DOI https://doi.org/10.18551/rjoas.2017-08.19

ANALYSIS OF RELATIONS BETWEEN KNOWLEDGE ON SAFETY AND HEALTH TOWARDS CONSTRUCTION WORKERS' BEHAVIOR ON SEPAKU-PETUNG ROAD IMPROVEMENT PROJECT IN EAST KALIMANTAN PROVINCE

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ABSTRACT
The purposes of the present research are to know the most dominant factor that influences the knowledge about Occupational Safety and Health towards construction workers' behavior; to comprehend the influence of variables of knowledge about Occupational Safety and Health collectively towards construction workers' behavior; the influence of variables of knowledge about Occupational Safety and Health partially towards construction workers' behavior. The research method used in the present research is quantitative method with regression and correlation analysis. Based on the simultaneous hypothesis test analysis of this research, it can be proven that those five variables give influence on the construction workers' behavior. It can be seen from the value of F count which is higher than F table from each variables. Besides seeing from the value of F count, it also can be seen from its significance value. From the research result, its significance value is < 0,05, so it is proven that those five variables give influence on the construction workers' behavior. There are influences between identification and initiation of Occupational Safety and Health, management system of Occupational Safety and Health, personal protective equipment, facilities and infrastructure, and risk of Occupational Safety and Health towards construction workers' behavior. The higher variable of identification and initiation of Occupational Safety and Health, management system of Occupational Safety and Health, personal protective equipment, facilities, and risk of Occupational Safety and Health are: the better behavior of construction workers will be. Based on the analysis of simultaneous hypothesis test, it can be proven that those five variables give influence toward the construction workers' behavior.

KEY WORDS
Occupation, safety, health, workers, behavior, construction, project.

Construction work is a combination of various disciplines of science, both in terms of technical construction and in terms of non-technical construction and including the element of human resources (manpower). It is always concerned on the implementation of construction work and the organizing community of the construction work itself. The implementation of this construction work must meet the provisions on engineering, Occupational Safety and Health (OSH), labor protection, and local environmental order to ensure the realization of orderly implementation of construction work. Traditionally, construction work has reactively conducted a security approach to reduce the number of wounded. By increasing the financial implications of work injury and pursuing a zero accident project, various construction professionals implement an innovative safety strategy that can be introduced from the beginning of the project development process (Baud, 2012; Blake, 2012; Navon & Kolton, 2007; Goetsch, 1996 ; Holt, 2001).

Occupational Safety and Health (OSH) problems in Indonesia are still often neglected, as indicated by the high number of work accident. Based on the source of Indonesia Labor Insurance (ASTEK) in 2013, that frequent accidents are: transport and traffic (30%), falling objects (29%), slipping, hit (26%), falling from a height (10%) and fire (5%). Accidents can be avoided or minimized if the right OSH Regulations are applied at the project site and it requires knowledge, understanding, planning, preparation, and coordination in preventing work accidents.

In general, knowledge about Occupational Safety and Health (OSH) is very wide, but there are some components of OSH which considered important to be benchmark of understanding of OSH. The components are the Definition and Initiation of OSH, Management System of OSH (SMK3), Personal Protective Equipment (PPE), Facilities and Infrastructure of OSH, Risk of OSH, (Sorensen and Barbeau, 2006). Definition and initiation are useful for the initial description of OSH on a construction project that is closely related to general introduction such as definition of terms, extensions of abbreviations, essence and meaning of the OSH symbol, associated organizational structure, internal and external parties related to functions implementation of OSH, and so on. The SMK3 process uses the PDCA (Plan Do Check Action) approach that starts from planning, implementation, examination, and corrective actions, (Yancey, 2004). Thus, SMK3 will run continuously during the organization's ongoing activities. The protection of workers' safety and security in a construction activity should be done seriously through various means to reduce the source of danger by using personal protective equipment. However, in the realization of the use of Personal Protective Equipment (PPE), it is still very difficult by considering the workers that will assume that this equipment will disrupt the work. Similarly, adequate health and safety facilities and infrastructure, such as the availability of toilet, organic or inorganic waste containers, waste management, can also indirectly affect workers' behavior while working. Another important component is OSH risk which illustrates the magnitude of potential hazards to the construction work to cause incidents or injuries to workers determined by the resulted likelihood and severity, so that it should be managed and avoided through good OSH management.

