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RISK HANDLING OF IT MANDIRI BUILDING

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Abstract

Work accidents are a problem in Occupational Safety and Health activities in a job, especially construction. Accidents that occur can cause losses both in terms of workers and the company. For example, workers who are exposed to materials that can cause injury require hospitalization and disrupt work time. Things like this can cause losses in terms of time, costs, and work performance. In this research, Occupational Safety and Health (OHS)risk identification, (OHS)risk assessment, and (OHS)risk control will be examined in the Mandiri Slipi IT Project development activities. This analysis focuses on workers and identifies the factors that cause accidents that are often experienced by workers so that the factors that are most at risk of causing accidents when carrying out work activities can be identified. The research will be carried out through direct interviews and distributing questionnaires to workers at the Mandiri Slipi IT Project and the results will pay attention to the steel work on the activity of workers' hands being scratched by steelwork when installing steel rings and risk control by determining the person in charge and handling risks, including by conducting briefings before starting. work and wear personal protective equipment.

Keywords: *risk identification, risk assessment, work accident, risk handling*

1. PREFACE

Occupational accidents in the construction sector are often ignored and considered insignificant, especially in construction which has a higher risk than other jobs because construction is associated with height [1].

The biggest causal factor for work accidents is humans, divided by several characteristics of age, gender, level of education, work experience, psychological condition, as well as the interaction of workers with the work environment. The occurrence of an accident is an obligation that must be analyzed so that the incident does not recur and can avoid losses due to minor accidents or fatal accidents, these losses can cause damage, complaints, sadness, negligence, and disability, up to death. Therefore the role of safety and health in a project work is to provide guarantees and protection for worker safety, reduce the possibility of work-related accidents, and reduce the cost of bearing the accident [2].

PT IT Mandiri is a landmark of PT Bank Mandiri which is located in the Bumi Slipi service on Jalan S. Parman by implementing a design system that applies an asymmetrical building shape at the bottom with modern materials

Research objective: to determine Occupational Safety and Health risk control that occurs in the Mandiri Slipi IT project development.

2. LITERATURE REVIEW

2.1 Risk/Hazard Identification

Identification of potential hazards is a stage that can provide comprehensive and detailed information about the risks found by explaining the consequences from the mildest to the most severe [3].

According to [4] the purpose of carrying out activities to identify potential hazards is as follows.

1. Reducing the chance of an accident.
2. Provide an understanding for all parties regarding the potential dangers of the company's activities.
3. As a basis as well as input to determine an appropriate and effective prevention and security strategy.
4. Provide documented information regarding sources of danger within the company to all parties, especially stakeholders.

The identification process begins with determining the identification technique that will provide the required information. The following are identification techniques according to [5] that can be used include:

1. Work safety survey
2. Work safety patrols
3. Safety sampling
4. Work safety audit
5. Environmental inspection
6. Accident report
7. Reports of near misses
8. Suggestions and criticisms from employees

2.2 Risk Assessment

According to [4] risk assessment is obtained from the results of hazard identification which are then analyzed and assessed for the level of hazard impact so that the magnitude of the risk, the level of risk can be determined, and whether the risk is acceptable or not.

The definition of risk assessment is the ways that companies use to properly manage the risks faced by their workers and ensure that their health and safety are not exposed to risks while working [5].

With the discussion of risk assessment above, the following are steps that can be taken for risk assessment in the workplace according to the ILO Office in Jakarta [3].

1. Identify and look for potential hazards in the workplace.
2. Determine the consequences caused by the potential hazard and how it is likely to occur.
3. Evaluate risks and determine whether the existing prevention requirements are adequate or additional control requirements are still needed.
4. Record all findings.
5. Review the results of the assessment and make revisions if necessary.

After carrying out the steps to obtain a workplace risk assessment, the data resulting from the risk assessment activities should be analyzed. The following are various ways to analyze risk assessment according to ILO Office in Jakarta [3].

Table 1. Risk Matrix (Standard Operational Procedures for Hazard Identification, Risk Assessment, Determination of Risk Control and Opportunities [6].

