

# Are Physical and Non-Physical Working Environment Effect Employees Productivity with Motivation as an Intervening Factor?

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**Abstract**—Productivity means as a comparison between the results achieved (output) and the overall resources used (input). Work productivity is a process to produce or increase the results of goods and services as high as possible by utilizing resources as efficiently as possible. In this study, productivity will be measured through the impact of physical work environment, non-physical work environment and work motivation. The research method used is a quantitative method with a descriptive research approach and associative analysis. The number of sample in this study was 82 employees who were determined using simple random sampling technique with Slovin method. The data obtained are primary data through questionnaires and processed using statistical software. This study has fulfilled the instrument test and classic assumption test, namely: normality test, linearity test, multicollinearity test, and heteroscedasticity test. The description of statistics in the study shows that the physical work environment, non-physical work environment, work motivation and work productivity have homogeneous data. The results of the analysis in the study showed that there were positive and significant effects (1) physical work environment on work motivation, (2) non-physical work environment on work motivation, (3) work motivation on work productivity, (4) work motivation on work productivity, (5) work motivation as an intervening variable between physical work environment and work productivity, (6) work motivation as an intervening variable between non-physical work environment and work productivity. The results of the latest data processing showed results that did not significantly influence the non-physical work environment on work productivity.

**Keywords**—physical work environment, non-physical work environment, work motivation, work productivity

## I. INTRODUCTION

The aim of this study was to analysed the problems related to the factors that influence work motivation into two clusters which will lead to satisfaction and dissatisfaction at work, namely motivational factors related to the content of the tasks carried out and the second cluster is the hygiene factors namely factors those outside of work include the work environment according to Herzberg [1]. The reason for choosing work motivation variables as mediator between the physical work environment and non-physical work environment on

productivity is based on the mental importance of employees who are fostered by developing their potential through the working environment effectively in order to realize high quality company productivity and to achieve the main objectives in the organization.

The organization has various efforts to improve the quality and competencies of employees of the company. High quality and highly competent human resources must always be managed and maintained by the organization in order to achieve the expected performance. Productivity measurement at the company can be used as a means for management to analyse and drive production efficiency. Employees need workplaces that are pleasant, safe and sufficient lighting, fresh air and short working hours. On the other side, Motivation is one of the important role lies within employees. Motivation will promote commitment to the organization so that it is willing to sacrifice for the benefit of the organization. The existence of motivation and high commitment employees is one of the main variables of measures to increase productivity also suggests that work motivation is an impulse in a person to do or do an activity or task as well as possible in order to achieve achievement with honours [2].

The growth and development of a company cannot be separated from the surrounding environment which means that the working environment can have a positive or negative influence on the company. Working environment issues should not be ignored because it is a place to do work [3]. At the moment, the organization environment often changes and is difficult to predict, resulting organizations must be more responsive and flexible in dealing with the situation. Changes in the working environment not only affect the organizational structure, but also require leaders to be more flexible in decision making. The work environment can be categorized into two, namely the physical working environment and the non-physical working environment [4].

A comfortable and conducive physical work environment will increase the employee motivation to work [5]. The physical work environment is all physical forms that are around the workplace that can affect employees both directly [6]. The physical work environment is where an employee's work

activities and affect the morale and emotion of the employees. In addition, the physical work environment can be explained as all aspect focused on objects and situations around the workplace that can influences employees in carrying out their duties. Working environment issues in an organization are very important, in this case it is necessary to regulate and organize physical work environment factors in organizing organizational activities [4].

The working environment of both physical and non-physical is affected employee's productivity [7]. Non-physical working environment is all conditions that occur related to work relationships, both relationships with superiors and fellow co-worker's relations or relationships with subordinates. Therefore, the non-physical environment can also affect employees' productivity and performance. Companies should be able to create good relationships between workers in the company, so they can support each other to achieve common goals [8]. This is in line with the results of research conducted by Alfatha and Yuniawan which shows that the non-physical work environment has a positive and significant effect on work productivity [7].

