IDENTIFICATION OF OCCUPATIONAL HEALTH AND SAFETY RISKS IN PILING WORK CASE STUDY OF UJUNG MENTENG FLATS PROJECT

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Abstract

Construction of flats jl. BKT Inspection of Ujung Menteng Urban Village, Cakung Subdistrict, East Jakarta to accommodate housing needs for Low-Income Communities in DKI Jakarta. The purpose of this research was to determine the Occupational Health and Safety risk factors which are significant and influential at the time of the construction work. Using quantitative research methods by distributing questionnaires to 30 respondents using 4 phase of data collection and data analysis using the Risk Analysis method, Classical Assumption Test, Regression Analysis using SPSS (Statistical Package for Social Science) software version 22. The results of this research are that there are variables the most influential on the emergence of Occupational Health and Safety Risk in the piling work is at X8, X11, X14 with a coefficient of determination (R Square) of 84% in multiple linear regression analysis using the stepwise method. And there are 9 dominant/high risks which are the causes of the emergence of Occupational Health and Safety Risk in the piling work including X6, X9, X11, X12, X13, X15, X16, X17, X18 besides that there are 2 dominant/most significant factors, namely the factor of Welding Pile Joint and pile breaking/cutting piles.

Keywords

Regression Analysis, Risk Analysis, Piling Work.

1. Introduction

According to estimates by the ILO (International Labor Organization) in Leyn (2018) every year around the world 2 million people die because of problems due to work. Of these, 354,000 people had accidents. In addition, every year there are 270 million workers who experience accidents due to work. According Hutasoit (2016) construction work is a high-risk job and is in the main ranking for the occurrence of work accidents. Construction work can cause undesirable things to occur among others those related to work safety aspects. Based on these things, what can be done is to identify what are the risks and dangers of work accidents that can occur in that location. This research focuses on the Occupational Health and Safety Risk Identification research in piling work because after observing the piling work there are several risks that often occur, one of which is workers who are injured due to being hit by work tools or materials at the time of breaking into piles. The method in this study used the SPSS (Statistical Package for Social Science) software version 22, to determine the influential Occupational Health and Safety risk and significant Occupational Health and Safety factors in the implementation of the piling work.

2. Literature Review

According to the definition of OHSAS (Occupational Health and Safety Assessment Series) in Wibowo (2019) Occupational Health and Safety are all conditions and factors which can have an impact on the safety and health of workers and other people (contractors, suppliers, visitors and guests) in

the workplace.
According to Nishaant et al. (2019), the risks to Occupational Health and Safety are:
1. incorrect Security awareness
2. Accidental risk
3. Occupational risk
4. Improper safety procedures
5. Lack of Training & Skills in Handling Machines
Risk identification is the process of identifying individual project risks well according to the source of the overall project risk, and documents its characteristics (PMBOK, 2017).
According to Kristiana et al. (2017) used two important criteria for measuring risk, namely:
1. Opportunity is the possibility of an unwanted event.
2. Impact is the level of influence on other activities, if an unwanted event occurs.
Opportunity and impact are used to find a risk index and produce a risk rating such as Low, Medium, or High which is described in Figure 2, while the scale of opportunity and impact is described in Figure 1 as follows:

N0	Level	Scale Opportunity	Description	Level	Scale Impact	Description
1	Very Rarely	1	Rarely, only under certain conditions	Insignificant	1	No Influential
2	Rarely	2	Sometimes it happens under cartain conditions	Minor	2	Less influential
3	Possible	3	Occurs under cartain conditions	Moderate	3	Sufficient Influential
4	Likely	4	Often occurs under certain conditions	Major	4	Influential
5	Very Likely	5	Always happen to each condition	Extreme	5	Very Influential

Figure 1. Scale of Opportunity and Scale of Impact

Opportunity Happening of Risk	Impact Risk				
	1	2	3	4	5
1	5	10	15	20	25
2	4	8	12	16	20
3	3	6	9	12	15
4	2	4	5	8	10
5	1	2	3	4	6

Risk Value:

<5	*Low*
>5≤12	*Medium*
>12	*High*

Figure 2. Risk Matrix
There are several factors and variables found in the piling work, namely as following:
1. Setting the placement of piles.
The initial process of setting the pile placement begins by running the HSPD to a predetermined point, after the HSPD is at the predetermined

coordinate point, check the HSPD is flat with the help of the "nivo tool" in the operator's room assisted by a waterpass device placed in a long position - boat. Then the piles are lifted and put into the clamping-box. After the piles are clamped, the piles are pressed with a hydraulic machine controlled by the operator. In the research factors above, it was found that the worker variable was hit by a pile when he was lifted as (x1) (Indrayani, 2017), the worker's feet fell into the excavation as (x2) (Yuliani, 2017), landslide of the pile excavation as (x3) (Yuliani, 2017).

2. Welding of pile joints.

Joint welding is carried out to connect piles that require a depth that cannot be reached using a single pile. Because the production of piles is limited by the long capacity of the pile hauling vehicles. In the research factors above, the variable exposed to sparks is obtained as (x4) (Moniaga et al., 2019), Workers scratched by metal joints as (x5) (Indrayani, 2017), Workers exposed to steam or welding smoke as (x6) (Yuliani, 2017), Impaired vision as (x7) (Moniaga et al., 2019), Explosive gas as (x8) (Hutasoit, 2016), Exposed to electric shock as (x9) (Moniaga et al., 2019), Electric fires as (x10) (Moniaga et al., 2019).

3. Breaking the stake.

This cutting pile occurs when the depth of the pile, the hardness of the soil and the compressive strength stated on the manometer in the operator's station has been reached but the piles are still above the ground, then the remaining piles must be cut to facilitate the tool. cutting/mortising of concrete is done manually with a concrete chisel, iron hammer, and electric welding to cut the strand installed in the pile. In the research factors above, it is found that the worker variable is injured by work tools (short crowbars) (x11) (Indrayani, 2017), respiratory disorders as (x12), (Fuad et al., 2018), Workers falling objects from above as (x13) (Randy, 2016), exposed to material as (x14) (Hutasoit, 2016), worker injury from tripping on the stake as (x15) (Fuad et al., 2018).

4. Heavy equipment

subject to heavy equipment maneuvers as (x16) (Hutasoit, 2016), HSPD legs collapsed over as (x17) (Randy, 2016), Wire Rope/cable sling breaks as (x18) (Randy, 2016).

3. Research Methodology

In this research, the data sources needed were primary data and secondary data. The survey technique in this research was to distribute questionnaires to 30 respondents. This questionnaire consists of 18 questions with the number of answers according to their stance. The questionnaire is a research on an interval measurement scale, as described in Figure 1.

3.1 Primary Data

According to Wibowo (2019) primary sources are data sources that directly provide data to data collectors. This primary source is in the form of notes on the results of direct interviews with the parties involved in the implementation.

1. In determining Respondents, the following considerations are needed:

1. Minimum education level is S1.
2. Experienced in construction at least 1 - 5 years.

2. In determining the Expert, the following considerations are needed:

1. Minimum education level is S1.
2. Experienced in construction at least 10 years.
3. Have a Certificate of Expertise Occupational Health and Safety Intermediate or Young.

3.2 Secondary Data

According to Alam (2020) Secondary data sources are data sources that do not provide information directly to data collectors. Secondary data sources can be obtained from further processing of primary data, previous research or documents related to the determination.

3.3 Determination of the number of samples

To determine the sampling (if the population is known) is used by using the Slovin formula with the following equation:

$n = N / (1 + N \times e^2)$

$n = 42 / (1 + 42 \times 0{,}1^2) = 29{,}57$ □ sample 30

Meaning:

n : Number of samples

N : Number of population

e^2 : Precision specified or error tolerance (5%, 10%, 15%)

3.4 Data Processing Techniques

In data processing, researchers used descriptive statistical data analysis techniques. This technique is used by researchers because the data collection by distributing questionnaires and processing them.