	Keparahan				
Kekerapan	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Information:
1-4 : Low risk level
5-12: Moderate risk level
15-25 : High risk levelKeterangan:

Table 2. Determination of Frequency Levels [6]

Level of frequency	Description	Definition
5	Almost Definitely Happened	● There is a high probability of an accident occurring while doing work ● The possibility of an accident occurring more than 2 times in 1 year
4	Very possible	● The possibility of an accident occurring while performing work in almost any condition ● Kemungkinan terjadinya kecelakaan 1 kali dalam 1 tahun terakhir ● Probability of having an accident 1 time in the last 1 year
3	Might happen	● There is a possibility that an accident will occur while doing work under certain conditions ● Probability of having an accident 2 times in the last 3 years
2	Low Chance of Happening	• It is unlikely that an accident will occur when doing work under certain conditions • Probability of having an accident 1 time in the last 3 years
1	Almost Never Happens	• Accidents may occur while performing work under certain conditions • Probability of an accident occurring more than the last 3 years

Table 3. Determination of the Severity Level of the Human Aspect [6]

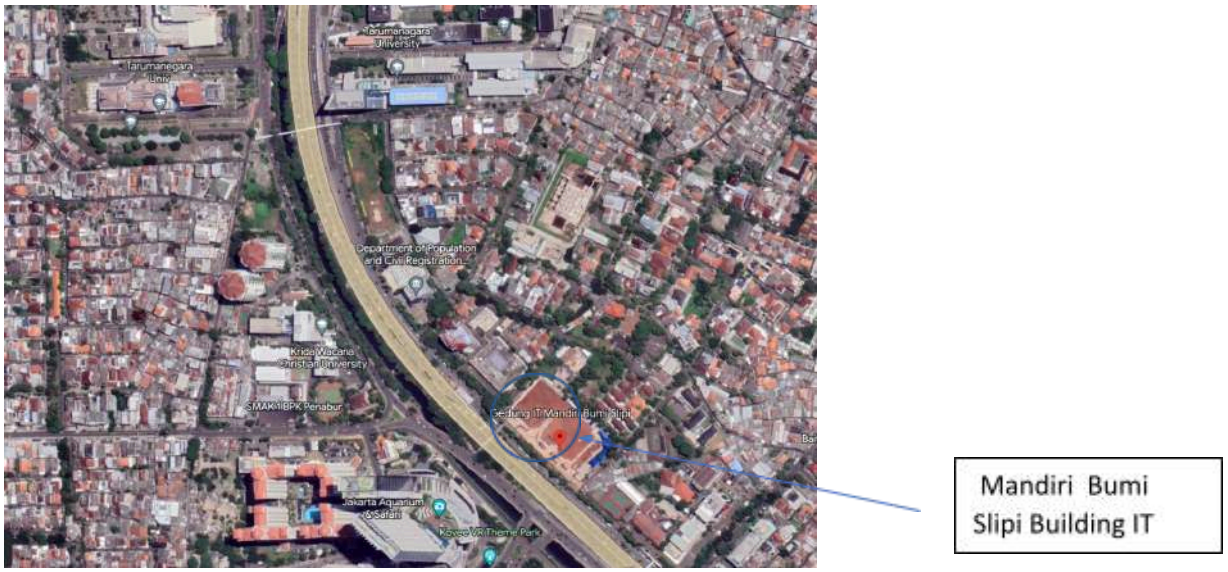
Severity Level	Safety Consequences Scale Human (Workers & Society)
5	The incidence of fatality is more than 1 person dies; or more than 1 person with permanent disability
4	Incidence of fatality 1 person died; or 1 person with permanent disability
3	There was an incident that resulted in more than 1 worker with inpatient medical treatment, lost work time
2	There was an incident that resulted in 1 worker with inpatient medical treatment, lost work time
1	There are incidents that are handled only through first aid, no loss of work time

2.3 Risk Control

After identifying and assessing the risks, a conclusion will be drawn from the identification of problems that occur while working. Risk control is carried out to minimize the risk level until it reaches the lowest level or zero accidents at work. The following are steps that can be taken for risk control according to [6]:

1. Elimination, namely eliminating hazards and risks by not employing humans in activities;
2. Substitution, namely the replacement of processes, operations, materials, or equipment with those that are not dangerous or have less danger;
3. Technical engineering, namely controlling the design of equipment, and workplaces to provide construction safety protection;
4. Administrative control, namely by controlling procedures, work permits, job safety analysis, and increasing the competence of the workforce; And
5. Adequate use of personal protective equipment and work protective equipment.

