The Impact of Occupational Safety and Health, Physical Work Environment on the Workload and Performance of PT XYZ Technicians Batam City

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Abstract. This study aims to investigate how disturbance technicians' workload and performance are affected by their physical work environment and occupational safety and health. This study uses descriptive quantitative research. This study applies a Quantitative approach method through questionnaires and observations. The sample of this study includes 75 respondents, who are all disturbance technicians, obtained through saturated sampling techniques. The analysis methods applied include descriptive techniques and path analysis using the Partial Least Squares (PLS) analysis model with the Smart-PLS 4.1.0.3 application. According to the discussion in this study, occupational safety and health and the physical work environment have a significant impact on workload. This study also shows that occupational safety and health and the physical work environment significantly impact performance. These findings also show that the workload of disturbance technicians does not significantly affect their performance.

Keywords: Occupational Safety and Health, Physical Work Environment, Workload and Employee Performance.

1 Introduction

In the age of globalization, the condition of human resources (HR) has a big influence on businesses. A company's success is intrinsically linked to its personnel, making HR one of its most valuable assets[1]. In the context of providing customer service, technicians play a central role in maintaining smooth operations and responding quickly to disruptions that may arise. Workers need to pay attention to occupational safety and health so that they can be maximized and create a safe, healthy, and comfortable atmosphere. Seeing the dangers posed by working at height, companies must also prioritize the safety aspect of all their equipment. This is because accidents and safety conditions are not created for technicians, the surrounding community, and the environment.

In addition to aiming to avoid accidents in the company's production process, Occupational Health and Safety Impact is also useful for increasing employee morale, work sense, and work participation and ensuring improved employee performance.

Companies need to attach high importance to occupational safety and health because of the detrimental impact of occupational accidents and diseases on the welfare and productivity of employees and organizations [2]. The quality of a company's occupational safety and health program has a negative correlation with employee productivity [3].

The physical work environment encompasses everything around employees and can have an impact on how quickly they complete the tasks given to them[4]. Workers will be happier and more productive if their work environment is good, comfortable, clean, and pleasant[4]. Employees performance in carrying out their responsibilities and work can be affected by the conditions of the work environment, so it can be a major factor that affects their level of effectiveness and efficiency[2].

Stating workers and workloads both greatly affect businesses [5]. Workload refers to how many or few tasks are assigned to employees and how it affects their performance. Excessive workload can cause fatigue, strain, and other detrimental effects on performance. Instead, stress or boredom may be caused by too low a load level.

Performance is defined as the outcome of an individual's attempts to do work in accordance with predefined requirements and specifications while accounting for variables like skill level, experience level, task severity, and time restrictions[5]. Increasing employee productivity is something that every company strives for because it has proven to have several significant advantages.

The study is named "The Impact of Occupational Health and Safety, Physical Work Environment on Workload and Performance of PT XYZ Disruption Technicians" in light of the background information mentioned above. This study's goal is to put the specified difficulties to the test. To ascertain, using a quantitative approach, the effects of Physical Work Environment and Occupational Health and Safety on the Workload and Performance of PT XYZ Batam City's Disruption Technicians.

2   Literature Review and Hypothesis Development

2.1. Occupational Safety and Health

It claimed that ensuring employees' physical and mental well-being is the goal of putting safety and health measures in place at work. The main goal is to create a safe working environment from hazards that can put workers and others around them at risk, according to previous information. Thus, any equipment and machinery operating in good condition can be used safely and efficiently.

Offer valuable information on the various occupational safety and health factors that employers must consider when making recruitment choices. Below are the signs mentioned:

1) Tools and Materials
2) Personal Protective Equipment
3) Work Environment
4) K3 Education and Training
5) Means of Accident and Health Disorder Management

2.2. Physical Work Environment

Workers in a positive and collaborative work atmosphere will feel safe, and comfortable, and perform at their best [4]. If employees are aware of their work environment, then employees will be hit by their work and carry out effective activities. Even on the other hand, a non-supportive environment can weaken the performance of its employees, while many people are overwhelmed.

The following are indicators of the physical work environment: [6] Business Hours, Security, Workplace hygiene, Workplace lighting, Use of color, and Workplace air circulation.

