Assessment of Occupational Safety and Health Risk (K3) Using the Hiradc (Hazard Identification Risk Assessment and Determining Control) Method in the Sanur Sea Port Facility Construction Project

I Ketut Sutapa[1], I Made Anom Santiana[1], I Nengah Darma Susila[2] and Made Sudiarsa[1]
[1]*Civil Department, Bali State Polytehnic, Bali 80364, Indonesia*
[2]*Mechine Department, Bali State Polytehnic, Bali 80364, Indonesia*

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Abstract: Work accidents cannot be avoided but can actually be controlled or minimized. Diseases and accidents due to work in the field of building projects can affect the level of labor productivity as a result of reduced labor resources. In an effort to control and minimize work accidents, this research was carried out. The study of occupational safety and health risks in buildings has not been specifically carried out. The OSH risk assessment carried out is in accordance with the HIRADC stage, namely Hazard Identification, Risk Assessment, And Determining Control. In terms of risk control, it is carried out by referring to the risk assessment hierarchy. This research in the long term aims to produce data in compiling a Construction Project Occupational Safety and Health System. The specific purpose of this research is to identify risks of occupational safety and health in building construction on structural works, determine risk values based on identification results, determine risk control based on the risk control hierarchy. The output of this research is information related to the OHS risks of construction projects, which are expected to provide input to construction service actors in the project implementation stage.

1 INTRODUCTION

Construction services according to the law (UUJK) are an activity to build facilities or infrastructure which in the process includes building construction (building construction), mechanical and electrical installations as well as civil engineering construction. Meanwhile, construction work is the whole or part of a series of planning and/or implementation activities as well as supervision which includes architectural, civil, mechanical, electrical and environmental management works respectively and their completeness in realizing a building. . This situation is similar to the case of a broken gondola accident in 2008, which recurred and streaked when the volume of construction of property buildings increased (Anonymous., 2018).

Projects are activities that take place within a certain period of time and with limited resources. The project management process begins with the planning stage, followed by engineering and design, procurement or auction, construction, operational tests (commissioning), and the utilization and maintenance stage (operational and maintenance). (Setiawan et al., 195). The implementation of construction projects definitely has risks. Project risks can be political, environmental, planning, marketing, economic, financial, natural, project, technical, human, criminal and safety. These risks can affect the cost, quality and timing of project implementation.

Work accidents in any sector including the construction sector cannot be avoided but can actually be controlled or minimized. In addition, other problems are the existence of health problems and the emergence of diseases due to work carried out by workers. This will have an impact on reducing labor resources which of course will affect the operational implementation of work so as to reduce the level of work productivity which results in losses by interested parties, namely project owners, consultants, contractors, chief craftsmen and the workforce itself.

This fact certainly complicates the handling of OSH problems which are usually carried out by training methods and explanations regarding the K3 Management System that is applied to the implementers of construction projects. Construction

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projects in developing countries have three times the mortality rate compared to developed countries. This is certainly very concerning. The level of concern of the business community for OHS is still low even though workers are important tools for project implementers (Sucita et al., 2011).

Based on research by (Nurhayati., 2010) the most frequent number of construction work accidents from 2005 to 2015 were 78 cases of electrocution accidents, 59 cases of falling objects and 51 cases of falling from a height. Currently the government has issued a policy related to the implementation of K3 (Occupational Safety and Health) construction. The legal basis for reference is the Law, Government Regulation, Ministerial Regulation, SKB MenPU & Menaker, and Permenaker.

Building construction has a complex job compared to other constructions. The building consists of groups of Structural, Architectural, Mechanical and Electrical, Plumbing, Interior, Landscape, and other additional works. Each occupational group has different occupational health and safety risks. Sources of danger come from humans themselves, equipment used, materials, work methods and the environment. Therefore, it is necessary to carry out a specific analysis of all work items in order to achieve project objectives, namely cost, quality, time and orderly administration.

Analysis of occupational safety and health risks in building construction with the HIRADC stage, starting with Hazard Identification of structural and architectural work, followed by Risk Assessment, and Determining Control. The method in determining risk control is based on the risk control hierarchy, namely elimination, engineering, administrative control, and the use of personal protective equipment. The method of determining control is also not based on a risk assessment hierarchy. Therefore, in this study, a specific construction safety and health risk analysis was carried out on structural works with the HIRADC (Hazard Identification, Risk Assessment, and Determining Control) stages and control based on the risk control hierarchy.

1.1 Research Purposes

This study aims to obtain information related to occupational safety and health risks in the construction world. The research design is a research strategy in identifying problems before the final planning of data collection and used to define the structure of the research to be carried out (Arikuto., 2010). The objectives of this research are to Identifying occupational health and safety risks in the construction of the Sanur sea port facility on structural work.

