

Cost of occupational safety and health using circular number: 11/se/m/2019 on the rehabilitation work of the karajinan irrigation area

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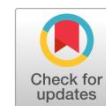
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ABSTRACT

To minimize the number of work accidents in construction work, especially in irrigation work. Irrigation construction service providers must provide costs for occupational safety and health purposes taken from the total project costs. This study has the aim of knowing the amount of occupational safety and health costs required according to Circular Number 11/SE/M/2019 (SE19). The research was carried out using the literature study method where the stages of data analysis were compiling a list of risks that occurred, assessing risk, mitigating risk, calculating occupational safety and health costs with the price survey results and calculating the percentage of occupational safety and health costs to the contract. The results showed that 27 occupational accidents and safety risks were identified with 18 low risk categories and 9 moderate risks. The required occupational safety and health cost based on the contract is Rp. 11,961,000.00 while the cost based on the SE19 regulations is Rp. 18,350,000.00.



KEYWORDS

construction services
risk identification
risk assessment
OSH costs



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1. Introduction

The mandate of circular letter Minister of Public Works No. 11/SE/M/2019 which regulates technical instructions for the cost of implementing a construction safety management system. In every construction project implementation, of course all parties involved in it hope that there will be no work accidents so that project success can be achieved. One of the efforts made by construction service companies to minimize the number of accidents is to implement a construction occupational safety and health management system (SMK3). Construction service providers must provide costs for occupational safety and health purposes which are taken from the total project costs even though these costs are included in the general and non-specific cost categories listed in the contract.

Research related to OHS financing in the construction sector has been carried out and resulted in an analysis related to the different OHS costs of each project that became the research review. This is because there are no identical projects and only similar projects.

To analyze the work accident cost on occupational safety and health risk handling at the construction project of Hasanuddin University Faculty of Engineering. Methods: An explorative study with a retrospective approach, analyzed the occupational accident records and Microsoft Excel for the safety cost data. The case samples were: 80 workers at ADHI Company Hasanuddin University Engineering Faculty Construction Project who experience occupational health during the project. The

instrument used in this study was a questionnaire and interviews. Results: The results showed that the cost of OSH risk handling in this project is around IDR 956.4 million, the cost of work accidents handling is around IDR 64,534 million, the opportunity cost is around IDR 3475 million, cost of OSH risk controlling program is around IDR 724,275 million. Conclusions: The value of the benefit–cost ratio is 1.2 or ≥ 1 , which means the OSH program cost investment by ADHI Company is categorized as beneficial for the company. The safety cost data presented in this paper may be useful for practitioners to direct resource investment.[23]

Economic Evaluation of Occupational Safety and Health Interventions from the Employer Perspective: A Systematic Review ,The aim of this systematic review was to evaluate the cost-effectiveness of occupational safety and health interventions from the employer perspective.A comprehensive literature search (2005 to 2016) in five electronic databases was conducted. Pre-2005 studies were identified from the reference lists of previous studies and systematic reviews, which have similar objective to those of this search.A total of 19 randomized controlled trials and quasi-experimental studies were included, targeting diverse health problems in a number of settings. Few studies included organizational-level interventions. When viewed in relation to the methodological quality and the sufficiency of economic evidence, five of 11 cost-effective occupational safety and health (OSH) interventions appear to be promising.present systematic review highlights the need for high-quality economic evidence to evaluate the cost-effectiveness of OSH interventions, especially at organizational-level, in all areas of worker health.[24]

The research problem on this take a look at is the Cost Budget Data Plan for numerous projects, specifically constructing, road, bridge and drainage initiatives. Details of the implementation of occupational safety and fitness (OSH) in the field of construction initiatives, namely occupational protection and health (OSH) guidance , socialization and promoting of occupational protection and health (OSH), work defensive device, non-public shielding equipment, coverage and licensing, safety personnel and occupational health (OSH), health facilities, occupational protection and health (OSH). Fulfillment of occupational safety and fitness (OSH) for creation projects covering roads, bridges, homes and drainage varies from at the least 0.8% to 0.7% of mission value. The smallest occupational safety and health (OSH) fees for street creation projects are zero.Eight% for bridge production tasks zero.Nine% for drainage production tasks 1.2% and the largest for constructing creation tasks is 1.7% of project expenses. With wonderful fee from diverse initiatives.[25]

As well as projects for the development and management of primary and secondary irrigation systems in irrigation areas with an area of less than 100ha.Rehabilitation project for Karajinan Irrigation Area, Girijaya Village, Nagrak District. Limited time and wide scope of work will lead to accidents that result in the need for Personal Protective Equipment (PPE) and cost requirements for project occupational safety and health.