Using the Ishikawa analysis, researcher concluded the factors caused the productivity of employees are in figure 1:

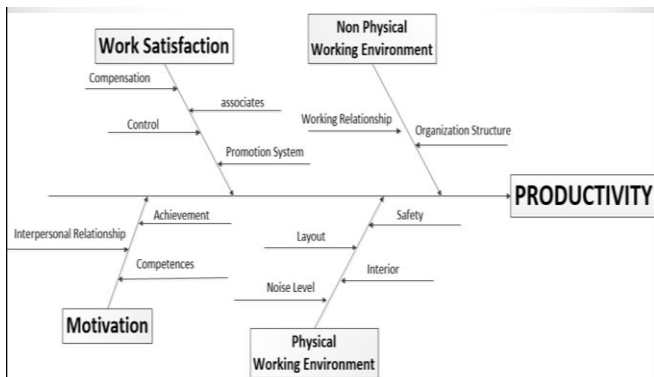


Fig. 1. Cause effect of employees productivity.

The grade values below indicate the final value of employee performance at the company as in figure 2.

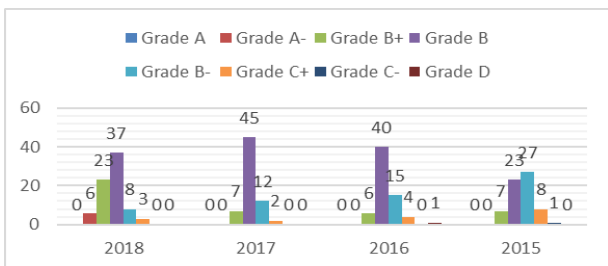


Fig. 2. Employees productivity trend (2015 – 2018).

Based on the research background and problem identification, the research problem formulations are: (1) Is there an influence of the physical working environment on employee productivity? (2) Is there an influence of non-physical working environment on employee productivity? (3) Is there an influence of employee motivation on productivity? (4) Is there an influence of the physical working environment on employee motivation? (5) Is there an influence of the non-physical working environment on employee motivation? (6) Is there an influence of working motivation as an intervening

variable between the physical working environments on employee productivity? (7) Is there an influence of working motivation as an intervening variable between the non-physical working environments on employee productivity?

## II. LITERATURE REVIEW

The work environment can be defined by space, physical layout, noise, tools, materials, and work relations and the quality of all these has an important positive impact on the quality of work produced [9]. The work environment has an influence on the performance of company employees in an effort to complete the tasks assigned to employees and affect the productivity of employee performance, a good environment will improve performance, and vice versa if the work environment is less calm, will be able to increase the level of mistakes of the employees [6]. The ambiances of the physical environment consisting of office design and layout, indoor air quality, thermal conditions, lighting and noise will affect performance and productivity. The workplace is a place where the organization evolved that brings benefits to the organization itself or the individuals within it [10]. The physical working environment is also one of the factors that causes employees work stress that effects on performance. The physical work environment factors such as temperature, noise, lighting, and air quality. These factors can improve their performance if one of these factors facilitates employees in working [11].

Non-physical working environment is all physical aspects of psychological work and work regulations that can affect employee job satisfaction and can increase productivity at work [12]. Company should provide cooperation between levels of superiors, subordinates and those who have the same position status in the company. The conditions that should be created are a family atmosphere, good communication and self-control between employees [13].

Work motivation is an impulse in a person in carrying out an activity or task as well as possible in order to achieve achievement with the honourable title. In this theory the work motivation applies as follows: "Need for power, Need for affiliation, and Need for achievement". These three needs are stated to have been proven to be incorporated into important elements in various work situations and ways of life [2]. Work motivation is a process that explains the strength of direction and a person in an effort to achieve a goal. Motivation is a desire to carry out activities as a willingness to spend a high level of effort and is conditioned by the ability of the effort to meet an individual's needs in achieving organizational goals [11]. Work productivity is how to produce or improve the results of goods and services as high as possible by utilizing resources as efficiently as possible. Productivity implies as a comparison between the results achieved (output) with the overall resources used (input) [14].

Work productivity is explained as an individual effort that can be measured and contributes to the output produced by the organization [15].

## III. RESEARCH METHODOLOGIES

This research is quantitative research with descriptive nature. Quantitative type of research is defined as the type of research conducted using aspects of statistical measurement wherein some examples are to measure the behaviour,

knowledge, opinions, or attitudes of consumers [16]. The descriptive nature of this study can test and explain in full the actual aspects of the research results [16]. Based on the objectives, types of investigations, benefits and time dimensions of this study are further explained with an explanation of the theory issued by Sekaran and Bougie [17], namely:

Based on its purpose, this research is a case study research. Based on the type of investigation, this study includes a comparative causal type that is looking at the causal relationship between variables [17]. Based on the benefits, this research is applied research. Based on the time dimension, this research is included in cross-sectional or cross-sectional research, carried out in a certain period of time and in a short time in February 2019 - June 2019.

