

# Correlation between Workload and Work Environment with Work Stress

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## Abstract

Competition in the business world nowadays caused many pressures on workers and resulting in work stress. During 2001, the problem of stress had cost the organization up to \$ 300 billion in terms of reimbursing maintenance costs, workers' compensation, absenteeism and labor turnover. In Indonesia, especially Jakarta, around 1.33 million residents experience stress. This figure reaches 14% of the total population with severe stress levels of 7-10% and acute stress of 1-3%. It was also reported that Health care costs were almost 50% higher for treating workers who experienced high levels of stress in their work. Previous studies had found out that work stress was caused by several factors including work environment and workload. The purpose of this study was to analyze the correlation between workload and work environment with work stress on the Maintenance and Repair Division workers of PT. PAL Indonesia (Persero). This research design was a cross-sectional study. The population in this study were all technician workers on the Maintenance and Repair Division of PT. PAL Indonesia (Persero) as many as 51 workers. The sample was calculated using a simple random sampling technique so that a sample of 49 workers was obtained in the Production Department, Maintenance and Repair Division of PT. PAL Indonesia (Persero). The study was conducted in June 2019. Variables in this study were work climate, noise, lighting, physical workload, mental workload, and work stress. The data were analyzed by using the chi-square test and spearman test because there are differences in the scale of the data on the variables. The results are: work climate is not related to work stress ( $\text{sig } 0.715 > \alpha$ ), noise is not related to work stress ( $\text{sig } 0.380 > \alpha$ ), lighting is not related to work stress ( $0.322 > \alpha$ ), physical workload is related to work stress ( $\text{sig } 0.004 < \alpha$ ), mental workload has no relationship with work stress ( $\text{sig } 0.377 > \alpha$ ). The conclusion of this study is that only physical workload has a correlation with work stress.

**Keywords:** *Workload, Work Environment, Work Stress*

## Introduction

Along with the development of the business world in the current development era, competition in the business world both at home and abroad is getting tougher and more complex. This forces companies to

look for new innovations in order to increase production efficiency and productivity of their workers. To realize this, the company is challenged to be able to move all organizational factors to work optimally. One factor that plays a very important role in an organization is the human or worker factor. Workers have full control on every activity of the company in order to achieve its objectives.

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Therefore, workers are required to perform well in the interests of the company. The high demands of companies on workers will cause pressure in workers and can cause work stress. Work stress is a feeling of stress experienced by employees in carrying out work. In addition, stress is a response in adjusting that is influenced by differences in each individual and his psychological processes, as a result of environmental actions, situations or events that produce too much psychological and physical demands of a person<sup>(1)</sup>. Symptoms of work stress according to Beehr & Newman are divided into three, namely 1) Psychological symptoms, which are characterized by anxiety, tension, confusion, irritability, mental fatigue, depression, ineffective communication, boredom. 2) Physiological symptoms, physiological changes are characterized by symptoms such as feeling tired / tired, exhausted, dizzy, digestive disorders, respiratory problems, high blood pressure, sleep disorders, physical fatigue, skin disorders, increased heart rate. 3) Symptoms of behavior such as absenteeism, decreased performance and productivity, decreased quality of interpersonal relationships with family and friends, anxiety

In addition to the work environment, factors that also influence the occurrence of work stress are workloads. Human work consists of two characteristics that is, mental and physical in nature, then each has a level of loading which is different. Too much loading rate high energy consumption allows overload for physical workload and “overstress” for mental work, conversely intensity too low loading is possible boredom in physical work and burnout or “understress” on mental work. So, effort is needed for intensity levels optimum loading between the two limits the extreme was and of course different between each individual<sup>(7)</sup>. Workload is something that arises from the interaction between the demands of tasks and the work environment used as a workplace. Workload is divided into 2 namely physical workload and mental workload<sup>(8)</sup>. High work demands in the company will cause a large workload given to workers. Winarsunu states that there is a correlation between workload with three strains, namely psychological, physical, and behavioral strains<sup>(9)</sup>. On this basis, the purpose of this research is to find out the relationship between work environment and workload with work stress.