Poor work safety has prompted many researchers to examine the causes of the accident. Behavior and characteristics of workers as the cause of accidents occur, so that OSH knowledge is needed to minimize accidents that occur, (Heinrich, 1950, Manuele, 2003). Therefore, from the above statement, the present research's questions are: 1) what is the most dominant factor affecting the knowledge of OSH on the behavior of construction workers?, 2) what OSH knowledge variables influence simultaneously to the behavior of construction workers?, 3) are the OSH knowledge variables partially affecting the behavior of construction workers?

The aims of this research are: 1) To know the most dominant factor that influences the knowledge of OSH on the behavior of construction workers, 2) to know the effect of the OSH knowledge variables collectively to the behavior of the construction workers; 3) to know the effect of knowledge partially to the behavior of construction workers.

METHODS OF RESEARCH

The method used in this research is quantitative research method that is a method that attempts to collect data in accordance with the actual situation, presents and analyzes it so as to give a fairly clear picture of the researched object. Qualitative method can be meaningful if the obtained data are more complete, more in-depth, and more credible, so that the objectives of the research are achieved. This method is appropriately used to examine the status of a group of people, the company as the object of research which aims to create descriptive portrayal systematically, factual and accurate about the facts and the relationship between the investigated phenomena, (Hancock et al, 2009; Yin, 2011).

In this research, the methods used for data collection are as follows: 1) data collection of the number of workers involved, Contract Plan of OSH, tool box meeting on road projects, printed media related to road projects, some research references and some other data regarding to Control of Quality System and Environmental OSH (PSMK3L), 2) Primary data collected by questionnaire distribution method where respondent will be asked to answer the question, which then respondents' assessment tabulation will be made.

Factor analysis is used in this study to analyze the interdependence of several variables simultaneously with the aim to simplify the form of relationship between researched several variables to a number of factors fewer than the researched variables. This means that factor analysis can also illustrate the data structure of a research (Suliyanto, 2005).

Factor analysis is a technique of interdependence (interdependence technique) in which there is no division of variables into independent variables and dependent variables with the main goal is to define the structure that lies between variables in the analysis. This analysis provides tools for analyzing the structure of the interrelations or correlations among a large number of variables by explaining the good correlation between variables which is assumed to represent dimensions in the data (Hair, 2010).

Data analysis conducted in this research is regression and correlation analysis using SPSS program and Microsoft Excel. Regression analysis used is Multiple Linear Regression Analysis to know the effect of aspects of OSH knowledge collectively to the behavior of construction workers, then Simple Linear Regression Analysis is to determine the effect of each aspect of knowledge OSH partially on the behavior of construction workers. Besides, correlation analysis is to know correlation of knowledge of OSH on behavior of construction workers at workplace.