3.4.1. Validity Test

Validity Test using the SPSS (Statistical Package for Social Science) software is defined as a test to determine the accuracy and accuracy of a measuring instrument in performing its measuring function (Milen, 2016). Can be declared valid if r count > r table.

3.4.2. Reliability Test

Reliability Test using SPSS (Statistical Package for Social Science) software was used to determine the consistency and stability of the questionnaire (Milen, 2016). In testing this questionnaire because there are more than two answers, so that the reliability test using the Cronbach's Alpha test, can be declared reliable if the Cronbach's Alpha value is > 0.60.

3.4.3. Normality Test

Normality Test using SPSS (Statistical Package for Social Science) software is used to test whether the regression model meets the normality assumption. In this research using the Shapiro Wilk normality test because it has a small number of respondents, namely 30 respondents. In the Shapiro Wilk normality test it can be said to be normal if the significant value is > 0.050.

3.4.4. Correlation Test

3

Correlation Test using SPSS (Statistical Package for Social Science) software is used to test whether the regression model is multicollinearity (there is no relationship between the independent variables). A VIF (Variance Inflation Factor) value greater than 10 identifies a serious multicollinearity problem (Ryan, 1997).

3.4.5. Multiple Linear Regression Analysis

Multiple Linear Regression Analysis with stepwise method using SPSS (Statistical Package for Social Science) software is used to find the influential of two or more independent variables (X) on the dependent variable (Y). It can be said to be influential if the significant value < 0.050.

3.4.6. Risk Analysis

To analyze risk, it is necessary to determine the risk index which is carried out by calculating the average value of each risk on the likelihood (opportunity) and impact.

4. Results and Analysis

In Chapter 4 this will explain about the data collection, data analysis and results phase I (early stage expert), phase II (potential respondent), phase III (respondent) risk analysis, classical assumption test, stepwise multiple linear regression analysis, phase IV (final stage expert).

4.1 Data Collection and Data Analysis Phase I (Expert Validation)

Phase I data collection aims to validate, add or remove variables found from literature studies. Experts are asked to fill out a questionnaire given by the researcher by providing a checklist in the available column with Yes / No answers, besides that the expert can also provide comments and add variables. Experts provide feedback, improvements and input on the 18 variables proposed by the author. There are experts who give similar responses in filling out the questionnaire so that the authors summarize it into 1 common point. It can be concluded that the experts agree with the 18 variables proposed by the author so that there is no need for variable reduction.

4.2 Data Collection and Analysis Phase II (Pilot Survey)

Phase II data collection (pilot survey) is carried out after obtaining validated variables and obtaining expert approval. These variables are given to several selected prospective respondents to provide input on whether these variables can be understood or there is still required for simplification. This aims to obtain improvements before the questionnaire is submitted to respondents. Based on the results of phase II data analysis (pilot survey), it can be concluded that the description of each variable item that must be filled in by the respondent and how to fill it in, basically can be clearly understood by the prospective respondent. So there’s no need for changes or improvements to the variables in the questionnaire.

4.3 Phase III Data Collection (Respondents)

At this Phase, data collection was carried out by distributing questionnaires to employees of Brantas Abipraya and Ciriajasa CM - as Contractors and Planning Consultants as respondents. The questionnaire used is in the form of a closed questionnaire with a total of 30 respondents. Respondents were asked to assess the level of occurrence of OHS risk and the influence of the occurrence of OHS risk on the erection of existing variables. The profile data of the respondents in the Phase III questionnaire in this research were then distributed based on the level of education, work experience, and age of the respondents. The following is the distribution of the respondent profiles for Phase III data collection as follows:

4.3.1. Profile of Respondents Based on Education Level

Questionnaire in this research was distributed to 30 respondents. To find out the distribution of respondents based on education level, the explanation can be seen in Table 1 and Figure 3 as follows:

Table 1. Distribution of Respondents Education Level

No	Education Level	Total	Percentage
1	S2	2	7%
2	S1	26	86%
3	D3	2	7%
Total		30	100%