2.3. Workload

Workload can be defined as the total number of tasks of a division or individual that must be completed within the time specified by a particular position known as their workload [5]. According to Permendagri No. 12/2008, a unit's or department's workload is the total number of tasks that the unit or department in an organization is required to complete. Workers may experience a feeling of burnout when their talents exceed the demands of their jobs. Alternatively, people may experience burnout if their talents do not meet their trading requirements [5]. Workload according to [5]: Working Conditions, Time Usage, Standards of Work, Goals to be achieved

2.4. Employee Performance

There is a common belief that workers' performance can be evaluated based on how well they are fulfilling their job duties, which indicates the level of quality and quantity of their workforce [7]. When looking for methods to increase the productivity of an institution or business, it is advisable to consider performance as a reliable indicator [8].

Employee performance has a high commitment to risk and is brave enough to operate and survive. To make the goal realistic, feedback from the entire activity can be used. Able to implement plans quickly. Companies definitely need employee performance to achieve optimal goals [1]. Some of the employee performance indicators, as identified in the study by [6], involve several indicators, including Quality, Quantity, Timeliness, Ability to work together, and Independence.

2.5. Hypothesis Development

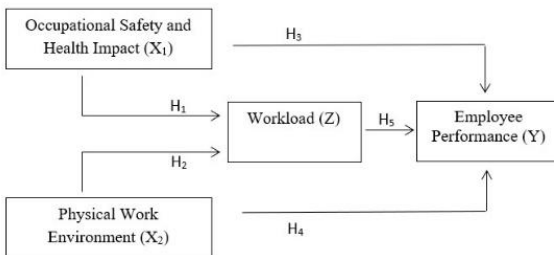Based on Figure 1, the following can be deduced as the study's hypothesis:

Fig. 1 Hypothesis Development

H_1 : The workload of PT XZY Batam City interruption technicians is significantly impacted by workplace safety and health

H_2 : The physical work environment has a significant effect on the workload of PT XZY Batam City disruption technicians

H_3 : The efficacy of PT XZY Batam City disruption technicians is significantly impacted by work safety and health

H_4 : The physical work environment has a significant effect on the performance of PT XZY Batam City disruption technicians.

H_5 : Workload has a significant effect on the performance of PT XZY Batam City disruption technicians

3   Research Method

This research employs quantitative research methods. In quantitative research, [9] states that both the population and its attributes are considered as samples. In this sampling, the researcher uses a saturated sampling technique on the object, which has a total population of 75 PT XYZ fault technicians in Batam City. The saturated sampling technique determines that all parts of the population are taken as samples. Thus, all parts of the population were taken as a sample of 75 people. This study uses path analysis with the Partial Least Square method with the outer model, inner model, and hypothesis testing stages, all of which are measured using the SmartPLS 4.1.0.3 statistical data analysis application.

4   Results and Discussion

The objective is to provide an overview of the respondents' attributes and their responses to the questionnaire questions for every variable. This study uses descriptive statistics and PLS analysis to evaluate the average number of respondents from Batam City to a survey conducted by PT XYZ Interference Technicians. Below is a brief overview of the participants' attributes and their responses:

4.1 Measurement Model (*Outer Model*)

The outer model, also known as the outside relationship or measurement model, establishes the correlation between the variable and the indication under investigation. The measurement model is used to define latent indicators and variables [10]. There are three criteria to measure with convergent validity, discriminant validity, and composite reliability.

Convergent Validity
To measure the extent of the positive correlation between the indicator and its latent variables, we can use the concept of reliability. The percentage of the indicator's true

volatility that can be accounted for by the latent variable is known as reliability [10] argues that to measure *Convergent validity* in reflective constructs can use the outer loading and ave values. Below are the results.

Table 1. Average Variance Extracted (AVE)

Variable Indicators	AVE
Occupational Safety and Health (X1)	0.63
Physical Work Environment (X2)	0.68
Workload (Z)	0.78
Employee Performance (Z)	0.63

The table displaying the AVE results shows that every variable's value is more than 0.5. Thus, it may be said that the meaning variable is reflected in the index variable.

