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Health and Safety Analysis of Light Rail Transit Projects in Palembang

Health and Safety Analysis of Light Rail Transit Projects in Palembang

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Abstract. Several sports in the XVIII Asian Games will be held in Palembang city in 2018. To support activities and facilities it is necessary to support such buildings as Light Rail Transit (LRT). The city government of Palembang targets LRT construction to operate in June 2018 with a total length of 23.4 km and a 12 meter LRT road width for two lines. PT. Waskita Karya (Persero) Tbk as the implementation of LRT project development. In an effort to prevent or reduce accidents on the required development an occupational safety and health program (K3). The purpose of this study is to calculate the frequency and impact of OHS risk on the Light Rail Transit (LRT) project in Palembang. This research uses field observation and interview method, and conducting assessment based on risk assessment matrix from AS / NZS 4360: 2004 risk management standard. Matrix risk assessment methods derived from Australian Standards / New Zaeland Standards (AS / NZS) 4360: 2004 and ISO 31000: 2009. From 60 variables that have been tested previously obtained 78 factors in group L (low), 18 factors in the group Medium (M) and as many as 4 factors in group H (high).

1. Introduction

In the year 2018 Asian Games XVIII will be held one of them in the city of Palembang. To support the implementation of the required supporting buildings such as Light Rail Transit (LRT). The city government of Palembang targets LRT construction to operate in June 2018 with a total length of 23.4 KM . PT. Waskita Karya (Persero) Tbk as the implementation of LRT project development. To support the development of the required safety and health programs (K3) in an effort to prevent or reduce the occurrence of work accidents.

Occupational accidents often occur due to the lack of fulfillment of requirements in the implementation of occupational safety and health. In this case the government as the organizer of the State has an obligation to provide protection to the workforce. This is realized by the government with the issuance of regulations such as: RI Law no. 1 of 1970 concerning work safety, Law no. 3 of 1992 on Social Security of Workers, and Regulation of the Minister of Manpower No.: Per.05 / Men / 1996 on OHS management system. But in reality, project implementers often ignore the requirements and regulations in OSH. This is due to lack of awareness of how much risk to be borne by the workforce and company.

Besides, the regulation on OSH is not balanced by strict legal action and severe sanction, so that many project implementers neglect the safety and health of their workforce. The possibility of accidents occurring in the construction project will be one of the causes of disruption or cessation of project work activities. Therefore, at the time of construction work is required to implement a work safety and health management (OSH) system at work sites where safety and health issues are also part of project planning and control.

2. Literature review

2.1. *A review of previous research*

Many studies have been done of natural d Occupational Health and Safety analysis of several previous studies. The research of Yuliani (2017) Air title risk management safety and health (K3) on infrastructure buildings [1]. The hypothesis proposed is problem accidents in Indonesia is still relatively high. Data on accidents in Indonesia are still limited.

Assessment method using risk assessment matrix sourced from AS / NZS 4360: 2004 Risk Management Standard and AS / NZS 1SO 31000: 2009. From this research obtained the highest risk in soil work is lifting material with service crane with variable that is worker and facility struck material with a risk index of 5.88, on the foundation work of the reinforced steel frame framework with the employee variable falling by 5.35, the upper structure work is the lifitng material with tower crane with the material variable falling from the height and the worker's fall 6.63, ceiling installation with worker risk fell from a height of 5.02, wall and ceramic work with an electric shock risk of 5.24, plumbing work ie plumbing installation with worker risk falling from a height of 5.27 [2-8].

2.2. *Definition of Light Rail Transit (LRT)*

Light rail or Light Rail Transit is a passenger rail system operating in urban areas whose construction is light and can be operated along with other vehicle traffic or in special tracks used for light rail. Light rail is widely used in various European countries and has experienced modernization, such as automation, so it can be operated without machinist, can operate on a special track, low floor usage (about 30 cm) called low floor LRT to facilitate up and down passenger. In general, the order in the main structure of the project Light Rail Transit (LRT) is a sub-structure work includes foundation work, job shop floor, pile cap work, work and work pier upper structure includes pier head work, and u-shape (girder work).

2.3. *Risk management*

According to the AS / NZS 4360 standard on risk management standards, the risk management process includes the risk management process, including risk management, risk management, and risk management the following steps and can be seen in Figure 1.