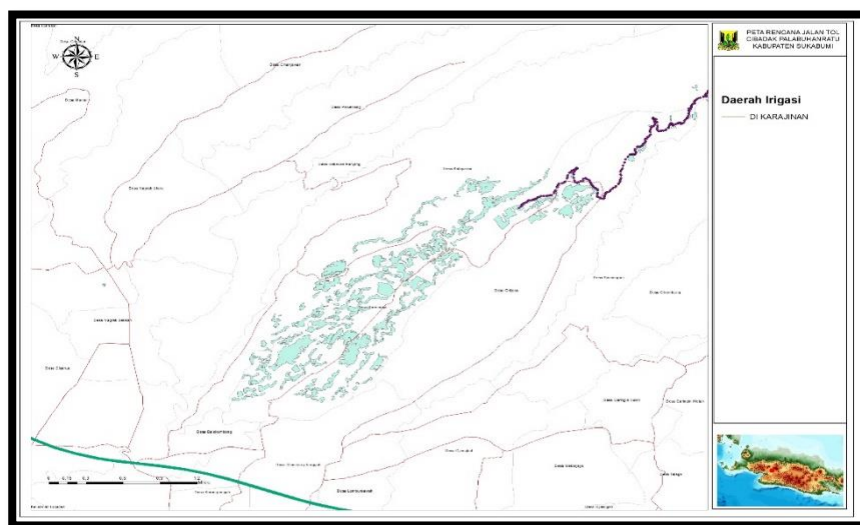


Fig. 1.Location of Karajinan Irrigation Area, Girijaya Village, Nagrak District, Sukabumi Regency

2. Method

3.1. 2.1. Material and Method

a) 2.1.1 Material

2.1.1.1 Occupational Health and Safety (K3)

Mangkunegara defines Occupational Safety and Health (K3) as a thought and effort to ensure the physical and spiritual integrity and perfection of the workforce in particular and humans in general as well as the results of work and culture towards a just and prosperous society. OHSAS 18001:2017, occupational safety and health (K3) are all situations and causes that can have an impact on the safety and health of workers at their respective work locations. (<https://sistemmanajemenkeselamatankerja.blogspot.com/2013/09/pengertian-dan-definisi-k3-keselamatan.html>)

2.1.1.2 Occupational Health and Safety Management System (SMK3)

Minister of Manpower Regulation No. 5 of 1996, the occupational safety and health management system (SMK3) is the whole part of the management system which includes organizational structure, planning, responsibilities, implementation, procedures, processes and resources needed for development, implementation, achievement, review and maintenance of occupational safety and health policies to control risks related to work activities so as to create a safe, efficient and productive work environment.

2.1.1.3 Hazard and risk identification

Jawat and Suwitanuwijaya explained that danger is all conditions and actions that have the possibility of causing accidents, damage or injury to humans. Hazard identification is carried out to find out, recognize and estimate risks that may occur in operating systems, equipment, procedures and work units. The risks that have been identified are then analyzed for their severity values for later control of the identified hazards[5]

2.1.1.4 Risk Assessment

According to Suharto, project risk is characterized by the following factors:

- Risk events (shows the negative impact that can occur on the project).
- The probability of the event occurring (or frequency).
- Depth (severity) of the negative impact / impact / negative consequences of the risks that occur (Identifikasi Dan Penanganan Risiko K3 Pada Proyek Konstruksi Gedung, Sucita, 2011,87)

Risk is formulated as a function of likelihood and negative impact. Risk = Likelihood x Impact, This means that the total amount of risk exposure is the probability of an unfortunate event occurring, multiplied by the potential impact or damage incurred by the event. If you put a dollar value on the impact, then you can value the risk and in a simple way compare one risk factor to another. [5]

		Severity			
		Catastrophic: 4	Critical: 3	Moderate: 2	Marginal: 1
Probability	Frequent: 5	High - 20	High - 15	High - 10	Medium - 5
	Probable: 4	High - 16	High - 12	Serious - 8	Medium - 4
	Occasional: 3	High - 12	Serious - 9	Medium - 6	Low - 3
	Remote: 2	Serious - 8	Medium - 6	Medium - 4	Low - 2
	Improbable: 1	Medium - 4	Low - 3	Low - 2	Low - 1

Fig. 2. Risk Matrix

To calculate the income is the multiplication of the probability score and the impact score obtained from the respondents. The formula used is Risk = probability x impact/severity. (Well-Stam et.al.,2004)

2.1.1.5 Occupational Health and Safety (K3) Cost Planning

Based on a literature study that the Bill of Quantity (BOQ) is used as a method for identifying project waste, identifying residual materials, planning, scheduling work, scheduling labor, even as a basis for calculating the budget plan, using either the SNI or BOW methods, and some are using WEB-based estimation. (Paikun, Dikdik Sadikin, Arman Kadarisman, Mia Arma Desima, Angga Irawan Bati Nova, 2018, 4)

The budget plan / BOQ of occupational safety and health (K3) can be used as a method of identifying OHS risk mitigation in the rehabilitation work of the Karajinan Irrigation Area.