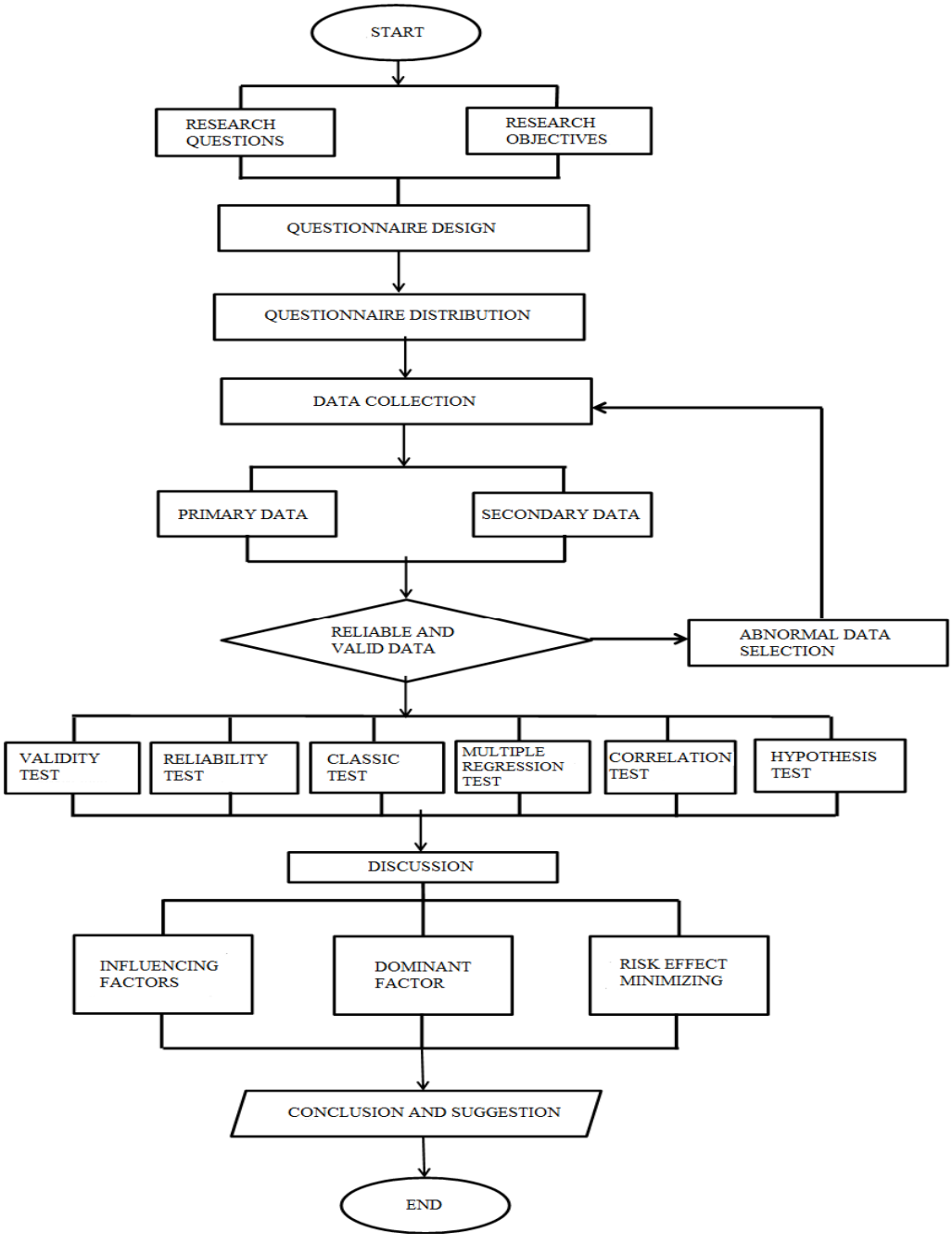

Figure 1 – Research Framework Diagram

RESULTS AND DISCUSSION

Analysis of Independent Variables on Construction Workers Multiple Regression Analysis. The influence of independent variables on Construction Workers' Behavior can be viewed by utilizing regression analysis using *IBM SPSS* software *Statistics 20* which is as follows:

Table 1 – Multiple Regression Analysis

Coefficients								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-5.247	.501		-10.464	.000		
	X1	-.233	.048	-.796	-4.846	.000	.020	49.069
	X2	.052	.020	.270	2.575	.016	.050	19.995
	X3	.081	.037	.324	2.188	.037	.025	39.790
	X4	.248	.042	.955	5.889	.000	.021	47.808
	X5	.051	.018	.248	2.785	.009	.069	14.468
a. Dependent Variable: Y								

Based on the calculation of the SPSS, it is obtained multiple linear regression equation as follows:

$$Y = -5.247 - 0.233X1 + 0.052X2 + 0.081x3 + 0.248X4 + 0.051X5$$

From the multiple linear regression equation above, it is obtained a constant value which is 5.247. It means that if the variable (Y) is not affected by the five independent variables or OSH identification (X1), management system of OSH (X2), personal protective equipment (X3), facilities and infrastructure (X4), and the risk of OSH (X5) are zero, then the average size of the behavior of construction workers (Y) will be 5,247.