3. METHOD



3.1 Data Collection and Data Processing Methods

The research data that has been collected is then analyzed using a descriptive method which aims to determine the accident factors that workers often experience as the cause of work accidents and how they are handled.

3.2 Data Analysis

Before analyzing accident risk factors, it is necessary to identify conditions that can influence work accidents obtained from primary data. After data collection is complete, the data obtained from the results of questionnaires and interviews are processed through the data processing stages and results will be obtained in the form of risk levels and risk management from accidents that have occurred and risk management that will be carried out in connection with handling work accidents on the project.

3.3 Validity Test

A validity test is a test used to measure instruments in a questionnaire that can determine the level of effectiveness of a questionnaire. According to [7] the degree of accuracy is demonstrated by a validity test between the data that actually occurs on the object and the data collected by the researcher.

This test is carried out by comparing the r value calculated by the software with the r value in the table. A variable is said to be validated if the calculated r value is greater than or equal to the r value in the table. The r value was calculated at a significance level of 0.05.

3.4 Reliability Test

Reliability testing is used to find out whether the data can be trusted and whether the instrument gives correct results. According to [7] reliability testing is the extent to which measurement results using the same object will produce the same data. Reliability testing can be interpreted as a test that can determine whether the questionnaire that has been collected can be trusted or not.

3.5 Draft Questionnaire

The design of this questionnaire aims to determine the factors that cause accidents that can occur to workers or those that have been experienced by project workers as well as the magnitude of the chances of accidents occurring to workers and the risk management that will be carried out.

The preparation of the questionnaire in this study used data from JSA (Job Safety Analysis) [8], IBPR (Hazard Identification and Risk Assessment) [9], as well as accident reports contained in the Bumi Slipi Mandiri IT Project as references in preparing the questionnaire. The following is the questionnaire design in this study as listed in Table 3 to Table 4.

Table 4. Formwork Category Questionnaire Draft

	Num	Work Activities	ACCIDENT HAS HAPPENED	Source
4.	1	Formwork	The worker's hand was injured by a hammer	(Alim, 2022)
	2		The worker's finger was injured by a nail when using a hammer and nails	(Alim, 2022)
	3		Worker's hand caught during formwork installation	(Alim, 2022)
	4		Worker crushed by formwork while doing formwork installation	(Alim, 2022)
	5		The worker tripped over formwork material that was not properly arranged	(Alim, 2022)
	6		Workers mired while doing formwork work (edge/hole area)	(Alim, 2022)
	7		Workers fall from scaffolding during formwork installation	(Alim, 2022)
	8		A worker is crushed by scaffolding while doing formwork work	(Alim, 2022)
	9		The formwork collapsed and caused workers to be injured because it was not in accordance with the planning method	(Alim, 2022)
	10		The worker was exposed to the formwork material resulting in a torn wound	(Alim, 2022)

RESULTS AND DISCUSSION

4.1 Validity test results

Table 6 Test the Validity of the Formwork Work Category

Num	list of questions	R count	Note
1	The worker's hand was injured by a hammer	0.385	Valid
2	The worker's finger was injured by a nail when using a hammer and nails	0.362	Valid
3	Worker's hand caught during formwork installation	0.621	Valid
4	Worker crushed by formwork while doing formwork installation	0.595	Valid

5	The worker tripped over formwork material that was not properly arranged	0.524	Valid
6	Workers mired while doing formwork work (edge/hole area)	0.585	Valid
7	Workers fall from scaffolding during formwork installation	0.559	Valid
8	A worker is crushed by scaffolding while doing formwork work	0.601	Valid
9	The formwork collapsed and caused workers to be injured because it was not in accordance with the planning method	0.684	Valid
10	The worker was exposed to the formwork material resulting in a torn wound	0.455	Valid

4.2 Reliability test results

The results of the reliability test show that of the three categories it produces a reliability test that meets the requirements with the greatest reliability test results in the construction work category, as you can see in Table 7.