Population is a generalization area that consists of objects / subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions [18]. While the population in this study were employees of one of Palm Oil company in Jakarta as the head office, consist of 3 (three) divisions; Human Resource Group Development, Information and Technology and Purchasing with a total of 103 employees. The population in this study is illustrated in the following table 1:

TABLE I. NUMBER OF POPULATION BASED ON DIVISION

No	Division	Number of Employees
1.	Human Resource Group Development	35 people
2.	Information and Technology	31 people
3.	Purchasing	37 people
Total		103 people

SPSS and Researcher 2018

The sampling technique uses a simple random sampling technique. Simple random sampling is a sampling technique from members of the population that is done randomly regardless to the strata that exist in that population [18].

The number of samples used in the study performed calculations using the Slovin formula, namely:

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{103}{1 + 103(0,1)^2}$$

$$n = \frac{103}{2,03}$$

$$n = 51$$

Data collection was conducted using a questionnaire approach and measured using a Likert scale technique. Likert scale is a specific interval scale that has an ordinal value and consists of 5 (five) levels of choice that is strongly agree, agree, neutral, disagree, and strongly disagree [19]. The validity of a question in the questionnaire is done by comparing the limit r (0.3) and the calculated r value with the basis of decision making in testing validity [20]. The reliability test was assessed using the Cronbach's Alpha value and the instrument was declared reliable if the value was above 0.7 in the Cronbach's Alpha table value criteria.

**A. Hypothesis Testing Design**

The analytical method is multiple linear regression analysis. The multiple regression equation model is used to test the effect of 2 or more independent variables on the dependent variable with a scale measuring intervals or ratios in a linear equation.

$$MTV = \alpha + b_1PWE + b_2NPWE + e \text{ (multiple regression equations I)}$$

$$PRD = \alpha + b_1PWE + b_2NPWE + b_3MTV + e \text{ (multiple regression equations II)}$$

Where:

- PRD = Productivity
- MTV = Motivation
- α = Constanta
- b<sub>1</sub>, b<sub>2</sub>, b<sub>3</sub> = Coefficient
- PWE = Physical Working Environment
- NPWE = Non Physical Working Environment

The indicators have a corrected total-item correlation value of minimum 0.518 and maximum 0.815. So, it can be said that the indicators used in the study are valid (more than 0.3).

Table 2 provides the means, standard deviations and correlations for the variables that used in the study.

TABLE II. RESULT OF THE STANDARD DEVIATION, MEANS AND CORRELATIONS

	Mean	SD	1	2	3	4
1.PWE	3.6812	0.32898	(0.957)			
2.NPWE	4.1351	0.40981	0.348**	(0.846)		
3. MTV	3.9403	0.33661	0.356**	0.505**	(0.868)	
4. PRD	3.8429	0.26481	0.530**	0.300**	0.620**	(0.900)

\*\*Correlation is significant at 0,01 level ( ) = Cronbach's alpha  
Source: SPSS and Researcher 2018

Based on the table 2, each scale had satisfactory reliability with Cronbach's Alpha value above 0,70 and all variables used in the study are correlated with each other as expected.

**B. Path Analysis**

To test the effect of intervening variables is using the path analysis method. Path analysis is an extension of multiple linear regression analysis or path analysis is the use of regression analysis to estimate the causality relationship between variables (casual models) that have been predetermined based on theory [21]. Describe that the steps in the path analysis can be carried out as follows [22]:

1) *Stage I testing the effect of PWE and NPWE variables on MTV variable:* Establish a path diagram based on the paradigm of the relationship between variables as in table 3:

TABLE III. RESULTS OF SUBSTRUCTURE PATH COEFFICIENT 1

Effect	Path coefficient (beta)	Sig. Value	Test Result	R (R <sup>2</sup> )	Other Variable Coefficients
PWE toward MTV	0.205	0.058	Ha rejected	0.540 (0.292)	0.841
NPWE toward MTV	0.433	0.000	Ha accepted		

Source: SPSS and Researcher 2018

Based on Table 3, substructure 1 model is obtained which is presented with the path coefficient value that has been obtained through data analysis that has been done. This is shown in figure 3 below.