The value of the regression coefficients in the independent variables illustrates if the estimated independent variables rise by one unit and the value of other independent variables is estimated to be constant or equal to zero, then the value of the dependent variable is estimated to rise or may decrease in accordance with the sign of regression coefficient of independent variables.

If the regression coefficient for the independent variable of OSH identification (X1) is negative, it indicates an unidirectional relationship between OSH identification (X1) and the behavior of construction workers (Y). The regression coefficient of OSH identification (X1) variable as much 0.233 means that each increase of OSH identification (X1) for one unit will cause the decrease of the construction workers' behavior (Y) by 0.233.

The regression coefficient for the independent variable of OSH (X2) management system is positive, indicating a direct relationship between OSH management system (X2) and the behavior of construction worker (Y) .The regression coefficient of OSH (X2) management system variable of 0.052 means that for each addition of OSH (X2) management system of one unit will cause the increase of the construction worker's (Y) behavior by 0,052.

If the regression coefficient for self-protective free variable X3 is positive, it indicates a direct relationship between the personal protective equipment (X3) and the behavior of the construction workers (Y). The variable regression coefficient of personal protective equipment (X3) as much 0.081 means that each increase of personal protective equipment (X3) for one unit will result in the increase of the construction workers' behavior (Y) by 0,081.

Furthermore, if the regression coefficient for the independent variable of facilities and infrastructure (X4) is positive, it marks a direct relationship between facilities and infrastructure (X4) and the behavior of construction workers (Y). The regression coefficient of facility and infrastructure variable (X4) as much 0.248 means that every increase of facilities

and infrastructure (X4) for one unit will cause the increase of the behavior of the construction workers' behavior (Y) by 0.248.

Moreover, if the regression coefficient for the risk-free variable OSH (X5) is positive, it indicates a direct relationship between the risk of OSH (X5) and the behavior of the construction workers (Y). The regression coefficient of OSH risk variables (X5) as much 0.051 means that for each risk increase of OSH (X5) for one unit will cause the increase of construction workers' behavior (Y) by 0.051.

Correlation Analysis. Correlation analysis is used to determine the relationship of independent variables with dependent variable. Through this correlation analysis, influence of independent variables to dependent variable will be investigated.

Table 2 – Guidelines Interpretation of correlation coefficients

No	Interval Coefficient	Relationship Level
1	0.000-0.199	Very Weak
2	0.200-0.399	Weak
3	0.400-0.599	Quite Strong
4	0.600-0.799	Strong
5	0.800-1.000	Very Strong

Source: Sugiyono (2010).

This analysis is done by using *IBM SPSS Statistics 20* software and it obtained the result of correlation analysis between independent variable (OSH) and dependent variable (construction workers' behavior) as follows:

Table 3 – Correlation coefficient

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.992[a]	.985	.982	.30970	2.432
a. Predictors: (Constant), X5, X2, X1, X3, X4					
b. Dependent Variable: Y					

Based on the output, it can be seen that the correlation coefficient between independent and dependent variable is as much 0.985 in which coefficient correlation is positive meaning that the correlation that occurs between the five independent variables and construction workers' behavior are in line, where the greater the independent variables will be followed by the growing magnitude of the dependent variable. The value of 0.985 shows the correlation between independent variable and dependent variable (construction workers' behavior) are in a very strong relationship category (0.800 to 1.000).