Population is a generalization area consisting of objects / subjects that have certain qualities and characteristics determined by researchers to be studied and then conclusions drawn (Sugiyono., 2012). The sample used in this study were 25 respondents. To give more direction or focus more on the selection of samples that really can represent the number of population, the sampling technique is used with accidental sampling. Accidental Sampling according to Sugiyono (Sugiyono., 2010).

1.2 Benefit of Research

The benefits of this research are as follows: .Obtain information related to occupational safety and health risks in the construction world.. As a teaching material in the Occupational Health and Safety Management System course in the construction sector.

2 METHODOLOGY

2.1 Research Design

This research was conducted in the section of the terminal building on the construction of the Sanur Seaport facility. Secondary data in this study were obtained from studies of journals, literature studies, reports that have been carried out, as an illustration in conducting early risk identification. Primary data was obtained through observation and interviews with the parties involved in the project. From the results of interviews and observations, the results obtained are the identification of occupational safety and health risks at the project implementation stage. The data to get the respondents' assessments and opinions on the identified risks was carried out by distributing questionnaires with people who were appointed as respondents.

The data obtained from the results of distributing questionnaires were grouped according to the respondents' answers to each question. The answer given by the respondent is in the form of a risk acceptance scale.Risk assessment based on PERMEN PU No. 05-PRT-M-2014 the value of the frequency of occurrence of OHS risk in construction, namely the value of 1 (one) rarely occurs in construction activities, the value of2 (two) sometimes occur in construction activities, a value of 3 (three) often occurs in construction activities. Severity scores are 1

(mild), 2 (moderate), 3 (severe). Construction OHS risk level (TR) is the result of multiplying the value of the occurrence of Construction OHS risk (P) with the resulting severity value (A).

3 RESULTS AND DISCUSSION

3.1 Hazard Identification

The K3 risk analyzed in this study is the work on the structure and architecture of the building project in Badung Regency. The hazard identifications in structural and architectural work were obtained. From this planning into one with implementation, with this it can be said that good planning with better implementation can provide good work results in this case can achieve the goals and objectives of the policy or project implementation commitment (Intellectual Wiranti and Gusti Ayu Kade., 2013) (Swastika and Martini., 2011). The level of "good" assessment of the implementation carried out by the implementation of the project is not only stated based on the results of the internal audit, but also from the evaluation of the incidence rate (Udiani et al., 2012).

3.2 Risk Assesment

Construction projects of dams, tunnels, roads, bridges and other civil engineering projects require certain specifications, expertise and technology, which are certainly different from housing or settlement projects (Latupeirissa et al., 2016). Project risk in risk management is the cumulative effect of uncertain event opportunities, which affect project goals and objectives. Uncertainty due to human/technology activities can be reduced by extracting more information and applying better models. Risk management must be carried out throughout the project cycle from the initial stage to the end of the project (Husen et al., 2011). Analysis of the data to determine the significant risks in structural and architectural works of buildings carried out the frequency and consequences identified from the respondents' assessments through questionnaires. Based on the respondent's answer seen from the mode, the risk assessment is obtained from the results of the multiplication of the respondent's answer mode on frequency with the respondent's answer mode for consequences, which can be seen in the following table 1.

Table 1: Risk Assessment.

Source of Risk	No. Sort Identification	Risk Identification	Frequency Scale Mode	Consequence Scale Mode	Risk Value	Category
QUICKING AND HACKING FOR LAND FACILITIES						
Digging 1 meter deep	1	Falls in the excavation area	1	2	2	currently
Sirtu heap	2	Pollution of materials	1	1	1	Light
Land Pile	3	Pollution of materials	2	1	2	currently
Geotextile Couple	4	Stuck in the material installation area	2	1	2	currently
STRUCTURAL WORK						
SUB STRUCTURE						
LAND WORK						

Table 1: Risk Assessment.(cont.)