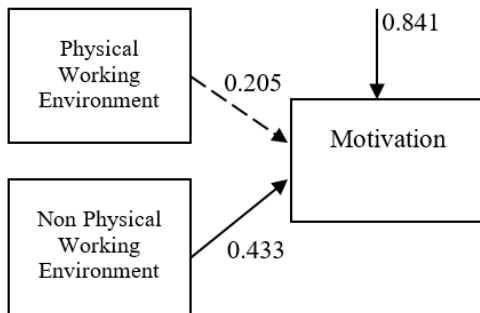


Fig. 3. Substructure 1 path.

We can be obtained structural equation substructure 1 as follows.

$$MTV = 0.205 PWE + 0.433 NPWE + 0.841$$

Based on structural model substructure 1, it can be interpreted that PWE does not significantly influence MTV. On the other hand, NPWE significantly influences MTV. The PWE and NPWE variables contributed in explaining the MTV variable by 29.2%. The remaining 70.8% is explained by other variables outside this study.

2) Stage II testing the Effect of PWE, NPWE and MTV variables on PRD variable: Determine the structural equation of the variable as in table 4:

TABLE IV. RESULTS OF SUBSTRUCTURE PATH COEFFICIENT 2

Effect	Path coefficient (beta)	Sig. Value	Test Result	R (R <sup>2</sup> )	Other Variable Coefficients
PWE toward PRD	0.373	0.000	H <sub>0</sub> Rejected	0.708 (0.501)	0.706
NPWE toward PRD	-0.102	0.309	H <sub>0</sub> accepted		
MTV toward PRD	0.539	0.000	H <sub>0</sub> Rejected		

SPSS and Researcher 2018

Based on table 4, the substructure 2 model is obtained which is presented with the path coefficient value that has been obtained through data analysis that has been done. This is shown in figure 4 below.

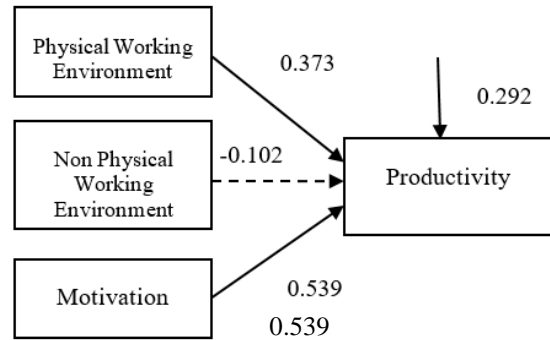


Fig. 4. Substructure 2 path.

We can be obtained structural equation substructure 2 as follows.

$$PRD = 0.373 PWE - 0.102 NPWE + 0.539 MTV + 0.292$$

Based on the structural model of substructure 2 it can be interpreted that the physical working environment and motivation work each have a significant effect partially on productivity. On the other hand, the nonphysical working environment does not significantly influence productivity. Variables physical working environment, nonphysical working environment and motivation contribute to explain the productivity variable of 50.1%. The remaining 49.9% is explained by other variables outside this study.

3) Stage III testing the effect of PWE and NPWE variables on MTV and their impact on the PRD variable: Overall the causal influence of Physical Working Environment (PWE) and Non Physical Working Environment (NPWE) variables on Motivation (MTV) and their impact on Productivity (PRD) can be described in the complete structural model as follows (figure 5).

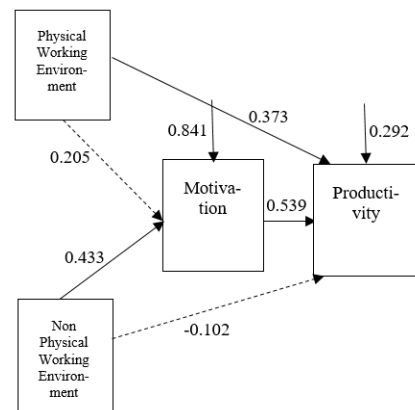


Fig. 5. Empirical causal relations of variables PRE, NPRE, and MTV to PRD path.

To determine the significance of an indirect effect, we use the Sobel test as in table 5 and table 6.