Hypothesis testing. Furthermore, to test whether the influence of independent variables on the behavior of construction workers is significant both collectively (simultaneously) or partially (individually), significance test is conducted. Testing starts from simultaneous testing and if testing result is simultaneously significant, it is with a partial test.

Simultaneous hypothesis testing (F test). To know the significant influence of independent variables collectively over a dependent variable, F test is used. The results of collective hypothesis testing using *IBM SPSS Statistics 20* are as follows:

Table 4 – Collective Hypothesis Testing

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	171.785	5	34.357	358.202	.000[b]
	Residual	2.686	28	.096		
	Total	174.471	33			
a. Dependent Variable: Y						
b. Predictors: (Constant), X5, X2, X1, X3, X4						

Based on these outputs, it can be seen that the F-count value is 358.202. In addition, the F-table value is at the 5% level and its degree of freedom (df) is k = 2-1 and the degree of free denominator (df2) of n - k (34 - 1 = 33) is 4.14. If these two values are compared, then the value of f count is higher than F-table (358.202> 4.14), so Ho is rejected. Thus, it can be concluded that collectively the independent variables have a very significant influence on the dependent variable (construction workers' behavior). Moreover, its significance value is below 0.05, which is 0.000.

Partial Hypothesis Testing. To know the variables that have significant influence partially, test of regression coefficient by using t test statistics is done. Determination of test result (acceptance/rejection of H0) can be done by comparing t-count with t-table or also can be seen from significance value. The result of partial hypothesis testing using *IBM SPSS Statistict 20* is as follows:

Table 5 – Partial Hypothesis Test

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-5.247	.501		-10.464	.000		
	X1	-.233	.048	-.796	-4.846	.000	.020	49.069
	X2	.052	.020	.270	2.575	.016	.050	19.995
	X3	.081	.037	.324	2.188	.037	.025	39.790
	X4	.248	.042	.955	5.889	.000	.021	47.808
	X5	.051	.018	.248	2.785	.009	.069	14.468
a. Dependent Variable: Y								

Based on the output, the value of t-table obtained by each variable can be seen clearly. To make a conclusion whether it accepts or rejects Ho, it must first specify the t-table values that will be used. This value depends on magnitude of the degree of freedom (df) and the level of significance used. Using a significance level of 5% and a df value of n - k - 1 (34 - 6 - 1 = 29) obtained a t-table value by 1.699.

The test results of the influence of each independent variable (X1, X2, X3, X4, X5) to the dependent variable (Y) are as follows:

1. The Influence of OSH Identification (X1) on the Construction Workers' Behavior (Y). Based on the output, it is known that the value of t-count is 4.846. If compared to the t-table value as much 1.699, then the t-count obtained is much larger than the value of t-table. So, Ho is rejected. Thus, it can be concluded that the variable of OSH identification gives significant influence on the behavior of construction workers. It can also be seen from the significance value of X1 which is smaller than 0.05, that is 0,000 <0.05.
2. The Influence of OSH Management System (X2) on the Construction Workers' Behavior (Y). Based on the output, it can be known that the value of t-count is as much 2.575. If compared to the t-table value as much 1.699, then the t-count obtained is much greater than the value of t-table. So, Ho is rejected. Thus, it can be concluded that the variable of OSH management system significantly influences the behavior of construction workers. It can also be seen from the significance value of X2 which is smaller than 0.05, that is 0.016 <0.05.
3. The Influence of Personal Protective Equipment (X3) on the Construction Workers' Behavior (Y). Based on the output, it can be known that the value of t-count is 2.188. If compared to the t-table value as much 1.699, then the t-count obtained is much larger than the value of t-table. So, Ho is rejected. Thus, it can be concluded that the variable of personal protective equipment significantly influences the behavior of construction workers. It can also be seen from the significance value of X3 which issmaller than 0.05, that is 0.037 <0.05.