Table 2. Outer Loading

Variable Indicators	Occupational Safety and Health (X1)	Physical Work Environment (X2)	Workload (Y)	Employee Performance (Z)
X1.1	0.772			
X1.2	0.724			
X1.3	0.754			
X1.4	0.889			
X1.5	0.830			
X2.1		0.772		
X2.2		0.741		
X2.3		0.833		
X2.4		0.874		
X2.5		0.870		
X2.6		0.845		
Y1				0.772
Y2				0.715
Y3				0.746
Y4				0.897
Y5				0.832
Z1			0.901	
Z2			0.92	
Z3			0.779	
Z4			0.928	

The outer loading values in Table 2 align with the guidelines set by [10] which recommend that indicators with loadings below 0.4 should be eliminated. Conversely, loadings above 0.7 indicate a strong relationship and should be retained. Loadings

between 0.4 and 0.7 can be considered for retention, but their suitability depends on the composite reliability and AVE threshold values.

Discriminant Validity
Evaluating a construct's degree of representation of a construct variable in relation to other construct variables using empirical standards [10].

Table 3. Cross-Loading

Variable Indicators	Occupational Safety and Health (X1)	Physical Work Environment (X2)	Workload (Z)	Employee Performance (Y)
X1.1	0,772	0,59	0,621	0,673
X1.2	0,724	0,559	0,436	0,582
X1.3	0,754	0,637	0,57	0,624
X1.4	0,889	0,718	0,665	0,769
X1.5	0,830	0,743	0,691	0,715
X2.1	0,556	0,772	0,524	0,645
X2.2	0,565	0,741	0,522	0,597
X2.3	0,664	0,833	0,587	0,592
X2.4	0,773	0,874	0,708	0,679
X2.5	0,748	0,870	0,682	0,665
X2.6	0,72	0,845	0,691	0,646
Y1	0,644	0,562	0,55	0,772
Y2	0,607	0,526	0,351	0,715
Y3	0,635	0,579	0,484	0,746
Y4	0,766	0,691	0,603	0,897
Y5	0,714	0,702	0,622	0,832
Z1	0,697	0,699	0,901	0,631
Z2	0,673	0,682	0,920	0,578
Z3	0,582	0,607	0,779	0,469
Z4	0,721	0,686	0,928	0,650

The cross-loading value in Table 3 is the first approach in assessing the indicators of each construct variable. The indicator variable of each construct variable must have an outer model value that exceeds the other cross-loading values.

Composite Reliability
There are two ways to evaluate composite reliability: Cronbach's alpha, a measurement based on the intercorrelation of observable indicator variables, and composite reliability itself. In the meantime, internal consistency reliability is measured by composite reliability.

Table 4. Cronbach's Alpha dan Composite Reliability

Variable Indicators	Cronbach's alpha	*Composite reliability*
Occupational Safety and Health (X1)	0.854	0.896
Physical Work Environment (X2)	0.905	0.927
Workload (Z)	0.905	0.934
Employee Performance (Y)	0.852	0.895

As shown in Table 4, the value exceeds 0.70, demonstrating satisfactory reliability according to the standard. This suggests that the variables consistently measure the underlying constructs, validating their use in subsequent research.

Structural Model (*Inner model*)

Next, verify the postulated relationships between the various elements by examining the inner model, which is also referred to as the structural model. Evaluating the R-squared values of endogenous constructs based on the influence they get is a method for assessing structural models. The results of the structural model analysis, which was carried out using the Smart PLS software, are shown in the following section:
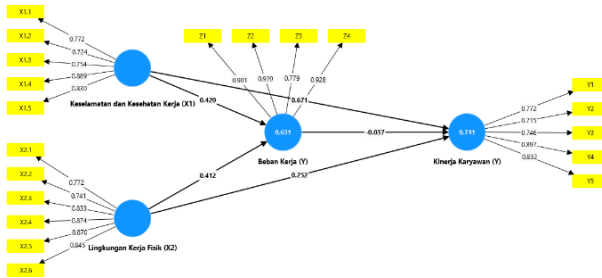
Fig. 2. PLS Research Model

As illustrated in Figure 2, the two most significant elements that impact workload are the physical work environment and occupational safety and health.