Based on Circular Number 11/SE/M/2019 which regulates the technical instructions for the cost of implementing a construction safety management system, a standardized cost plan can be made. The details of the implementation of the Occupational Health and Safety Management System according to Circular Number 11/SE/M/2019 include:

- a. Construction Safety Plan Preparation;
- b. Socialization and Promotion of Occupational Safety and Health;
- c. Work Protective Equipment
- d. Personal Protective Equipment
- e. Insurance and Licensing
- f. Construction K3 Personnel
- g. Facilities, facilities, infrastructure, medical devices
- h. Signs
- i. Expert Consultation
- j. Others related to Risk Control[5]

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b) 2.1.2 Method

2.1.2.1 Prepare a list of occupational safety and health risks

The preparation of the risk list was carried out by interviewing occupational safety and health workers for the Karajinan Irrigation Area project.

2.1.2.1 Conduct an occupational safety and health risk assessment

The risk assessment multiplies the value of the level of frequency with the value of the severity level to further determine the risk priority category.

2.1.2.2 Determine mitigation actions for occupational safety and health risks

Mitigation of occupational safety and health risks is carried out for identified and assessed occupational safety and health risks. Mitigation actions are determined by interviewing the project occupational safety and health personnel and the project site manager.

2.1.2.3 Perform work safety and health cost calculations

The calculation is done by multiplying the volume of each cost of preparing personal protective equipment (PPE) and occupational safety and health equipment with the price per each item so that the costs of each occupational safety and health implementation activity are obtained.

2.1.2.4 Calculate the percentage of K3 costs against the contract

The calculation of the occupational safety and health costs that have been carried out is then determined by the percentage with the total contract value of the work.

3. Results and Discussion

3.2. 3.1 Identification of Occupational Safety and Health Risks

Identification of the risk of occupational safety and health incidents during project implementation is carried out through interviews with occupational safety and health personnel. In addition, field observations are carried out to see the risks that may occur due to the implementation of the work. The Karajinan Irrigation Area Rehabilitation Project was carried out within three months using a workforce

of 20 people with a construction cost budget of Rp. 1,354,727,000. The risks identified in the implementation of the Karajinan Irrigation Area Rehabilitation project are shown in Table 1.

Table 1. Hazard Identification and risk assessment of Preparatory Work

No	Description	Hazard Identification	Risk Assessment	
I.	PREPARATORY WORK			
I.1.	Mobilization and Demobilization	Squeezed Heavy Equipment	4	Low Risk

Table 1.

Table 2. Hazard Identification and risk assessment of Building Measuring And Draining Work

No	Description	Hazard Identification	Risk Assessment	
II.	BUILDING MEASURING AND DRAINING WORK			
II.1	Cleaning Job	The worker was bitten by a venomous animal, his leg was tripped.	2	Low Risk
II.2	Ordinary Earthworks (Mechanical)	Workers buried in excavations and trapped	4	Low Risk
II.3	Building earth excavation work	The worker got hit by the hoe and fell into	4	Low Risk
II.4	Formwork and Formwork Demolition	Worker's leg is pinched and crushed by wood	4	Low Risk
II.5	Reinforcement Iron Work	Workers hit by iron and stabbed by iron	6	moderate risk
II.6	Cast concrete work K-225	Chemical poisoning workers	2	Low Risk
II.7	Cast Concrete Work K – 125	Chemical poisoning workers	2	Low Risk
II.8	Wheep Hole Job	Workers injured by sharp tools	6	ResikoSedang
II.9	Water Stop Job	Workers injured by sharp tools	6	ResikoSedang
II.10	Landfill work brought in	Workers buried in the ground and crushed by trucks	4	Low Risk

II.11	Excavated Soil Filling Works	Workers hit by hoes/shovels	6	moderate risk
II.12	Procurement and Installation of Iron Doors B = 1,00 M1	Pinched Worker's Fingers and Hands	6	moderate risk

Table 2.