TABLE V. SOBEL TEST OF THE INDIRECT EFFECT OF PWE ON PRD THROUGH MTV

a	B	S <sub>a</sub>	S <sub>b</sub>	t-statistic
0.205	0.539	0.048	0.105	3.283

Source: SPSS and Researcher 2018

TABLE VI. SOBEL TEST OF THE INDIRECT EFFECT OF NPWE ON PRD THROUGH MTV

a	B	S <sub>a</sub>	S <sub>b</sub>	t-statistic
0.433	0.539	0.175	0.105	2.228

Source: SPSS and Researcher 2018

The t-statistic value by the Sobel test was compared with the t-table value. By  $df = n - k = 51 - 2 = 49$  and  $\alpha = 0.05$ , the value of t-table = 2.01 is obtained. It's seen in table 5 and table 6, the t-statistic value is more than the t-table value, so it can be said that the indirect effect of PWE on PRD through MTV and the indirect effect of NPWE on PRD via MTV is equally significant.

Based on the path coefficient value of the causal relationship it can be seen the direct causal effect, indirect causal effect, and the total causal effect of each variable summarized in the following Table 7.

TABLE VII. CAUSAL INFLUENCE

Variable	Path Coefficient	Causal Influence		
		Direct	Indirect	Total
PWE toward MTV	0.205	0.205	-	0.205
NPWE toward MTV	0.433	0.433	-	0.433
PWE toward PRD	0.373	0.373	0.0765	0.4495
NPWE toward PRD	-0.102	-0.102	-0.0442	-0.14617
MTV toward PRD	0.539	0.539	-	0.539
$\epsilon_1$	0.841			0.841
$\epsilon_2$	0.292			0.292

Source: SPSS and Researcher 2018

**IV. RESULT ANALYSIS**

The influence of physical work environment and non-physical work environment on motivation known from the results of the hypothesis can be concluded by predicting the model in equation I. The magnitude of the role or contribution of the variables in this research model based on the correlation coefficient of 0.540 which explains the correlation between the physical work environment and non-physical work environment on work motivation has a strong relationship. This can also be proven by individual parameters namely:

- The physical work environment has no significant effect on work motivation. Expressed with a significance value above 0.05 (i.e. 0.058). Where if there is an increase or decrease in the physical work environment by 1% then it will not effect on work motivation, assuming the related variables are considered constant.
- Non-physical work environment has a significant effect on work motivation. Expressed with a significance value below 0.05 (i.e. 0.000). Where if there is an increase in non-physical work environment by 1% then work motivation will increase by 0.433% assuming the dependent variable is considered constant. The magnitude of the contribution of physical work environment and non-physical work environment variables to work motivation can be seen through the coefficient of determination of 29.2%.

Physical Work Environment has a significant effect on Work Productivity. Expressed with a significance value below 0.05 (i.e. 0.000). Where if there is an increase in the physical work environment by 1% then work productivity will increase by 0.373% assuming the dependent variable is considered constant.

Non-physical work environment has no significant effect on work productivity. Expressed with a significance value above 0.05 (i.e. 0.359). Where if there is an increase or decrease in non-physical work environment by 1% then it will not effect on work productivity, assuming the related variables are considered constant.

Motivation has a positive and significant effect on productivity. Expressed with a significance value below 0.05 (i.e. 0.000). Where if there is an increase in work motivation by 1% then work productivity will increase by 0.539%, assuming the dependent variable is considered constant. The magnitude of the contribution of physical work environment, non-physical work environment and work motivation variables to work productivity can be seen through the coefficient of determination of 50.1%.

Effect of physical work environment and non-physical work environment on work productivity through work motivation. This can also be proven by individual parameters namely:

- Work motivation mediates the physical work environment on productivity significantly. Expressed with a t-statistics value more than t-table value by Sobel test.
- Work motivation mediates non-physical work environments to productivity significantly. Expressed with a t-statistics value more than t-table value by Sobel test.

**V. CONCLUSION**

Physical work environment has direct and indirect effects on work productivity through work motivation. On the other hand, non-physical work environment does not directly affect work productivity. But the non-physical work environment has an indirect effect on work productivity through work motivation. This is valuable information for the company, that it is important to remain oriented to the physical work environment to increase work productivity. In addition, the non-physical work environment must also be considered even though it does not directly affect work productivity. A good non-physical work environment will increase employee work motivation. The higher the work motivation of employees, work productivity will increase.

**VI. RECOMMENDATION**

To increase employees, work motivation, management strongly to:

- Re-arrange the layout of the room to minimize noise.
- Provide additional music to the workspace with enough volume to help clear the mind-set of employees.

To increase employees, work productivity, management strongly to:

- Re-Organizing activities that can enhance teamwork between employees.
- Create a sense of openness between employees and leaders of the company as well as establishing fraternal relations, so that the work performed can be in accordance with the target or can exceed the target set by the company.

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