4. The Influence of Facilities and Infrastructure (X4) on the Construction Workers' Behavior (Y). Based on the output, value of t-count is known as much 5.889. If compared to the t-table value as much 1.699, then the t-count obtained is much larger than the t-table value. So, Ho is rejected. Thus, it can be concluded that the variable of facilities and infrastructure significantly influences the behavior of construction workers. It can also be seen from the significance value of X4 which is smaller than 0.05, that is 0,000 <0.05.
5. The Influence of OSH Risk (X5) on the Construction Workers' Behavior (Y). Based on the output, it is known that the value of t-count is 2.785. If compared to the t-table value as much 1.699, then the t-count obtained is much larger than the t-table value. So, Ho is rejected. Thus, it can be concluded that the variable of OSH Risk significantly influences the behavior of construction workers. It can also be seen from the significance value of X5 which is smaller than 0.05, that is 0.009 <0.05.

DISCUSSION OF RESULTS

The Influence of Collective OSH Knowledge Variables on Construction Workers' Behavior. Every workplace, work environment, and work type have different characteristics and requirements of Occupational Safety and Health (OSH). Therefore, OSH cannot be realized as it is from the workers or other parties. OSH must be planted and built through guidance and training. A good workplace is a safe workplace. A harmonious and a pleasing workplace will support safety level. Thus, OSH condition in company is the reflection of the employment condition in company.

All OSH management system aims to manage OSH risk in company so that the unexpected event or loss can be prevented. Managing OSH is similar to managing other aspects in company by using modern management approach starting from planning, organizing, implementation and supervision. If OSH is not managed well, then it will influence the construction workers' behavior. The better the management of OSH is, the better the behavior of construction workers during project will be. On contrary, the worse the management of OSH is, the worse the behavior of construction workers during project will be.

It is in line with the research result stating that there is an influence among OSH initiation and identification, OSH management system, personal protective equipment, facilities and infrastructure, and OSH risk toward the construction workers' behavior. The program output of *IBM SPSS Statistics 20* reveals that if hypothesis is rejected, it means that the higher the OSH initiation and identification, OSH management system, personal protective equipment, facility and infrastructure, and OSH risk are, the higher or the better the behavior of construction workers will be. Based on simultaneous hypothesis test analysis of the present research, it can be proven that the five variables give influences on the construction workers' behavior. It can be clearly proven from the value of F count which is higher that F table from each variable. Besides seeing from the value of F count, it also can be seen from its significance value. From the research result, it obtained significance value < 0,05, so it proves that the five variables give influence simultaneously on the construction workers' behavior.

The Influence of Partial OSH Knowledge Variables on Construction Workers' Behavior. OSH Knowledge consists of five variables: OSH identification and initiation, OSH management system, personal protective equipment, facilities and infrastructure, and OSH risk. Each variables affect the behavior of construction workers. This is in accordance with the results of research which states that there is an influence between identification and initiation of OSH on the behavior of construction workers. The output of the *IBM SPSS Statistics 20 program* shows if the null hypothesis is rejected, this means that the higher the identification variable and the OSH initiation will be, the higher or better the behavior of the construction workers. Based on partial hypothesis test analysis from this research, it can be proven that variable of OSH identification and initiation gives influence on construction workers' behavior. This can be proven from the t-count value of 2.822. If compared to the t-

table value of 1.69236m then the t-count obtained is much larger than the value of t-table. So, Ho is rejected. It can be concluded that OSH identification and initiation variable significantly influences construction workers' behavior. This can also be seen from the significance value smaller than 0.05 which is 0.008 <0.05, so that the variable of partial OSH identification and initiation influences construction workers' behavior.

The second variable is the OSH management system. Based on the research result, it emphasizes that there is an influence between OSH management system to the behavior of construction workers. The output of the *IBM SPSS Statistict 20 program* shows if the null hypothesis is rejected, this means that the higher the OSH management system variable will be the higher or better the behavior of the construction workers. Based on partial hypothesis test analysis from this research, it can be proven that the variable of OSH management system gives an influence on construction workers' behavior. This can be viewed clearly from the t-count value which is 2.355. If compared to the t-table value of 1.69236, then the t-count obtained is much larger than the value of t-table. So, Ho is rejected. It can be concluded that OSH management system variable significantly influences construction workers' behavior. It can also be seen from the significance value smaller than 0.05 that is 0.025 <0.05, so that the assurance that OSH management system variable partially gives influence on construction workers' behavior.

