	Coefficient Path	P *Value*	Hypothesis testing	Effect		
				Direct	Indirect	Total
Occpational S & H	0,246	0.0421	Significant	0.0605	0.1414	0.2019
Work Stress	0,657	0.0000	Significant	0.4316	0.1414	0.4316
Total Effect simultaneously						0,6336

Partially the direct effect of the work safety variable is 6.05% and the work stress variable is 43.16%. While simultaneously, the total direct effect of the occupational safety variable is 20.19% and the work stress variable is 43.16%. Simultaneously the total influence of the two variables is 63.36%.

5. Conclusions and Future Research

The test results concluded that OSH and work stress had a positive and significant effect on work productivity, both partially and simultaneously. The effect of work safety and work stress on work productivity is 20.19% and 43.16% respectively. The results also show that work stress has a more dominant influence than work safety.

The results of this study indicate that work safety has a relatively lower effect than work stress. On the one hand, this illustrates that OSH conditions in Indonesia are still relatively weak. Future research is needed to explore how much management commitment in day-to-day operations. This commitment illustrates how big the top management is to create work safety. Is there regular training? How big is the budget prepared? Do employees comply with the SOP? Research is important because it involves the safety and lives of humans and the positive impact is the better results of work productivity received by the company.

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Biographies

Daswir Lelo is a PhD Candidate at Universiti Teknologi Malaysia. He is an expert in the field of work safety and has extensive experience, has been an employee at PT Caltex Riau, an international oil mining company and heads the occupational health and safety field. In addition to actively providing training, he also works as a consultant in the same field. He completed his post-graduate education at Pakuan University and is currently continuing his studies in the Doctoral Program at Universiti Teknologi Malaysia.

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