Source of Risk	No. Sort Identification	Risk Identification	Frequency Scale Mode	Consequence Scale Mode	Risk Value	Category
pack. Soil excavation	5	Landslide excavation	1	1	1	Light
pack. Sand dump	6	Falls while loading and unloading	1	1	1	Light
pack. Empty stone pair	7	Struck by stone material	1	1	1	Light
pack. River stone couple	8	Struck by stone material	1	1	1	Light
pack. Backfill the soil back to the foundation continuously	9	Hit by heavy equipment	1	1	1	Light
CONCRETE WORKS						
pack. workshop floor	10	Falls while loading and unloading	2	1	2	Currently
Pile Work	11	Struck by pile material	1	2	2	Currently
Pile Cap Foundation Concrete Works and Telapak Foundations	12	Hit by concrete material	2	1	2	Currently
Pile Cap Foundation and Telapak Foundation Work	13	Got electric shock	2	1	2	Currently
Pile Cap Foundation Formwork and Telapak Foundations	14	Nailed	1	2	2	Light
SUPER STRUCTURE						
GROUND FLOOR						
CONCRETE WORKS						
Sloof Concrete Works	15	Hit by concrete material	2	1	2	Currently
Sloof Cleaning Job	16	Got electric shock	1	1	1	Light
Sloof Formwork Pekerjaan	17	Nailed	1	1	1	Light
Column concrete work	18	Hit by concrete material	1	1	1	Light
Column repair work	19	Got electric shock	1	1	1	Light
Column Formwork Work	16	Nailed	1	2	2	Light
Stairs Concrete Works	17	Hit by concrete material	1	1	1	Light
Staircase Cleaning Job	18	Got electric shock	1	1	1	Light

Table 1: Risk Assessment.(cont.)

Source of Risk	No. Sort Identification	Risk Identification	Frequency Scale Mode	Consequence Scale Mode	Risk Value	Category
Stair Formwork Pekerjaan	19	Nailed	1	1	1	Light
UPSTAIRS						
CONCRETE WORKS						
Block concrete work	16	Hit by concrete material	2	1	2	Currently
Beam work	17	Got electric shock	2	1	2	Currently
Beam formwork	18	Nailed	1	1	1	Light
Floor Slab Concrete Works	19	Hit by concrete material	2	1	2	Currently
Floor slab work	20	Got electric shock	2	1	2	Currently
Floor slab formwork	21	Nailed	1	1	1	Light
UPPER STRUCTURE						
CANOPY WORK						
Canopy Job	22	Steel pinch	1	1	1	Light
ROOF WORKS						
Roof covering work	22	Falling from a height	1	1	1	Light
ARCHITECTURAL WORK						
WALL COUPLE WORK						
Light Brickwork	23	Squeezed in lightweight brick material	1	1	1	Light
Plastering and wall plastering	24	Falling from a height	2	1	2	Currently
CERAMIC FLOOR AND WALL WORK	25	Got electric shock	1	1	1	Light
CEILING WORK	26	Got electric shock	1	1	1	Light
DOOR AND WINDOW WORK	27	Pinched door/window	1	1	1	Light
TOILET SANITARY WORK	28	Pinched	1	1	1	Light
FINISHING AND WATERPROOFING WORK	29	Falling from a height	1	1	1	Light
RAILING INSTALLATION WORK	30	Pinched	1	1	1	Light
BALI ARCHITECTURE STYLE WORK	31	Falling from a height	1	1	1	Light

Based on the table 1 above, it explains that the level of acceptance of OHS risk is obtained in 2 categories, namely the mild category (score 1) with 21 risks, the low category (value 2) with 10 risks. There are 21 risks that are at priority level 1 which are in the mild category but cause permanent injury, priority level 2 as many as 10 risks that fall into the moderate category whose impact is severe but not permanent,.This can help the placement of workers in accordance with their expertise, arrangement of work areas and work environment, as well as arrangements for the order in which work is carried out (Wicaksono Imam et al., 2011). A person's work attitude is influenced by 4 factors, namely physical characteristics, types of task requirements, work station design and work environment (Bridger et al., 1995). Work attitude or non-ergonomic working conditions will eventually lead to complaints such as disorders of the musculoskeletal system (Manuaba et al., 2000).

3.3 Determining Control

The existence of risks that fall into the moderate and light categories will greatly affect the implementation of construction work. The priority scale is determined based on work items that have a high, medium and small level of OHS risk, with the explanation: priority1 (high risk), priority 2 (medium risk), and priority 3 (low risk). If the level of risk is declared high,then the work item becomes the main priority (rank 1) in the control effort. Risk is said to have top priority when it threatens the safety of workers the most fatal is death. The main priority risk control with the risk control hierarchy is elimination, substitution, technical control, administrative and provision of occupational safety and health equipment. This stage is carried out by considering the completion time of the work.

4 CONCLUSION

Based on data processing and analysis in this study, conclusions are obtained as follows: Occupational safety and health risks of building construction at the structural and architectural work stage were identified as many as 32 risks. The results of the occupational safety and health risk assessment of building construction at the structural and architectural work stage obtained two categories, namely the light category (value 1) with 21 risks, the low category (value 2) with 10 risks. controlled are excavation and embankment of land facilities, sub-structure work, concrete work, ground floor superstructure work, upper floor concrete work, wall masonry work. 3. Risk control based on the risk control hierarchy is carried out with TBM (tools box meeting), APK (regulating work positions, placement of materials and tools, installation of signs), applying for work permits, using PPE (helmets, shoes, safety belts, gloves). , mask).

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