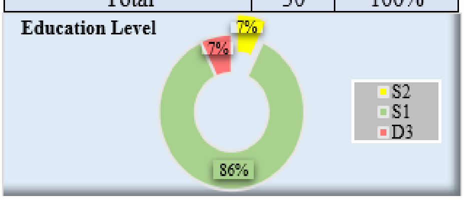

Figure 3. Pie Chart of Respondents Education Level

4.3.2. Profile of Respondents Based on Work Experience

Questionnaire in this research was distributed to 30 respondents. To find out the distribution of respondents based on work experience, the explanation can be seen in Table 2 and Figure 4 as follows:

Table 2. Distribution of Respondents Work Experience

No	Work Experience	Total	Percentage
1	1 – 5 Years	15	50%
2	5 – 10 Years	8	27%
3	> 10 Years	7	23%
Total		30	100%

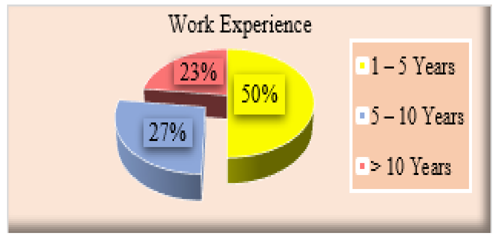

Figure 4. Respondents Work Experience Pie Chart

4.3.3. Profile of Respondents Based on Position

Questionnaire in this research was distributed to 30 respondents. To find out the distribution of respondents by position, the explanation can be seen in Table 3 and Figure 5 as follows:

Table 3. Distribution Of Respondents Position

No	Position	Total	Percentage
1	Team Leader Planning Consultant	1	3%
2	Project Manager Contractor	1	3%
3	Inspector Structure Planning Consultant	1	3%
4	Site Engineering Manager	1	3%
5	Supervision	3	10%
6	HSE Coordinator	2	7%
7	Sub Equipment Coordinator (Hspd)	1	3%
8	Main Implementer	1	3%
9	Implementer	6	20%
10	Quality Control	2	7%
11	Technical Staff	4	14%
12	Operational Staff	4	14%
13	Drafter	3	10%
Total		30	100%

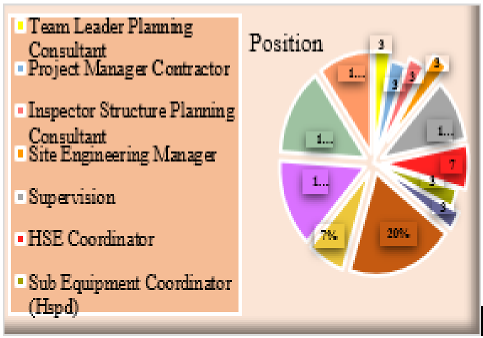

Figure 5. Pie Chart of Respondent Position

4.4 Data Analysis Stage III

To analyze the results of data collection stage III using risk analysis, test classical assumption, stepwise multiple linear regression analysis.

4.4.1. Risk Analysis

To analyze risk, it is necessary to determine the risk index which is carried out by calculating the average value of each risk on the likelihood (opportunity) and impact so that the risk rating results are obtained as described in Table 4 and the risk level as described in Table 5:

Table 4. Risk Level

No	Code	Variable	Risk Index
1	X17	HSPD legs collapsed over	15,7
2	X16	Exposed to heavy equipment maneuvers	15,0
3	X18	The sling rope is broken	14,8
4	X13	Workers falling objects from above	14,6
5	X15	Workers tripped over piles	13,7
6	X6	Workers are exposed to steam or welding smoke	13,4
7	X12	Respiratory disorders	12,6
8	X9	Exposed to electric shocks	12,4
9	X11	Workers are injured by work tools (crowbars)	12,4
10	X14	Exposed to material	12,0
11	X5	Workers scratched by metal joints	11,4
12	X3	Landslide of the pile excavation	11,4
13	X2	Worker's feet fell into the excavation	11,2
14	X4	Exposed to sparks	10,6
15	X7	Impaired Vision	10,6
16	X8	Exploding Gas	10,5
17	X1	Workers hit by piles when lifted	8,7
18	X10	Fire	8,0