The third variable is a personal protective equipment. Based on the result of research, it marks that there is an influence between personal protective equipment on the behavior of construction workers. The output of the *IBM SPSS Statistics 20 program* reveals that if the null hypothesis is rejected, this means that the higher the personal protective equipment variable will be the higher or better the behavior of the construction workers. Based on partial hypothesis test analysis from this present research, it can be proven that the variable of personal protective equipment has an effect on construction workers' behavior. This can be proven from the t-count value which is 2.363. If compared to the t-table value of 1.69236, then the t-count obtained is much larger than the value of t-table. So Ho rejected. Thus it can be concluded that the variable of personal protective equipment (PPE) significantly influences construction workers' behavior. It can also be seen from the significance value smaller than 0.05 that is 0,024 <0,05, so it is proven that the variable of personal protective equipment partially gives influence on construction workers' behavior.

The fourth variable is facilities and infrastructure. Based on the results of research, it demonstrates that there is an influence between facilities and infrastructure on the behavior of construction workers. The output of the *IBM SPSS Statistics 20 program* emerges that if the null hypothesis is rejected, this means that the higher the facilities and infrastructures the higher or better the behavior of the construction workers. Based on partial hypothesis test analysis from this research, can be known that the variable of facilities and infrastructure gives an effect on construction workers' behavior. This can be proven as well from the t-count value which is 3.366. If compared to the t-table value of 1.69236, then the t-count obtained is much larger than the value of t-table. So, Ho is rejected. Thus, it can be concluded that the variable of facilities and infrastructure gives significant effect on construction workers' behavior. It can also be seen from the significance value smaller than 0.05 is 0.002 <0.05, so it proves that the variable of facilities and infrastructure partially influences construction workers' behavior.

The fifth variable is the risk of OSH. Based on the research result, it is known that there is an influence of OSH risk on the behavior of construction workers. The output of the *IBM SPSS Statistics 20 program* shows if the null hypothesis is rejected, this means that the higher the OSH risk variable, the higher or better the behavior of the construction workers. Based on analysis of partial hypothesis test of this research, it can be proven that OSH risk variable affect construction workers' behavior. It can be taken as evidence from the t-count value which is 2.722. If compared to the t-table value of 1.69236, then the t-count obtained is much larger than the value of t-table. Thus, Ho rejected. Hence, it can be concluded that OSH risk variable significantly affects construction workers' behavior. It can also be seen from the significance value smaller than 0.05 0.010 <0.05, so that OSH risk variable partially affects construction workers' behavior.

CONCLUSION

From the results of this research, it can be concluded that the results of factor analysis show that there are factors that affect the knowledge and behavior of construction workers. The most influential factor is the action on the violation of Personal Protective Equipment (PPE). This is seen from the presentation table of factors where the factor of action on the violation of PPE percentage is greater than other factors. The five independent variables consisting of OSH identification and initiation, OSH management system, personal protective equipment, facilities and infrastructure, and OSH risk have simultaneous influences on the behavior of construction workers, as evidenced by the larger F count of F table (358.202 > 4.14) and significance value in table F which is value 0.00 <0.05. Therefore, Ho is rejected. Thus, it can be concluded that the five independent variables simultaneously affect the behavior of the construction workers. Each variable contained in five independent variables has a partial influence on the behavior of construction workers. It is proven from the t-count value of each variable which is greater than t table. In addition, the significance value of each independent variable is also worth <0.05. So, Ho is rejected. Hence, it can be concluded that each independent variable partially affects the behavior of construction workers.

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