

An Analysis of the Implementation of Work Safety System in Underpass Development Projects of the Intersection of Mandai Makassar-Indonesia

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ABSTRACT

The high potential for workplace accident risk in the implementation of construction work makes the safety system on a construction project as a fundamental requirement. This study aims to analyze the management of occupational safety systems on the Underpass Development Work Project of the intersection of Mandai Makassar and explain the effect of the implementation of the safety system on the effectiveness of Occupational Safety and Health (OSH) policy. Data were obtained from questionnaires, interviews and direct observations at project sites and document data obtained from related institutions, comparative, qualitative and quantitative analysis with the help of SPSS program. The results showed that the project was successful (90.32%) implemented the activities of Occupational Safety and Health Management System (OSHMS), according to the Ministerial Decree No. 05/ PRT/M/2014). Based on the regression test results can be explained that the indicators of project organization, risk management and project workers and equipment of the OHS significantly affect the effectiveness of the implementation of OSH policy.

Keywords: Project, Work Safeties, Road Construction

I. INTRODUCTION

Occupational Safety and Health (OSH) is a very important program in the constructions operational processing, as an instrument that can protect workers, companies, environments and communities surrounding the work site from the dangers of accidents. In general, OSH program in Indonesia is still neglected; this is indicated by the number of work accidents that are still high. Description of the data on the number of occupational accidents from the Social Security Administering Agencies (SSAA) of Employment shows work accidents of 105,182 cases by 2015 in Indonesia. Severe casualty cases resulting in deaths accounted for 2,375 cases (2.25%) of the total number of accidents. The number of occupational accidents increased very large i.e. $\pm 5\%$ -10% [1].



Figure 1. Locus of Research

The Underpass project is a large and complex project with a workforce of ± 150 people, with a variety of workplace-prone activities such as excavation, erection and complex construction work. The project has also implemented Occupational Safety and Health Contract (OSHC) which contains ongoing improvements, i.e., Plan, Do, Check, Action (PDCA). PDCA consists of OHS policy, OSH organization, OHS planning, OSH controlling, inspection and evaluation of OHS performance, review of OHS performance [2].

By taking a case study on this project, it is expected to be an example of OSHMS implementation the projects of the Official Highways Construction and Maintenance of South Sulawesi Provincial because it is specifically for projects implemented by Highways of South Sulawesi Provincial that use the Regional Budget Management System Occupational Safety and Health (OSHMS) in actual and consistent. Based on the description of the problems mentioned above it is important to study about the implementation of OSHMS on Underpass Development Project of the intersection of Mandai Makassar.

II. METHODOLOGY

Data were obtained from questionnaires and interviews of employees and workers involved in the Underpass projects of the intersection of Mandai Makassar. In addition, direct field observation of each work component, such as equipment, management and work environment. Document data obtained from relevant agencies in the form of occupational safety contract, work accident recapitulation data, near miss report (almost accidents), Standard Operating Procedure of Safety and Environment System, Operational Standard of Equipment Procedure used as the comparison to the result of questionnaires.

This research is the descriptive with approach qualitative and quantitative method to be used together in an activity analysis, so that result can be more comprehensive, valid and objective. The technique of determining the sample is using probability sampling methods; with one technique is Cluster Sampling, which is a technique to determine the number of samples, where the population is divided into groups of elements with several characteristics and different characteristics. All variables used in this study were measured by Likert Scale and then analyzed using qualitative description methods as well as the simple linear regression test with SPSS program [3,4].

Researchers have distributed questionnaires containing written questions to employees and workers are according to the specified sample size of 42 project employees with 12 questions and 73 project workers with 15 questions. The questions given relate to the reality of the Project Underpass of the intersection of Mandai Makassar.

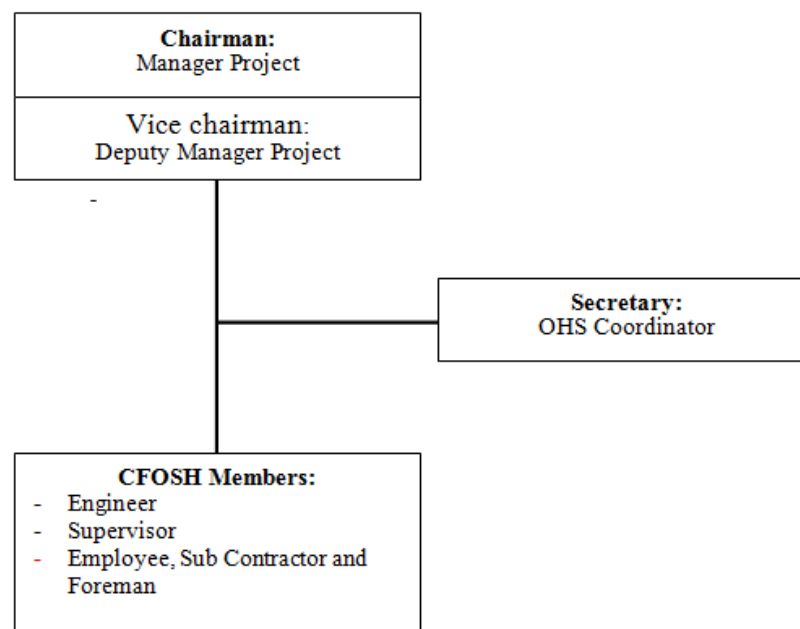


Figure 2. The organizational structure of OHS Underpass Project of The Intersection of Mandai Makassar