## Material and Method

The approach used in this study was a quantitative research approach. Based on aspects of data collection, this study is a type of observational research because the researchers only observe objects without giving any treatment or intervention act. The design of this study was a cross-sectional study because the data collection was carried out in only one time period, that is when the research was conducted in the field.

Data collection in this study was using the questionnaire method and laboratory measurement. The data collected were then analyzed on the correlation between two variables. Data presentation techniques used in this study include: editing, scoring, and tabulating. The data obtained will then be processed using data processing software. The results of the processed data were then analyzed descriptively and presented in the form of a frequency distribution table and percentage analysis, as well as an analysis of the correlation significance test between the two variables. The data were analyzed by using the chi-square test and spearman test because there were differences in the scale of the data on the variables. The significance level could be seen from the significance value. If it was less than 0.05, it showed that there was a correlation between the analyzed variables. Most of the styles are intuitive. However, we invite you to read carefully the brief description below.

This study was conducted in the Maintenance and Repair Division of PT. PAL Indonesia (Persero), Surabaya on June 2019. The population used in this study was 51 technician workers of the Maintenance and Repair Division of PT. PAL Indonesia (Persero), Surabaya. The sample was calculated using a simple random sampling technique so that a sample of 49 workers was obtained in the Production Department, Maintenance and Repair Division of PT. PAL Indonesia (Persero). The research variables analyzed in this study consisted of the dependent and independent variables. The independent variable in this study was the work environment (consisting of work climate, noise and lighting) and workload (consisting of physical workload and mental workload). Meanwhile, the dependent variables in this study was work stress.

## Findings

### The Frequency Distribution of Work Environment

In this study, work environment variables on the Maintenance and Repair Division of PT. PAL Indonesia (Persero), Surabaya consisted of work climate, noise and light-ing at work. Those three variables were divided into two categories based on the con-ditions felt by the workers, either the workers feel disturbed or not disturbed. Based on Table 1, the majority of workers (89.8%) did not feel disturbed by the work climate. The remaining 10.2% or 5 workers feel disturbed by the work climate in their work-place. Furthermore, as many as 36 people or 73.5% of workers did not feel disturbed by noise that occurs in the workplace. The rest (26.5%) were disturbed by the noise. For lighting variables, the majority of workers (77.6%) did not feel disturbed by the lighting in their workplace. While the remaining 22.4% were disturbed.

**Table 1. The Frequency Distribution of Work Environment**

Work Environment	Category		Total
	Disturbed	Not Disturbed	
Work Climate			
Frequency (%)	5 (10,2)	44 (89,8)	49 (100,0)
Noise			
Frequency (%)	13 (26,5)	36 (73,5)	49 (100,0)
Lighting			
Frequency (%)	11 (22,4)	38 (77,6)	49 (100,0)

### The Frequency Distribution of Workload

The workload in this study was divided into two, namely physical workload and mental workload. Each variable was being grouped into three categories: low, medium and high. Based on Table 2, it can be seen that the majority of technical workers was having a ‘moderate’ physical workload (44.9%). Furthermore, as many as 19 workers (38.8%) had ‘low’ physical workloads and the remaining 16.3% had ‘high’ physical workloads.

For mental workloads, the majority of workers were in the ‘moderate’ mental workload category (44.9%) or as many as 22 people. The remain-ing 15 people (30.6%) were in the category of ‘low’ mental workload and 12 people (24.5%) was having a ‘high’ mental workload.

**Table 2. The Frequency Distribution of Workload**

Workload	Category			Total
	Low	Moderate	High	
Physical Workload				
Frequency (%)	19 (38,8)	22 (44,9)	8 (16,3)	49 (100,0)
Mental Workload				
Frequency (%)	15 (30,6)	22 (44,9)	12 (24,5)	49 (100,0)

### The Frequency Distribution of Work Stress

Work stress in this study was divided into 3 categories, namely low, moder-ate, and high. Based on Table 3, it is shown that the majority of technician workers on the Maintenance and Repair Division of PT. PAL Indonesia (Persero), Surabaya were having a work stress in the ‘moderate’ category (53,1%) or as many as 26 per-sons. The rest, 17 persons (34,7%) were having work stress in the ‘low’ category and 6 persons (12,2%) were having work stress in the ‘high’ category.