Table 3. Hazard Identification and risk assessment of Main Channel Work

No	Description	Hazard Identification	Risk Assessment	
III.	MAIN CHANNEL WORK			
III.1	Cutting Jobs	The worker was bitten by a venomous animal, his leg was tripped.	2	Low Risk
III.2	Old Couple Demolition Work	Workers crushed/affected by demolition	6	moderate risk
III.3	Ordinary Earthwork (Mechanical)	Workers buried in excavations and trapped	6	moderate risk
III.4	Pek. Galian Tanah Biasa untuk Bangunan Ordinary Earthwork for Building	The worker got hit by the hoe and fell into	6	moderate risk
III.5	River Stone Couple Job 1Pc : 4 Psr	Workers hit by rocks	4	Low Risk
III.6	Plastering Work 1Pc : 2 Psr	Worker Struck by a Work Bucket	4	Low Risk
III.7	Formwork and Formwork Unloading work	Workers Squeezed and crushed by wood	4	Low Risk
III.8	Reinforcement Iron Work	Workers hit by iron and stabbed by iron	2	Low Risk
III.9	Cast Concrete Work K – 225	Chemical poisoning workers	2	Low Risk
III.10	Cast Concrete Work K – 125	Chemical poisoning workers	4	Low Risk
III.11	Wheep Hole Job	Workers injured by sharp tools	4	Low Risk

III.12	Water Stop Job	Workers injured by sharp tools	4	Low Risk
III.13	Landfill work brought in	Workers buried in the ground and crushed by trucks	4	moderate risk
III.14	Excavated earth embankment work	Workers hit by hoes/shovels	6	moderate risk

2) 3.1.2 Calculation of Occupational Health and Safety Costs

As a result of the risk mitigation of Occupational Health and Safety, planning for cost requirements for risk mitigation is carried out following the provisions in Circular Letter No. 11/SE/M/2019. However, not all provisions in the circular are included in the calculation of K3 costs because the calculation of costs is adjusted to the results of identification and risk assessment.

- a. Calculation of Occupational Safety and Health Costs with Circular Number 11/SE/M/2019, for the rehabilitation work of the Karajinan irrigation area with an implementation time of 3 months and a total of 20 workers. Unit price based on Governor's Regulation number 52 Tahun 2020 About Standard Price Of Regional Goods And Services Financial Year 2021.

Table 4. Work safety and health budget calculation based on Circular Number 11/SE/M/2019

NO	Description	Unit	Volume	Unit price	Total
1	Construction Safety Plan Preparation:				
a	Preparation of Manuals, Procedures, Work Instructions, Work Permits	Set	1	500.000	500.000
b	Making Worker Identity Card (ID Card)	pcs	20	7.500	150.000
2	Socialization and Promotion of Occupational Safety and Health:				
a	Safety Induction;	Set	20	15.000	300.000
b	Safety briefing; Safety Talk and/or Tool Box Meeting;	person	20	15.000	300.000
c	OSH training;	person	20	50.000	1.000.000
d	OHS Simulations;	person	20	15.000	300.000
e	Banner;	pcs	2	50.000	100.000
f	Poster;	pcs	4	50.000	200.000
g	OHS Information Board.	pcs	1	250.000	250.000
3	Work Protective Equipment:				
a	Safety Net;	Set	1	200.000	200.000
b	Life Line;	Set	1	150.000	150.000
c	Safety Deck;	Set	0		-
d	Guard Railling;	Set	0		-
e	Restricted Area.	Set	2	50.000	100.000

4	Personal protective equipment:				
a	Safety Helmet;	pcs	30	50.000	1.500.000
b	Goggles,Spectacles;	pcs	20	35.000	700.000
c	Face Shield;	pcs	0		
d	Breathing Apparatus;	pcs	0		
e	EarPlug, EarMuff;	pcs	20	20.000	400.000
f	Masker	Box	0		-
g	Safety Gloves;	pcs	3	20.000	60.000
h	Safety Shoes	pcs	20	150.000	3.000.000
i	FullBody Harness;	pcs	0		
j	LifeVest;	pcs	0		
k	SafetyVest;	pcs	30	15.000	450.000
l	Apron/Coveralls;	pcs	0		
m	Fall Arrester;	pcs	0		
5	Insurance and Licensing:				
a	Employment and Occupational Health Insurance	Ls	1	2.100.000	2.100.000
b	Equipment Eligibility Permit;	Tools/Vehicle	0		-
c	Operator Permit;	Person	0		-
d	Authorization Letter of the Trustees Committee Occupational Health and Safety	Set	1	500.000	500.000
6	OHS Personnel:				
a	OHS Expert	Person/Month	0		
b	OHS Officer	Person/Month	1	1.000.000	1.000.000
c	Emergency Response Officer;	Person/Month	0	500.000	-
d	First Aid Officer;	Person/Month	0	500.000	-
e	Flagman;	Person/Month	0	500.000	-
f	Medical Officer.	Person/Month	3	500.000	1.500.000
7	Health facilities;				
a	first aid kit,	Set	1	500.000	500.000
b	First Aid Room (Patient Bed, Stethoscope, Weight Scale)	Set	0		-
c	Fogging;	Set	0		
d	Fogging Drugs.	Set	0		
e	Covid Health Protocol.	Set	1	1.000.000	1.000.000
8	Signs:				
a	Directional Signs	pcs	2	35.000	70.000
b	Prohibition Sign	pcs	2	35.000	70.000
c	Warning sign;	pcs	2	35.000	70.000
d	Mandatory sign;	pcs	2	35.000	70.000

