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Identification And Risk Assessment Health, Safety, And Environment On Apartement Project

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***Abstract*— Occupational safety and health issues in Indonesia are still often overlooked. Data shows in Central Bureau of Statistics (BPS) that the number of workers in construction is considerably increased, from 4.844.689 people in 2010 to nearly double by 2015, that 8.208.086 people or about 7% of the 114 million workers (BPS, 2016). The construction sector is also considered to be one of the sectors that are at high risk for workplace accidents. The data previously presented work accidents are not specifically contain information on construction work accident, but some sources (BpjsKetenagakerjaan, 2016) (Pritanti, Purwoto, & Solechan, 2012) recorded at least 30% of cases of occupational accidents occurred in the construction sector. In this study will be examined on the identification and assessment risks of health, safety and environment in the construction of apartments. Methods of assessment using a risk assessment matrix derived from the AS / NZS 4360: 2004 Risk Management Standard. From this study obtained the highest risk that is at variable workers fall from high places at activity Dismantle pairs of scaffolding with risk index 12,6. The lowest risk index that is variable workers exposed to dust at activity Lifting material with tower crane with risk index 5.94.**

***Index Terms*— Risks, Health, Safety and Environment, Apartment.**

I. INTRODUCTION

Occupational Safety and Health problems in Indonesia are still often neglected. The Central Bureau of Statistics (BPS) data shows that the number of workers in construction is considerably increased, from 4.844.689 people in 2010 to nearly double by 2015, that 8.208.086 people or about 7% of the 114 million workers (BPS, 2016). The construction sector is also considered to be one of the sectors that are at high risk for workplace accidents. The work accident data described previously does not specifically contain workplace accident information in construction, but some sources (BpjsKetenagakerjaan, 2016) (Pritanti, Purwoto, & Solechan, 2012) recorded at least 30% of occupational accidents occurring in the construction sector. With a large portion of the workforce and also a great risk of making work accidents in the construction sector is an aspect to note. Safety, health and environmental management systems are expected to be applied to the implementation of construction work, thus reducing the occurrence of work accidents occurring during construction work and identifying risks from the highest to the lowest.

In implementing HSE risk management there are several steps that need to be done. It aims to make HSE risk management process work properly and accordingly.

Risk management process chart according to AS / NZS 4360: 2004 as in Figure 1 below:

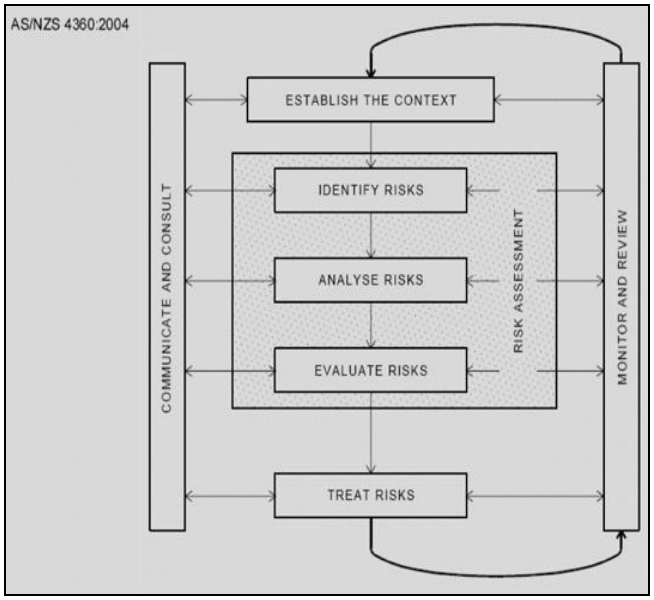

Figure 1. Risk Management Process AS/NZS 4360:2004

Context determination will establish the risk criteria to be obtained. Risk criteria are derived from a combination of criteria of probability and severity. In determining the likelihood level based on AS / NZS 4360: 2004 as in Table 1 below:

Table 1. Rating of Probability

Likelihood/ Probability	Rating
Almost Certain	5
Likely	4
Possible	3
Unlikely	2
Rare	1

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To determine the value of the severity so that each activity can be assessed its possible level of guidance AS / NZS 4360: 2004 can be used Table 2 below:

Table 2. Rating of Severity

Severity	Rating
Catastrophic	5
Major	4
Moderate/ Serious	3
Minor	2
Insignificant	1

To determine the scale of risk based on AS / NZS 4360: 2004 in Table 3 below:

Table 3. Scale of Risk Level

Risk Rank	Descriptions
17 – 25	Extreme High Risk
10 – 16	High Risk
5 – 9	Medium Risk
1 – 4	Low Risk

Furthermore, the assessment and risk analysis to determine the extent of the existing risk levels. Risk is formulated as a function of likelihood and impact. Or index risk = probability (likelihood) × impact (impact). Risk analysis is performed to determine the magnitude of a risk by considering the severity and probability that may occur by creating a risk matrix. Figure Risk Matrix guided by AS / NZS 4360: 2004 in Figure 2 below:

Likelihood / Severity	Negligible (1)	Minor (2)	Moderate (3)	Major (4)	Extreme (5)
Rare (1)	Low (1x1)	Low (1x2)	Low (1x3)	Low (1x4)	Medium (1x5)
Unlikely (2)	Low (2x1)	Low (2x2)	Medium (2x3)	Medium (2x4)	High (2x5)
Possible (3)	Low (3x1)	Medium (3x2)	Medium (3x3)	High (3x4)	High (3x5)
Likely (4)	Low (4x1)	Medium (4x2)	High (4x3)	High (4x4)	Very High (4x5)
Almost Certain (5)	Medium (5x1)	High (5x2)	High (5x3)	Very High (5x4)	Very High (5x5)

Adapted from the AS/NZ 4360 Standard Risk Matrix and NHS QIS Risk Matrix

Figure 2. Risk Matriks AS/NZS 4360:2004

II. Methodology

A. Research Methods

Methodology Methodology This study was conducted by explaining the variables and processing the data at the risk identification stage and risk analysis. The purpose of this study is to describe a number of variables related to the problems and units studied between the problems tested, and know the identification of risk and risk analysis. The place of research is Apartment development project located in Jakarta and Bekasi West Java. The study was conducted from August to October 2017.