**Table 3. The Frequency Distribution of Work Stress**

Category	Frequency	Percentage (%)
Low	17	34,7
Moderate	26	53,1
High	6	12,2
Total	49	100,0

**The Relationship between Work Environment and Work Stress**

Work environment variables in this study on the Maintenance and Repair Division of PT. PAL Indonesia (Persero), Surabaya consisted of work climate, noise and lighting at work. Based on Table 4, it is shown that each of the variables from work environment had no significant correlation with work stress as the significancy value was > 0,05. So, it was concluded

that there was no significant correlation between work environment and work stress on the technician workers of the Maintenance and Repair Division of PT. PAL Indonesia (Persero), Surabaya. The OSH policy and the provision of PPE were correlated with individual commitment. Those two variables had a relationship in the ‘moderate’ category and a positive relationship with individual commitment. It was shown from the p-value in the OSH policy and the provision of PPE that was less than 0.05.

**Table 4. The Relationship between Work Environment and Work Stress**

		Work Stress	Conclusion
Work Climate	Pearson Chi-Square	0,671	Not Significant
	Asymp. Sig. (2-sided)	0,715	
Noise	Pearson Chi-Square	1,933	Not Significant
	Asymp. Sig. (2-sided)	0,380	
Lighting	Pearson Chi-Square	2,264	Not Significant
	Asymp. Sig. (2-sided)	0.322	

**The Relationship between Workload and Work Stress**

Workload variables in this study on the Maintenance and Repair Division of PT. PAL Indonesia (Persero), Surabaya consisted of physical workload and mental workload. Based on Table 5, it is shown that physical workload had a significant correlation with work stress (significancy value  $0,004 < \alpha$ ). Further, mental workload had no significant correlation with work stress (significancy value > 0,05). So, it was concluded that only physical workload had a significant correlation with work stress, as for mental workload had no significant correlation with work stress.

**Table 5. The Relationship between Workload and Work Stress**

			Work Stress	Conclusion
Spearman’s rho	Physical Workload	Correlation Coefficient	0,400	Significant
		Sig. (2-tailed)	0,004	
	Mental Workload	Correlation Coefficient	0,129	Not Significant
		Sig. (2-tailed)	0.377	

## Discussion

Literature Review will show that the results of the research carried out in accordance with some of the results of other studies. The correlation result showed that there was no significant correlation between work environment and work stress. This is not in line with the research results of Angwen, which stated that there is a positive relationship between the physical work environment and work stress on PT. Citrabuana Electric Stage<sup>(6)</sup>. Therefore, it can be said if the physical work environment is comfortable then work stress too will be temporarily low if the physical work environment is uncomfortable, then his work stress will also be high. As for stress is an output of the interaction between individuals and the work environment, in which it can be a threat and stressors for both psychologically and physiologically of an individual<sup>(10)</sup>. This is in line with the research result which stated that both the physical work environment and non-physical work environment affects work stress on employees at PT PLN (Persero) Distribution of East Java Malang Service Area<sup>(5)</sup>. Physical work environment is all things that are around where someone works, which directly or indirectly can affect in carrying out his work, while non-physical work environment is all things that happen in the company related to work relations, both relationships with superiors and relationships with colleagues, as well as relationships with subordinates<sup>(11)</sup>. Companies are required to be able to make a good work environment. Because, in running the employee's work will interact directly with a work environment that is in each part of the company. So, the work environment will be very influential on the stress that will be received by employees or can also be interpreted that work environment is one of the ways that can be done to be able to control or minimize the stress received by employees. If interaction with the environment can go well will reduce the rate stress, besides that a good work environment will reduce fatigue and burnout at work<sup>(5)</sup>. Another study stated that the importance of the work environment for performance because of a good and positive work environment as well empower can increase employee work productivity<sup>(12)</sup>. Further discussion of the variables in the work environment on work stress, the correlation result showed that there is no significant correlation between work climate and work stress. In the previous studies on the relationship between work climate and