R Square

In accordance with [10], the method that estimates the extent to which one latent variable affects other variables is to calculate the R-squared value. The variables that are affected in this situation are endogenous latent variables [11] outline the prerequisites for R Squared. The moderate R-squared value is 0.50, the weak R-squared value is 0.25, and the high R-squared value is 0.75. The R-squared value obtained from the SmartPLS 4.1.0 software is.

Table 5. R-value Square

Variable	R-square	R-square adjusted
Workload (Z)	0,631	0,621
Employee Performance (Y)	0,741	0,730

Table 5 shows how much influence is received; the Workload construct's R-Square value is 0.631, or 63.1%. The physical workspace's dimensions and Occupational Safety and Health have an R-Square value of 0.741, which shows that these dimensions explain or affect Employee Performance in a significant amount, which is 74.1% of the variance.

Q Square
The next step in assessing a structural model is to measure the predictive significance of Q2, also known as Q-square. Predictive Fit of Structural Models (Q-Square) Q2, which measures how well the model produces values as well as parameter estimates. A strong model is when the Q-Square Predictive Relevance (Q2) value is 0.35, medium when it is 0.15, and poor if it is 0.02. A higher Q-square value indicates that the model is more accurate and better matches the data. The calculation of the Q-squared value yields the result:

$$Q\text{-}Square = 1 - [(1 - R21) \times (1 - R22)] \tag{1}$$
$$= 1 - [(1 - 0{,}631) \times (1 - 0{,}741)]$$
$$= 0{,}904$$

The model has a high degree of predictive relevance, as indicated by the value of 0.904 from the Q2 findings above, provided that the results are not zero. As a result, 90.4% of the variability seen in the study data is explained by this model. Nevertheless, the remaining 9.6% can be explained by variables unrelated to this research paradigm.

4.2   Hypothesis Test Results

A hypothesis can be accepted or rejected by closely studying the construct's significant values, t-statistics, and p-values. When the t-statistic exceeds 1.96, indicating statistical significance, and the probability of detecting the result by chance (p-value) is less than 5%, we will reject the null hypothesis (Ho) and accept the alternative hypothesis (Ha) in this study using the bootstrap resampling approach. This runs counter to the other possible outcome.
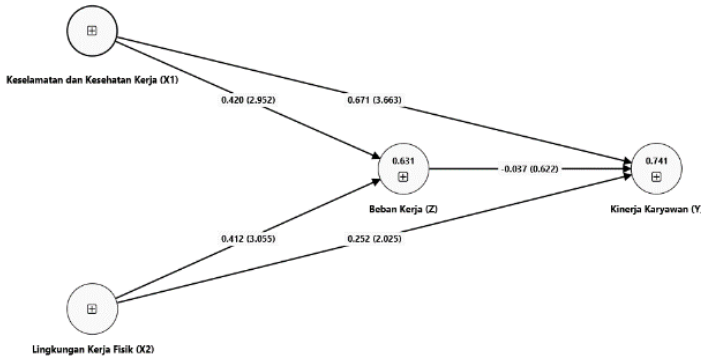
Fig. 3. Path Coefficients Bootstrapping

Table 6. Result Specific Indirect Effects

Variable	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Occupational Safety and Health (X1) -> Workload (Z) -> Employee Performance (Y)	- 0.015	- 0.010	0.027	0.571	0.568
Physical Work Environment (X2) -> Workload (Z) -> Employee Performance (Y)	- 0.015	- 0.018	0.027	0.559	0.576

According to the specific indirect effect table, the t-statistic serves as a crucial indicator for determining whether to accept or reject a hypothesis, with a benchmark value of 1.96 from the t-table. Consequently, the analysis revealed no significant indirect effects, with a value of 0.571. Significant influence was found between the physical work environment and employee performance, as indicated by a correlation coefficient of 0.559.

Path Analysis
The findings of the path analysis from the data testing using SmartPLS software are recorded in table 6. It can be stated that the t-statistical value or t-calculation is useful in assessing the acceptance or rejection of the hypothesis, with the t-table at 1.96.