Regulation of the Minister of Manpower of the Republic of Indonesia is No.PER.04/ MEN/1987 concerning the committee for the Provision of Occupational Safety and Health and the Procedures of the Appointment of Occupational Safety Experts Article 2 states "that the workplace in which employers or employers employ 100 or more persons or workplaces/managers employing less than 100 workers, but using materials, processes and installation that have a high risk of explosion, fire, poisoning and radioactive irradiation of employers/managers must establish the Committee for Fostering Occupational Safety and Health (CFOSH)". In the Development of

Underpass Project of the intersection of Mandai Makassar, an OSH organization (see in Figure 2) has been established in the form of a management system that starts from the Project Manager and all subordinates, is a workplace agency which is a place for employers and workers to develop mutual understanding and participation Effective in OSH application [5,6].

III. RESULTS AND DISCUSSION

Management Analysis of the Application of Occupational Safety System

There are 5 answer choices in the research questionnaire so as to determine the level of conformity of each answer by providing an assessment of 1 to 5, with a minimum value of 1 for the least suitable conditions and 5 for the most appropriate conditions. To determine the percentage criteria, the following formula is used [7]:

$$\begin{aligned} & (\text{Maximum Criteria} - \text{Minimum Criteria}) / \text{Class} \\ & = (100\% - 20\%) / 5 \\ & = 16\% \end{aligned}$$

So the degree of conformity of each assessment specified in this writing is as follows;

Value 5 = 84,00% to 100,00% is very appropriate

Value 4 = 68,00% to 83,99% is appropriate

Value 3 = 52,00% to 67,99% is Enough

Value 2 = 36,00% to 51,99% is Less appropriate

Value 1 = 20,00% to 35,99% is Inappropriate

Based on the assessment each variable is grouped into two, that is appropriate and Not inappropriate. A grade grouping of values of 3 to 5 is appropriate because the conformity rate is greater than 50%, while the 1 & 2 values is inappropriate because the conformity level is below 50%.

Table 1. Implementation of work safety system for the organizational indicators

No.	Activities	Value	Level of Application	
			Appropriate	Inappropriate
Organizational Indicators				
1.	Safety Officer	3	Appropriate	-
2.	Work Safety Program	3	Appropriate	-
3.	Organizational Commitment	5	Appropriate	-
4.	Punishment/Penalty	2	-	Inappropriate

Table 1, it is found that there are 4 variables on the organizational indicator of which 3 are in accordance with the rules, but for the penalty variable the application is inappropriate. Sanctions are conducted orally and no further action is taken against repeated safety system violations. Meanwhile, according to the pocket books of Guidelines on Safety, Health and Environment System (SHES) of the Underpass Project of the intersection of Mandai Makassar, oral warning or early warning is applied against first level violation and for level 2 violation is given the final warning or written warning and for level 3 violation imposed fines According to the level of position. This happens due to lack of firm safety officers in implementing sanctions.

Table 2. Implementation of occupational safety system for the risk management indicators

No.	Activities	Value	Level Of Application	
			Appropriate	Inappropriate
Risk Management Indicators				
1.	Planning of the Work Safety System	5	Appropriate	-
2.	Work Methods	5	Appropriate	-
3.	Setting Duration/Working Time	5	Appropriate	-
4.	Work Safety Instructions	4	Appropriate	-
5.	Emergency Response Procedures	4	Appropriate	-
6.	Implementation Of Work Safety Training Programs	2	-	Inappropriate
7.	Supervision to Workers	5	Appropriate	-
8.	Business Reports Hazards Danger	4	Appropriate	-

Table 2 shows that there are 8 variables in the risk management indicator, of which 7 are in accordance with the rules, but for the safety training program variables are not yet appropriate, one of the programs is the safety morning talks, which is often carried out at the beginning of the project where the main work items still ongoing, at this time is rarely implemented. Management believes that workers have understood the safety system. This case may not be allowed because the worker keeps changing with the progress of project activities. No matter how small the type of work, it still has potential unknown hazards if training and coaching for workers are not carried out on an ongoing basis.