Table 5. Rank Matrix Risk

No	Variabel	Average of Opportunity	Average of Impact	Risk Index	Level Risk
1	X1	2,87	3,03	8,7	Medium
2	X2	3,27	3,43	11,2	Medium
3	X3	3,4	3,4	11,4	Medium
4	X4	3,23	3,3	10,6	Medium
5	X5	3,43	3,3	11,4	Medium
6	X6	3,67	3,7	13,4	High
7	X7	3,23	3,3	10,6	Medium
8	X8	3,2	3,3	10,5	Medium
9	X9	3,4	3,6	12,4	High
10	X10	2,77	2,9	8,0	Medium
11	X11	3,47	3,57	12,4	High
12	X12	3,63	3,47	12,6	High
13	X13	3,73	3,9	14,6	High
14	X14	3,47	3,47	12,0	Medium
15	X15	3,67	3,73	13,7	High
16	X16	3,83	3,9	15,0	High
17	X17	3,93	4	15,7	High
18	X18	3,83	3,9	14,8	High

4.4.2. Classical Assumption Test (Validity Test)

Pearson's r value (r count) described in Table 6 is compared with Table r value. r table searching at 5% significance with a two-tailed test and N = 30, degree of freedom (df) = N - 2 = 30 - 2 = 28, then the r Table is 0.374 as can be seen in Figure 6.

n	Taraf Signifikan		n	Taraf Signifikan	
	5%	1%		5%	1%
3	0,997	0,999	27	0,381	0,487
4	0,950	0,990	28	0,374	0,478
5	0,878	0,959	29	0,367	0,470
6	0,811	0,917	30	0,361	0,463
7	0,754	0,874	31	0,355	0,456
8	0,707	0,834	32	0,349	0,449
9	0,666	0,798	33	0,344	0,442
10	0,632	0,765	34	0,339	0,436

Figure 6. Distribution r Table

Table 6. Validity Of Test Results

formula	Variable	Pearson r	r Table	Description
If the count r > r Table = valid If r count < r Table = invalid	X1	0.594**	0.374	valid
	X2	0.301		Invalid
	X3	0.456*		valid
	X4	0.430*		valid
	X5	0.593**		valid
	X6	0.412*		valid
	X7	0.589**		valid
	X8	0.751**		valid
	X9	0.806**		valid
	X10	0.735**		valid
	X11	0.612**		valid
	X12	0.724**		valid
	X13	0.695**		valid

From Table 6 above it can be concluded that 17 variables are declared valid and can be used for further research while 1 variable declared invalid, namely at X2 (Worker's feet fell into the excavation).

4.4.3. Classical Assumption Test (Reliability Test)

Used the reliability test using the Cronbach's alpha method as follows:

- Cronbach Alpha value ≥ 0,6 indicates that the research questionnaire is reliable.
- Cronbach Alpha value ≤ 0,6 indicates that the research questionnaire is not reliable.

The results of the reliability test data output with the SPSS version 22 statistical program can be seen in Table 7 as follows:

Table 7. Reliability Cronbach's Alpha

Cronbach's Alpha	N of Items
.903	17

From Table 7 above it can be concluded that in Variable X (OHS Risk to Piling Work) there are 17 items (N) with a Cronbach's Alpha value of 0.903 ≥ 0.6, indicating that the research questionnaire is reliable.

4.4.4. Classical Assumption Test (Normality Test)

The normality test of Shapiro Wilk can be said to be normal if significant > 0.050. The results of the normality test data output with the SPSS version 22 statistical program can be seen in Table 8 and Figure 7 as follows:

Table 8. Tests of Normality Shapiro Wilk

Variable	Shapiro-Wilk		
	Statistic	df	Sig.
OHS Risk on Piling Work (X)	.937	30	.074
Effect of OHS Risk on Piling Work (Y)	.939	30	.088