B. Data Collection

References (Literature) in preparing this study derived from books and various research journals related to the topic, as well as general research journals, as well as references obtained from various internet websites that the material related topics relevant discussion. This data collection activity is an important step to be done so that this research can be implemented.

Data collection is divided into 2 types, namely primary data and secondary data (reference data). Primary data obtained from questionnaires and interviews to respondents about the assessment or perception of HSE risk management in Apartment development. Secondary data is obtained from the project management, in addition to also obtained from the literature such as internet pages, books, electronic media and sources that support in this study.

III. Data Analysis and Discussion

The initial process of identifying these risks is the first step to determine the risk variables to be studied and establish a framework for overall implementation, compiling and conducting into risk categories. This explains that risks are identified early, although they are small but need to be anticipated for risk management. The variables obtained from the literature and compiled and then carried out questionnaires to respondents who have experience working at least 5 years in Apartment development, so that later will be obtained risk ranking after the results of the questionnaire is analyzed.

The results obtained are Activity Types and variables that exist in these activities. In each of these jobs that are part of the risk event (Risk Event) which includes the work activities (segment) with the risk variables that may occur in the work has been done mapping.

Risk assessment is obtained by chance (probability) x impact (impact). Risks that need to be considered is the risk that has a very big probability for the occurrence of an accident. The results of risk index in Table 4 below:

Table 4. Risk Indeks

No	Activity	Variable	Average Probability	Average Severity	Risk = (Probabiliy x Severity)	Risk Level
1.	Land Excavator	Workers hit by excavators	2,8	4,5	12,6	High Risk
		Landslides / collapse of side walls	3,1	4,1	12,71	High Risk
		Workers / vehicles fell into the pit	2,6	3,4	8,84	Medium Risk
		Excavator crashing the facility around	2,6	3,5	9,1	High Risk
2.	Lifting Material with service crane	Service cranes crash into workers / facilities	2,6	4,4	11,44	High Risk
		workers / facilities stricken material	2,9	4,1	11,89	High Risk
3.	Drilling	Drilling tools hit the worker / facility	1,9	4,6	8,74	Medium Risk
		Workers fall into the excavation	2,8	4,2	11,76	High Risk
		Landslide excavation	3,1	3,6	11,16	High Risk
4.	Making Guide Wall (diaphragm wall)	clamshell tool crashing facility / worker	2,1	3,7	7,77	Medium Risk
		Workers fall into the excavation	2,7	4,2	11,34	High Risk
5.	Steel Fixing	hands of workers exposed to barbender	2,7	3,5	9,45	High Risk
		Worker hands are exposed to barbending	2,7	3,5	9,45	High Risk
6.	Hot Work (welding,cutting)	Workers are exposed to welding sparks	3,8	3,1	11,78	High Risk
		fire due to leaking tube	2,9	3,5	10,15	High Risk
		respiratory distress due to exposure to welding fumes	3,4	2,8	9,52	High Risk
7.	Installation of reinforcing steel frame	workers fall	3,1	4,4	13,64	High Risk
		steel frame fell and hit the worker / facility	2,8	3,9	10,92	High Risk
		workers were hit by moving parts of steel	2,6	3,6	9,36	High Risk

8.	Moulding	workers fall from high places	3,0	4,6	13,8	High Risk
		Workers fall off when setting up molds of concrete	3,0	4,3	12,9	High Risk
		concrete mold collapsed	3,1	4,3	13,33	High Risk
9.	Dismantle pairs of scaffolding	formwork collapse	2,9	3,7	10,73	High Risk
		workers fall from high places	3,1	4,6	14,26	High Risk
		formwork / scaffolding fell and befall workers / facilities	2,9	4,6	13,34	High Risk
		worker injured while working	3,5	3,2	11,2	High Risk
10.	Lifting material with tower crane	Material fell from the heights and hit the workers	3,3	4,3	14,19	High Risk
		workers exposed to dust and dirt	3,3	1,8	5,94	Medium Risk
11.	Cleaning of dust and dirt with a compressor on floor plate work	Skin dermatitis due to dust and smoke	3,0	2,4	7,2	Medium Risk
12.	Installation of walls and plastering	respiratory disturbance caused by sand dust / cement	3,4	2,2	7,48	Medium Risk
		respiratory distress due to dust on the wall	3,3	2,2	7,26	Medium Risk
13.	Plumbing Installation	workers fall from high places	2,7	4,5	12,15	High Risk
		Workers hit equipment	2,8	4,5	12,6	High Risk
		Workers are injured when working with pipes	3,3	2,2	7,26	Medium Risk
14.	Electrical installation	the emergence of sparks and a fire	2,8	4,3	12,04	High Risk
		Exposed to electric shock	3,2	4	12,8	High Risk

IV. Conclusion

Identification And Risk Assessment Health, safety, and environment in Apartment development is known index highest risk that is at variable workers fall from high places at activity Dismantle pairs of scaffolding with risk index 12,6. The lowest risk index that is variable workers exposed to dust at activity Lifting material with tower crane with risk index 5.94.

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