The analysis found no significant indirect effects, with a measurement of 0.571. However, a strong correlation was observed between the physical work environment and employee performance, with a coefficient of 0.559, indicating a substantial influence.

Impact of Occupational Safety and Health on Workload
Testing using SmartPLS showed a statistically significant impact of Occupational Safety and Health on workload, Using p-values of 0.003 < 0.05 and t-statistical values of 2.952 > 1.96, H1 is accepted, suggesting a significant impact.

These findings are in line with the research [2] which shows a significant relationship. Improvements in standards tend to reduce workload as well as improve employee performance. Good Occupational Safety and Health can help reduce physical and mental workloads, as well as increase employee productivity. As a result, program implementation is crucial for businesses to establish a welcoming atmosphere for their staff.

Physical Work Environment on Workload
The data analysis using SmartPLS software indicates that the impact of the physical work environment on workload has a coefficient with a t-value of 3.055, which is higher than 1.96. P-value is less than 0.05, at 0.002. This results in the adoption of H3, which suggests that workplace culture and conditions have a big impact on how much work a person can handle.

These results are in line with earlier studies that highlight the important influence of the physical work environment on worker burden. This study adds more weight to the theory that environmental influences have a significant role in determining how comfortable and productive employees are. Both physical and mental workloads can be reduced with an efficient physical work environment.

Impact of Occupational Safety and Health on Employee Performance
The coefficient produces a t-value of 3.663, which is greater than 1.96, according to the analysis done with the SmartPLS tool. Given that the p-value is 0.000, it is less than 0.05. Consequently, H2 is validated, proving that Occupational Safety and Health has a major impact on Employee Performance. The findings are consistent with the study conducted by [3], which suggests that workplace safety and health have a significant impact on worker productivity. Thus, workplace safety and health are priorities that businesses must concentrate to meet their organizational goals, in addition to being essential components for improving employee performance.

Physical Work Environment on Employee Performance
The coefficient for the Physical Work Environment's effect on Employee Performance has a t-statistical value of 2.025, which is larger than 1.96, and a p-value of 0.043, which is less than 0.05, according to the analysis done using SmartPLS software. This demonstrates that H4 has been confirmed and has a considerable impact. This result is consistent with the study conducted by [4], which demonstrates that employee performance is highly impacted by the physical work environment. Furthermore, [12] emphasizes how crucial the physical work environment is in determining how well employees perform.

Workload on Employee Performance

According to the analysis's findings, there is a 0.622 relationship between workload and employee performance. H5 is rejected because this value does not meet the predetermined threshold for statistical significance. As a result, these results imply that worker performance is not significantly harmed by workload.

This outcome contrasts with the findings of [4], which assert that workload negatively and significantly affects employee performance. In this study, however, the workload did not demonstrate a noteworthy negative effect on employee performance. This suggests that variations in workload do not lead to a significant decline in employee performance. Technicians' performance remains consistent, regardless of workload changes. The study indicates that in specific contexts, other influencing factors, such as effective time management, enable technicians to balance their time across various tasks efficiently.

5   Conclusion

From the analysis carried out, many conclusions can be drawn, including:
1) The impact of Occupational Safety and Health has a significant effect on the Workload of Technician Disturbances of PT XYZ Batam City.
2) The Physical Work Environment has a significant effect on the Performance of Disturbance Technicians of PT XYZ Batam City.
3) The impact of Occupational Safety and Health has a significant effect on the Performance of Disturbance Technicians of PT XYZ Batam City.
4) The Physical Work Environment has a significant effect on the Performance of Disturbance Technicians of PT XYZ Batam City.
5) There is no discernible correlation between the workload and the performance of PT XYZ Batam City disturbance technicians.

6   Suggestion

1) Researchers suggest that companies should implement a more comprehensive and sustainable OSH program. Having proper safety equipment, conducting regular training, and maintaining close supervision can all help lower the likelihood of work-related illnesses and accidents.
2) Ensure that the physical condition of the place is at an optimal level. Investing in improving work facilities and equipment can increase comfort at work.
3) Conduct periodic evaluations of technician workloads. This aims to ensure that the existing workload does not exceed the capacity of the individual and does not cause long-term fatigue that could impact future performance.

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