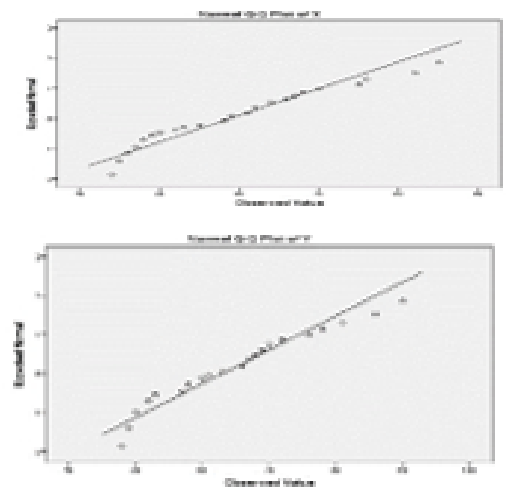

Figure 7. Normal Probability Plot

From Table 8 above, the results of the Shapiro Wilk normality test data output, on Variable X The significant value is 0.074 > 0.050 and the variable Y has a significant value of 0.088 > 0.050, it can be concluded that the research data is normally distributed. And from Figure 7 it can be seen that the graph shows the distribution of data around the diagonal line and follows the direction of the diagonal line, so the regression meets the assumption of normality.

4.4.5. Classical Assumption Test (Correlation Test)

If the VIF value exceeds 10 then it shows that there is multicollinearity and there are problems that occur between the independent variables. And if the tolerance value is < 0.10, it means that multicollinearity occurs. The results of the correlation test data output with the SPSS version 22 statistical program can be seen in Table 9 as follows:

Table 9. Coefficients Correlation Test

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	X01	.238	4.200
	X03	.310	3.221
	X04	.494	2.023
	X05	.287	3.484
	X06	.298	3.350
	X07	.250	3.995
	X08	.275	3.633
	X09	.128	7.807
	X10	.099	10.099
	X11	.311	3.217
	X12	.288	3.475
	X13	.255	3.927
	X14	.258	3.878
	X15	.189	5.297
	X16	.083	12.035
	X17	.278	3.603
	X18	.261	3.834

From Table 9 above it can be concluded that at X10 there is a tolerance value of 0.099 < 0.10 while the VIF value is 10.099 > 10 and in X16 there is a tolerance value of 0.083 < 0.10 while the VIF value is 12.035 > 10, then of the 2 variables There are symptoms of multicollinearity or it can be said that there is no relationship so that it cannot be included at a later phase in this research.

4.4.6. Multiple Linear Regression Analysis (Stepwise Method)

Used to find the influential of two or more independent variables (X) on the dependent variable (Y). The results of the data output of stepwise linear regression analysis with the SPSS version 22 statistical program can be seen in Table 10 as follows:

Table 10. Multiple Linear Regression (Model Summary)

Model	R	R Square
1	.917	.841

From Table 10 above it is known there are four of the most influential variables based on the method of stepwise variable X8 (Gas Explode), X11 (Worker injured by a working tool or a short crowbar bodem), X12 (Respiratory Disorders) , X14 (exposed to material) with a correlation value/relationship (R) of 0.917, besides that, the coefficient of determination (R Square) is 0.841 (84%). In addition, to be more convincing about the OHS risk on the piling work (X) the effect of occupational health and safety risk on piling work (Y) a simultaneous hypothesis test (test f) is carried out which is described in Table 11 and the partial hypothesis test (t test) which is described in Table 12 as follows:

1. Simultaneous Hypothesis Test (f Test) with the following conditions:
   1. If significance < 0,050, it has an influential.
   2. If significance > 0,050, then it has no influential.
   3. If f count > f Table, it has an influential.

4. If f count < f Table, then it has no influential.

Table 11. Multiple Linear Regression f test (ANOVA)

Model		Df	F	Sig.
1	Regression	4	33.009	.000
	Residual	25		
	Total	29		

From Table 11 above, it can be seen that the significance value is 0,000 < 0.050 so it can be said to be influential and get f count = (R^2 × (n – m – 1)) / (m(1 – R^2)) = (0,841 × (30 – 4 – 1)) / (4(1 – 0,841)) = 33,009 > f Table 2,42 can be said to be influential. f Tables are sought at significance of 5% or 0.05. the value of k – 1 = 15 – 1 = 14 with n = 30, degree of freedom (df) = 15. F Table = (k – 1; n – k) = (15 – 1 = 14; 30 – 15 = 15)) then the obtained f Table is 2,42.