Table 3. Implementation of work safety system for the worker indicators

No.	Activities	Value	Level of Application	
			Appropriate	Inappropriate
Work Indicators				
1.	Age Of Workers	5	Appropriate	-
2.	Work Experience	5	Appropriate	-
3.	Level knowledge and skill	4	Appropriate	-
4.	The status Economic Workers	3	Appropriate	-
5.	Concern for Occupational Safety Issues	4	Appropriate	-
6.	Unsafe behaviors	5	Appropriate	-
7.	Physical Conditions of Workers	5	Appropriate	-
8.	Emotional Conditions Of Project Workers	5	Appropriate	-
9.	The condition of exhaustion and sluggishness of the project workers	4	Appropriate	-
10.	Ownership	3	Appropriate	-
11.	Work Concentration Drunk/Use of Drugs	5	Appropriate	-

Table 3, it is found that there are 11 variables in the worker indicators, where all of its implementation is in accordance with the regulations. This is due to several factors including: a good employee recruitment system, workers' awareness in regard to safety is quite high and management has created a comfortable working environment for workers.

Table 4. Implementation of work safety system on equipment Indicators

No.	Activities	Value	Level of Application	
			Appropriate	Inappropriate
Indicator Equipment				
1.	Total Self-Protect Equipment	5	Appropriate	-
2.	Physical Condition And Mechanical Equipment	5	Appropriate	-
3.	Standard Procedure For Use Equipment	4	Appropriate	-
4.	Effect Of Vibration And Voice Of equipment	5	Appropriate	-

On table 4, it is known that there are 4 variables in the equipment indicator, where all of its implementation is in accordance with the regulations. This is due to the Standard Operating Procedure (SOP) of Equipment applied to the Underpass Project of the intersection of Makassar Mandai has been well implemented. Parties involved in equipment handling recognize the importance of following each procedure to ensure that safety is maintained.

Table 5. Implementation of occupational safety system on environmental factor indicators

No.	Activities	Value	Level of Application	
			Appropriate	Inappropriate
Environmental Factor Indicators				
1.	Extreme Weather	5	Appropriate	-
2.	Working Road	5	Appropriate	-
3.	Working Road	4	Appropriate	-
4.	Danger Sign	2	-	Inappropriate

Table 5, it is known that there are 4 variables in the indicators of environmental factor, of which 3 are in accordance with the regulations, but for the alarm variables are not yet appropriate. Based on observations in the field, it was found that the alarm sign is not yet adequate, such as there are no warning signs for the holes, signs of heavy equipment operation areas, signs of mandatory areas of the Personal Protective Equipment (PPE), sign forbidden smoking. This should be easy to handle, but management's awareness is required because the safety sign is one of the efforts to create a safe working environment to reduce the occurrence of work accidents.

Level of implementation of occupational safety system

Based on Table 1 to 5, to see the level of implementation of the safety system on the Underpass projects of the intersection of Mandai Makassar is using the following formula:

$$\frac{\text{Total score}}{\text{The number of variable items}} \times 100$$

$$\frac{28}{31} \times 100 = 90,32\%$$

The level of application of the safety system on the Underpass Projects of the intersection of Mandai is 90.32%, which means that the safety system management has been done in accordance with the Minister of Public Works

Regulation no. 05/PRT/2014 on OSHMS Guidelines for Construction of Public Works. The variables that are not in accordance with the rules of 9.68% include the provision of penalty, the implementation of safety training programs, and the placement of safety sign, where the four variables have not reached conformity in the application of safety management system works.

Analysis of the Effect of Application of Occupational Safety System to the effectiveness of Health and Safety Policy

The result of regression test of F indicator of organization showed that F value count (3,426) > F table (3,011) and significance p (f) 0,515 > α (0,05) mean the influence of indicator Organization significant to safety system management.

The result of regression test F risk management indicator shows that the value of F arithmetic (3.105) > F table (3.011) and significance p (f) 0,746 > α (0,05). This means the effect of significant risk management indicators for the successful management of the occupational safety system.

The result of regression test of F indicator of worker indicates that F count (3,768) > F table (3,731) and significance p (f) 0,240 > α (0,05) hence this mean influence of worker indicator significant effectiveness of k3 policy.

The result of regression test of F indicator of equipment shows that the value of f arithmetic (4.020) > f table (3,731) and significance p (f) 0,465 > α (0,05). This means the significant effect of equipment indicators on the effectiveness of OHS policies.

IV. CONCLUSION

1. Management of the work safety system on the project Underpass Development Workshop of the intersection of Mandai Makassar has been in accordance with Regulation of the Minister of Public Works No. 05/PRT/M/2014 with the success rate of implementation of 90.32%. The unsuitable policy aspect of 9.68% is;
 - a. Sanctions are conducted orally and no further action is taken against repeated safety system violations
 - b. Safety system training programs such as safety morning talk that should be done every day, however, it is rarely done on the grounds that the stages of construction work have been reduced and this activity has been done at the beginning of the project
 - c. Safety signs (warnings, orders, and restrictions) are not available at the project sites.
2. Based on the regression result, it is known that the four indicators, namely organization, risk management, worker, and equipment have a significant effect on the effectiveness of OHS policy.

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