work stress, there was various results. Recent research results found that work climate has an influence on work stress. Furthermore, it is found that organizational climate had a negative effect on employee work stress. This indicates that the healthier the climate of an organization, the lower level of employee work stress. Conversely, the unhealthy climate in the organization, the higher the level of employee work stress<sup>(13)</sup>. Another research result stated the opposite and along with this research's result found that climate the organization has no effect on work stress<sup>(14)</sup>. The results of the study explain that awareness or dysfunctional feelings of employees as a result of conditions that are felt at work and an employee's psychological and physiological reactions to uncomfortable or undesirable conditions are not affected by quality the internal environment of the organization which is relatively ongoing, experienced by members organization, influence their behavior and can be described in terms of a set characteristics or nature of an organization such as structure, responsibilities, standards, appreciation, support and commitment. Hereafter, the correlation result showed that there is no significant correlation between noise and work stress. The previous studies showed various results on the relationship between noise and work stress. Shept in stated that there was a positive correlation between noise and work stress of the electrical industry employees<sup>(9)</sup>. In line, Dawson also stated that there was a positive relation between the perception of noise in the work environment with work stress on bank employees<sup>(15)</sup>. A noisy environment is a disturbance that can affect comfort and health, especially those originating from operational activities of machine tools. Noise is a stressor that can cause physical, psychological, and human behavior changes<sup>(16)</sup>. In contrast, Febriana stated that there was no significant role between perception of noise on work stress on PT. Hasnur Riung Sinergi's employees<sup>(9)</sup>. Further, the correlation result showed that there is no significant correlation between lighting and work stress. In contrast, another research resulted in the influence of lighting workspace against work stress on research subject caused additional lighting intensity done helps reduce decrease in physical factors and factors psychological factors that affect work stress<sup>(17)</sup>. Employees who work on the premises those with good lighting will work better because they can work more optimally compared to lower lighting. Besides, that good

lighting also affects employee psychology where they will feel cared for and will create a positive perception in the mind the employee. Good physical and positive perception is what will cause employees to work with productive and achieve high performance<sup>(11)</sup>.

Further discussion of the variables correlated with work stress were physical work-load and mental workload. Every job, of course will put a burden on the workforce or humans both physically and burden mentally, from an ergonomic standpoint, every workload received by someone must be appropriate or balanced well against physical ability, cognitive abilities and human limitations who receive the burden. Physical workload is the workload received from jobs that require physical energy such as lifting, pushing, transporting, while for mental workload is the difference between demands between workloads of a task with the maximum capacity of someone in motivated condition<sup>(18)</sup>. The result of this study showed that there was a correlation between physical workload and work stress. This is in line with the research result which stated that there is a positive relationship between workload and work stress on PT Citrabuana Electric Stage employees <sup>(6)</sup>. Thus, it can be said that if the workload is high then the work stress will also be high. Conversely if the workload is low, the work stress will also be low. Furthermore, the result of this study showed that there was no significant correlation between mental workload and work stress. In contrast, there is a relationship between mental workload and work stress on labor CSSD In-stallation of Surabaya Hajj General Hospital. The relationship between mental work-load and stress have a strong relationship in the same direction which mean a higher mental workload experienced by workers, the higher the work stress level experienced by the workforce at CSSD Installation<sup>(19)</sup>. In line, there was also a relationship between mental workload and work stress on educational workers such as teachers and lecturers in Batam<sup>(7)</sup>. Mental workload which is greater than the body's ability can cause an uncomfot feelings (early phase), tiredness (overstress), injury, accident, pain, illness and decreased productivity (final phase). Inconversely, if the workload is smaller than the body's ability, it can cause understress, boredom, saturation, lethargy, less productivity and illness<sup>(20)</sup>.

## Conclusion

Based on the results of this study, it can be concluded that the majority of technician workers on the Maintenance and Repair Division of PT. PAL Indonesia (Persero), Surabaya did not feel disturbed by the work environment in the workplace. The research results showed that most of the workers experienced the moderate level of both physical and mental workload. They also experienced a moderate level of work stress.

From the study results, we can conclude that there is no significant relationship between work environment and work stress. Further, there is no significant relationship between mental workload and work stress. The significant relationship is only found between physical workload and work stress.

**Conflict of Interest:** None.

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