e	Information Signs;	pcs	2	35.000	70.000
f	Temporary Job Signs;	pcs	2	35.000	70.000
g	Warning Lights Stick;	pcs	0	35.000	-
h	Traffic Cone;	pcs	0	35.000	-
i	Rotary Lamp;	pcs	0	35.000	-
j	Traffic Hose Lights.	pcs	0	35.000	-
9	Others Related to OHS Risk Control				
a	APAR;	pcs	1	400.000	400.000
b	Sirens;;	pcs	1	100.000	100.000
c	OSH Flag;	pcs	1	100.000	100.000
d	Escape Rout;	pcs			
e	Emergency Lamp;	pcs	1	70.000	70.000
f	Internal Audit and Inspection Program;	Set	1	500.000	500.000
g	Incident Reporting and Investigation.	Set	1	500.000	500.000
Total Cost of Occupational Health and Safety Management System (SMK3)					18.350.000

b. Calculation of occupational safety and health costs in the Contract (Field)

Based on data from the Public Works Department, the number of field workers involved in the implementation of the di Karajinan project is 20 people. The budget stated in the contract (field costs) does not refer to Circular Letter Number 11/SE/M/2019, only budgets for personal protective equipment and accident insurance. The details are as follows:

Table 5. Work safety and health budget calculation based on contract (field cost)

No	Description	Unit	Vol	Unit Price	Total
1	Preparatory work				
	Security and health and construction safety costs				
	Work Protector				
	Helmet	Pcs	20	100.000,00	2.000.000,00
	Safety Vest	Pcs	20	150.000,00	3.000.000,00
	Safety Shoes	Pcs	20	125.000,00	2.500.000,00
	Covid Health Protocol.	Set	1	2.375.000,00	2.375.000,00
	Employment and Occupational Health Insurance	Set	1	2.086.000,00	2.086.000,00
	Total				11.961.000,00

c. Discussion

Based on the comparison of the budgeting for occupational safety and health in the Karajinan Irrigation Area Rehabilitation Activities between the budgets based on Circular Letter No. 11/SE/M/2019 and the field cost budget that the difference in the total costs of occupational safety and health is as shown in the following table:

Table 6. OHS Cost Comparison

No	Description	Cost	%
1	Work Contract Value	1.354.727.000,00	0.00
2	OSH Cast Based on Contract (Field)	11.961.000,00	0,88
3	OSH Cost Based on SE No 11SE/M/2019	18.350.000,00	1,35

The difference in the cost of the comparison of occupational safety and health using Circular No. 11/SE/M/2019 is not too significant to the contract value, meaning that the preparation of occupational safety and health costs for the rehabilitation of the Karajinan Irrigation Area can use the Circular Letter approach, the cost reference is based on Circular Letter No. 11/SE/M/2019. 11/SE/M/2019 can provide a guarantee that the budgeted costs have included a risk assessment on the Karajinan Irrigation Area Rehabilitation work, so that project service providers can guarantee their activities safely.

4. Conclusion

The results showed 27 occupational accidents and safety risks with 18 risk categories and 9 moderate categories in Karajin Irrigation work. Based on this assessment, to ensure occupational safety and health in these activities, the budget is based on Circular No. 11/SE/M/2019. The K3 budget based on the SE19 regulations is Rp. 18,350,000.00. For the rehabilitation work of the Karajinan irrigation area as stated in the contract, Rp. 1,354,727,000.00, the cost of occupational safety and health stated in the contract is Rp. 11,961,000.00. Comparison of the cost of occupational safety and health between the field and the price in the regulation is where this is due to the SMK3 item listed in SE No. 11/SE/M/2019 in accordance with the rules such as preparing an Occupational Safety and Health Plan, Socialization, Signs while in the field it is only on providing PPE, handling Covid and licensing.

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