Table 7 Reliability Test Results for Reinforcing Work

Cronbach's Alpha	N *of items*
0.869	10

4.3 Analysis of Work Risk Assessment

Based on the respondent's data obtained from interviews, questionnaires, and direct field observations that have been collected, the data obtained is processed through the stages of data processing. Risk events that occur are formulated using the average data from all respondents by job category. So the calculation of risk analysis = average frequency and average severity, as you can see in Table 8.

$$\text{Average frequency} = \frac{\sum frequency}{number\ of\ respondents\ (n)} \quad \text{.....(4.1)}$$

$$\text{Average severity} = \frac{\sum Severity}{number\ of\ respondents\ (n)} \quad (4.2)$$

Risk= Average frequency x Average severity .....(4.3)

Table 8 Formwork Risk Assessment Results

Num	ACCIDENT HAS HAPPENED	Average Frequency	Average severity	RISK(frequency x severity)
1	The worker's hand was injured by a hammer	3	2	6

2	The worker's finger was injured by a nail when using a hammer and nails	3	2	6
3	Worker's hand caught during formwork installation	2	2	4
4	Worker crushed by formwork while doing formwork installation	2	2	4
5	The worker tripped over formwork material that was not properly arranged	2	3	6
6	Workers mired while doing formwork work (edge/hole area)	2	3	6
7	Workers fall from scaffolding during formwork installation	2	3	6
8	A worker is crushed by scaffolding while doing formwork work	2	2	4
9	The worker was exposed to the formwork material resulting in a torn wound	2	1	2
10	Workers were hit by formwork material and suffered lacerations	2	2	4

1.3 Matrix Analysis of Risk Levels

Analysis of the risk level matrix can be seen in Table 9.

Table 9 Classification of Curtain Wall Risk Matrix According Rahadian, 2021

Num	ACCIDENT HAS HAPPENED	risk rounding	RISK MATRIX CLASSIFICATION
1	The sling broke when lifting the panel load, causing injury to workers	4	Low Risk
2	Workers fall from a height during Curtain Wall work	4	Low Risk

3	Workers fall from a height during Curtain Wall work	4	Low Risk
4	The hammer fell and injured workers below	4	Low Risk
5	The worker's hand was injured by a drill when installing the Dynabolt	6	Moderate Risk
6	The worker was electrocuted because of an exposed cable during the Starter Sill work	6	Moderate Risk
7	*The aluminum sleeve fell and injured the worker*	6	Moderate Risk
8	The worker was injured because the hoist crane cable was cut during the installation of the panel unit	2	Low Risk
9	Worker trips over Curtain Wall material	4	Low Risk
10	The panel material fell and broke causing injury to workers	4	Low Risk

4.5.1 Responsible Party
Risk control is carried out by finding the party responsible if the risk arises.
Based on the matrix classification of the risk calculation results, all jobs are included in the green category (moderate–risk level), because they are in the range of numbers 5-12.
4.5 Risk Control
Risk Control: Activities that can control both reducing and eliminating the impact of hazards that arise both as initial control and additional efforts.

Risk control is based on the responsible party and administrative actions to be implemented. Control that can be done from
the three levels of risk are known, namely by reducing risks with engineering, administrative, and using Personal Protective Equipment (PPE).
4.5.1 Responsible Party
Risk control is carried out by finding the party responsible if the risk arises, as you can see in Table 10.