2. Partial Hypothesis Test (t test) with the following conditions:

1. If significance < 0,050, it has an influential.
2. If significance > 0,050, then it has no influential.
3. If t count > t Table, it has an influential.
4. If t count < t Table, then it has no influential.

Table 12. Multiple Linear Regression t test (Coefficientsa)

Model		Unstandardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	14.713	5.139	2.863	.008
	X08	3.868	.975	3.966	.001
	X12	2.854	1.219	2.342	.027
	X14	3.982	1.426	2.792	.010
	X11	3.519	1.453	2.421	.023

From Table 12 above it can be seen that the biggest influential is the t variable in X8 is 3,966 > t Table 2,048 with a significance of 0.001 < 0.050, then it has an influential, on the X11 variable t is 2.421 > t Table 2.048 with a significance of 0.023 < 0.050, it has an influential, on the t variable on X12 is 2.342 > t Table 2.048 then with a significance of 0.027 < 0.050, it has an influential, on the t variable at X14 of 2.792 > t Table 2.048 with a significance of 0.010 < 0.050, it has an influential, from the results of multiple linear regression analysis, the regression equation Y = a + b1X8 + b2X12 + b3X14 + b4X11 = 14.713 + 3,868 X8 + 2.854X12 + 3.982X14 + 3.519X11 = 28.936X, which means that these 4 variables have a strong and positive influential on variable Y (the influential of occupational health and safety risk on piling work). The t value of the table searching at 5% significance. the value of a/2 = 0.05/2 = 0.025 with a two-tailed test and N = 30, degree of freedom (df) = N - 2 = 30 - 2 = 28, then the t table is obtained 2,048.

4.5 Data Collection and Analysis Phase IV (Final Stage Expert Validation)

In this phase IV data collection and analysis the researcher redistributes data from the results of phase III data analysis intended for the same experts at stage I data collection. It is concluded that there are several experts who give similar responses in answering the questionnaire so that the researcher summarize it into 1 common point out of 4 variables, there are 3 variables that have the highest influential of occupational health and safety risk on piling work, namely variables X8, X14, X11 while X12 is not the highest influential of occupational health and safety risk on piling work.

5. Conclusion

Based on the results of the analysis of the discussion of this research, a conclusion can be drawn about the factors that are significant to the OHS Risk on the piling work and the influential of occupational health and safety risk on piling work on the implementation of the construction work of the Flats Jl. Inspection of BKT in Ujung Menteng Village, Cakung District, East Jakarta are as follows:

1. There are 9 dominant/risks high that cause the OHS Risk in Piling Work, including the following:

a. At X6 (Workers are exposed to steam or welding smoke during Welding Pile Joints) with a risk index value of 13,4
b. At X9 (Exposed to electric shocks during Welding Pile Joints) with a risk index value of 12
c. At X11 (Workers are injured by work tool (crowbars) during Welding Pile Joints) with a value risk index 12,4
d. At X12 (Respiratory disorders during cutting piles) with a risk index value of 12,6
e. At X13 (Workers falling objects from above during cutting piles) with a risk index value of 14,6
f. At X15 (Workers tripped over during piles cutting piles) with a risk index value of 13,7
g. At X16 (exposed to heavy equipment maneuvers) with a risk index value of 15,0
h. At X17 (HSPD legs is collapsed over) with a risk index value of 15,7
i. At X18 (The sling rope is broken) with a risk index value of 14,8 and there is a strong and positive influential with multiple linear 10
regression analysis (stepwise method) on the Occurrence of OHS Risk in a validated piling work by the final stage expert on 3 of the remaining 15 variables, namely Exploding Gas (X8), Workers injured by work tools (crowbars) (X11), exposed to material (X14), with the obtained coefficient of determination (R Square) of 0.841 or 84% with a significance of 0.000.

2. There are significant factors in the OHS Risk to the piling work which is obtained from the results of the stepwise method of multiple linear regression analysis, namely the factor of Welding Pile Joint and pile breaking/cutting piles.

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