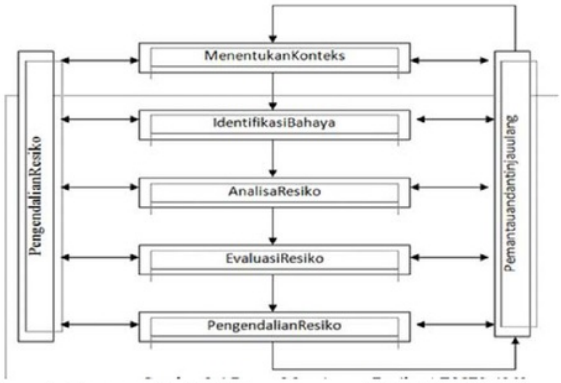

Figure 1. Processes in Risk Management AS / NZS 4360 [9]

2.4. *Identify Safety and health risk*

Identify Safety and health risk obtained based on the frequency and impact of each risk factor. According to [10] suggests an impact An approach used to measure the likelihood of occurrence of risk is frequency and impact.

$$\text{Average frequency} = \frac{\sum \text{frequency}}{\text{Number of respondents (n)}} \quad (1)$$

$$\text{Average impact} = \frac{\Sigma \text{frequency}}{\text{Number of respondents (n)}} \quad (2)$$

$$\text{Risk index} = \text{Frequency} \times \text{Impact} = \text{F x D} \quad (3)$$

The results of these answers are processed and produce data in the form of mean score or average frequency and impact. After the stage of risk identification is followed by the risk analysis stage to get the value of risk index. The magnitude of frequency and impact values will result in high risk index values.

2.5. *Safety and health risk analysis*

Risk identification yields the mean frequency score and impact. At this stage identified risk factors are analyzed to obtain risk index values. The risk index is derived from the multiplication of frequency mean score and impact.

3. Research Methodology

3.1. *Research Location*

Location of research is in development project of South Sumatra province. Especially on Zone 4 with 4 km long trace.

Figure 2. LRT Zone Employment Zone Map Location

3.2. *Research Variables*

Specifically, this research variable has been established based on previous research where the variable is the risk of accidents that occur in each type of work. This research method uses variables such as working electricity installation, equipment mobilization, concrete iron mobilization with crane lift and manual way, mounting ring on column, wire installation on ring and column, installation of reinforced steel frame, concrete work, unloading work, formwork, casting, girder erection, disassembly scaffolding, lifting materials with a crane car, cleaning dust and dirt with the compressor on the floor plate work, the use of equipment (stamper, vibrators, etc.), welding work, work on the river

From the description of these variables are used to analyze risk index and risk level in development of LRT zone 4 Palembang. Method used to obtain the risk index is a field survey by distributing questionnaires, and to analyze the level of risk that is matrix AS / NZS 4360: 2004.

4. ANALYSIS AN DISCUSSION

The results of the calculation of risk index and risk level for other risks can be seen in table 1 as follows.

Table 1. Results of Risk Index Calculation and Risk Level

Job Risk	Average frequency (P)	Average impact (C)	Risk Index (PxC)	Risk Level
1. Electrical Installation Work				
A. Stung Electric Current / Flow Leak	2	2	4	L
B. Stumble Cable While Working	2	2	5	L

C. Wires Damaged by Heavy Equipment / Vehicles	2	2	5	L
2. Mobilization of Equipment				
A. Accidents On Mobilization Heavy equipment	2	2	5	L
B. Heavy Vehicles Not Able to Walk	2	2	5	L
3. Mobilization of Concrete Iron With Crane Lift Tool And Manual Manual				
A. Overwritten Crossed Crane Seling	2	2	4	L
B. Stumped Iron Concrete	2	2	5	L
C. Crushed Iron Concrete	2	2	4	L
4. Installing Ring In Column				
A. The Hand of the Scrambled Iron Scrambler	2	2	4	L
B. Working Foot Squeezed Iron	3	2	6	L
C. Worker Terpleset	2	2	4	L
D. Workers Fall From Elevation	2	2	5	L

The data obtained and the results of field observations are further processed based on the meto de used. The risk k3 identification was performed on the basis of a questionnaire distributed to LRT development workers in Zone 4 based on 60 variables risk on the type of work performed.

Having obtained mean frequency score and impact then done calculation to get value of risk index. The risk index is obtained by multiplying the average frequency and impact of each factor. For the highest risk index value of 10.04 in welding work, consequently workers inhale welding smoke. The lowest index value of the risk of 3,66 on the work job electrical installation work consequently electric shock work . The risk index results are then grouped by AS / NZS 4360: 2004 matrix.

5. CONCLUSION

Based on the results of analysis and pe m discussion data obtained from interviews to respondents as described in chapter IV can be drawn conclusion as follows:

a. From result of research between mean of frequency and impact is got highest value of index of risk 10,04 that is at work of welding with occupancy factor inhale of welding smoke , whereas lowest index value of risk equal to 3,66 that is electrical work work job with job factor is electric shock .
b. From the risk grouping based on AS / NZS 4360: 2004 matrix obtained 78% factor in L (low) group, 18% factor in Medium group (M) and 4% factor in group H (high).

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