Table 10. Risk Control and flow of Curtain Wall Work handling

Num	ACCIDENT HAS HAPPENED	risk rounding	Person responsible	Handling
1	The sling broke when lifting the panel load, causing injury to workers	4	Ronbe	Project clinic (Contractor)
2	Workers fall from a height during Curtain Wall work	4	Ronbe	Project clinic (Contractor)

3	Workers fall from a height during Curtain Wall work	4	Ronbe	Project clinic (Contractor)
4	The hammer fell and injured workers below	4	Ronbe	Project clinic (Contractor)
5	The worker's hand was injured by a drill when installing the Dynabolt	6	Ronbe	Hospital (Contractor)
6	The worker was electrocuted because of an exposed cable during the Starter Sill work	6	Ronbe	Hospital (Contractor)
7	*The aluminum sleeve fell and injured the worker*	6	Ronbe	Hospital(Contractor)
8	The worker was injured because the hoist crane cable was cut during the installation of the panel unit	2	Ronbe	Project clinic (Contractor)
9	Worker trips over Curtain Wall material	4	Ronbe	Project clinic (Contractor)
10	The panel material fell and broke causing injury to workers	4	Ronbe	Project clinic (Contractor)

2 Risk Handling

Risk Handling is carried out by carrying out civil engineering and administrative actions and the use of PPE which can be seen in Table 11

Table 11 Handling Risk of Reinforcing Steel Work Risks

Num	ACCIDENT HAS HAPPENED	Rounding Risk	Person responsible	Implementation of Risk Handling
1	Hands scratched by iron when cutting iron using a bar cutter and bending iron with a bar bender	4	Roni, dan Jasmo	Self Briefing
2	The clamped hand is used to cut the wire	4	Roni, Jasmo	Self-Call Emergency Briefing Again
3	Workers experience eye irritation because fine iron cutting dust gets into their eyes	4	Roni, Jasmo	Complete PPE
4	The workers were impaled by the iron because the placement of the iron was not well-organized	4	Roni, Jasmo	Work tool binding
5	Workers were crushed by material during the process of transporting reinforcing steel using a tower crane	6	Roni, Jasmo	Equipment check before work
6	Workers are crushed by material during the process of transporting reinforcing steel using a tower crane	6	Roni, Jasmo	Equipment check before work
7	The reinforcing steel fell from a height so that the workers below were crushed by the reinforcing steel	6	Roni, Jasmo	Avoid the police line area during activities
8	The worker's hand was scratched by the iron during the installation of the iron ring	2	Roni, Jasmo	Tool check before work Pengecekan alat sebelum kerja

9	Feet injured by steel	4	Roni, Jasmo	Protect or put a warning sign
10	Workers were electrocuted when using the bar cutter and bar bender	4	Roni, Jasmo	Avoid the police line area during activities

Handling risks in independent IT development projects, among others, by:
1. Conduct briefings
2. Emergency Call Briefing
3. Wear Personal Protective Equipment
4. Protection and early warning
5. Avoid activities in the police line area
6. Checking tools before work

5. CONCLUSIONS AND SUGGESTIONS

5.1 CONCLUSION

The following are some conclusions that can be drawn from this research, including:
1. Based on the results of field observations during the construction process of the IT Mandiri Bumi Slipi building construction, accident identification was obtained for each work activity which was divided into 3 work categories, namely formwork work with 9 types of accidents, and ironwork and curtain wall work with 10 types of accidents.
2. Based on the results of risk analysis and risk matrix categorization for formwork, reinforcement work, and curtain wall work, various levels of risk are obtained, along with the results of risk analysis and matrix categorization based on each work category:
a. Based on the results of risk analysis and risk matrix classification in formwork work, 5 types of accidents are included in the "moderate risk level" and 4 types of accident events are included in the "low-risk level".
b. Based on the results of risk analysis and classification of the risk matrix in the ironing work, 3 types of accidents are included in the "moderate risk level" and 7 types of accident events are included in the "low-risk level".
c. Based on the results of risk analysis and risk matrix classification on curtain wall formwork, 3 types of accidents were obtained which were included in the "moderate risk level" and 7 types of events which were included in the "low-risk level".
3. Risk control that can be carried out from the three known risk levels, namely by reducing risks with engineering, administrative engineering, and using Personal Protective Equipment (PPE) by giving responsibility to the contractor and handling risks including conducting briefings, and using protective equipment self.

5.2 SUGGESTION

Contractors can increase supervision of workers related to project development so that the possibility of accidents caused by workers and work tools is reduced. and conduct briefings before starting work and use personal protective equipment.

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