





## Study on Implementation of Health Protocols for COVID-19 Prevention in Construction Project in Indonesia



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### ABSTRACT

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*COVID-19, project construction, protocol health, policy*

The construction services industry is one of the industries affected by the COVID-19 outbreak. Most construction project schedules in Indonesia have been postponed or even canceled due to this outbreak. Through the Minister of Public Works and Public Housing Instruction No. 02/IN/M/2020 on the Protocol for Preventing the Spread of COVID-19 in construction projects, the Indonesian government regulates the handling of COVID-19 prevention in construction projects. Unfortunately, the implementation of the Regulation has not been optimal, so it is still necessary to investigate which elements of COVID-19 prevention have been optimally implemented. The goal of this study is to identify the ability to implement COVID-19 prevention protocols in the implementation of construction projects in Indonesia. The research method used in this study was to use surveys and interviews then the data was analyzed using the SPSS statistical program with a quantitative analysis approach. The research findings for COVID-19 preventive health protocols show that COVID-19 prevention strategies have been well implemented in construction projects judging from the average scores, namely isolation if there is an indication of COVID-19 suspect workers (3.867), disinfectants (3.733), small groups (3.733), online meetings (3.667), COVID-19 posters (3.600), health facilities (3.533), and campaign & promotion (3.533). Specifically, this study will provide an overview of the extent of implementation of COVID-19 preventive health protocols in construction projects and input for future policy improvements.

## 1. INTRODUCTION

Coronavirus disease 2019, also known as COVID-19, is a respiratory disease caused by the SARS-CoV-2 virus that was discovered in December 2019. The COVID-19 outbreak began to spread in Indonesia in early March 2021 [1]. World meters data (2020) confirmed that the number of confirmed COVID-19 cases in Indonesia reached more than 6.01 million people, with more than 155,000 deaths, ranking Indonesia 18th in Asia for the highest number of deaths due to the COVID-19 outbreak [2]. Several studies noted significant negative impacts of the COVID-19 outbreak, including reduced economic growth, increased unemployment, inflation, decreased supply of goods, and hampered trade services due to ubiquitous activity restrictions [3].

COVID-19 has had an impact on all industrial sectors, including the construction industry. The construction sector is a local activity that creates buildings that support social and economic activities that help realize the development of the nation [4]. Elements of construction implementation such as materials, masons, equipment, transportation, time, and mobility are directly related to the COVID-19 outbreak so it can cause uncertainty in construction implementation [5]. The construction industry faces several challenges during the COVID-19 outbreak, including schedule delays, disrupted cash flow, delays in permits, approvals, and inspections; travel

restrictions; serious health and safety issues; and material and equipment shortages, which hinder the timely completion of construction projects [6].

In South Africa, has been implemented COVID-19 safety measures at construction sites, including the inadequate provision of personal protective equipment (PPE) by contractors, lack of adherence to health protocols, and attachment to social distancing rules, resulting in the spread of infection. These challenges have hampered their efforts to strictly adhere to safety measures according to COVID-19 health protocols [7]. During the COVID-19 outbreak, construction projects in the United States have experienced project delays, material delivery delays, material shortages, permit delays, productivity losses, cash flow challenges, project disruptions, and price increases [8]. Some countries in Southeast Asia such as Singapore indicated that projects experienced significant delays, cost overruns, and poor quality. Construction demand and production were noted to have fallen by 27.9% and 28.6%, respectively [9, 10].

Indonesia's construction industry is also experiencing the same conditions. The COVID-19 outbreak has caused various negative impacts in Indonesia, including a decrease in contractor performance [11]. To prevent the spread of COVID-19 on construction projects, the Indonesian government issued Minister of Public Works and Public Housing (PUPR) Instruction No. 02/IN/M/2020 on the

Protocol for Preventing the Spread of COVID-19 on construction projects [12]. Minister of Public Works and Housing Instruction No. 02/IN/M/2020 is a policy of the Government of Indonesia as a prevention effort, through health protocols, against the COVID-19 outbreak in the work environment of construction projects in Indonesia. The Government of Indonesia hopes that the implementation of the Ministerial Instruction No. 02/IN/M/2020 can emphasize the negative impact of COVID-19 on construction projects in Indonesia.

Furthermore, this study aims to develop a health protocol as a program to prevent the COVID-19 outbreak in construction projects and to measure the implementation of the COVID-19 outbreak prevention protocol in several construction projects in Indonesia. The benefits of the results of this study can contribute to efforts to deal with COVID-19 and provide an illustration of the extent to which the implementation of health protocols for COVID-19 prevention in construction projects can provide lessons learned and input for improving policies to prevent COVID-19 outbreak in future construction projects.

## 2. LITERATURE REVIEW

### 2.1 Vulnerability of construction project to COVID-19

A construction project's work environment is one of the activities with a high risk of accidents and occupational diseases [13]. A construction project as a work environment that involves a lot of disorganized workers, migrant workers, working time of 10–12 hours per day, and an open space work environment that has an impact on being very vulnerable to exposure to different physical, chemical, biological, mechanical, and psychosocial hazards during their daily work schedule causes a high level of vulnerability to occupational diseases [14]. Next, the construction industry is vulnerable to the COVID-19 crisis because most construction activities must be performed on-site, limiting the number of workers that can work remotely [15]. Occupational diseases caused by the COVID-19 outbreak increase the vulnerability of the safety and health aspects of the implementation of construction projects [16].

### 2.2 Health protocols for the prevention of COVID-19 in construction projects

Prevention and handling of the COVID-19 outbreak have been carried out in various industries [17, 18]. The Occupational Safety and Health Administration (OSHA) has proposed and implemented various measures and regulations aimed at maintaining the safety and health of construction workers; however, several reports indicate that the results have not been powerful and effective [19, 20]. Several previous studies have developed strategies as a preventive measure against the COVID-19 outbreak in construction projects, including:

1. Social distancing strategies include shift work (which increases social distance), staggered breaks and lunches, separated project offices, remote workers, and increased use of remote work sites for prefabrication.
2. Small group meeting strategies include project area isolation, shift work (to minimize large groups), separate work areas isolated via barriers, and the use of technologies (e.g., online meetings).

3. Job-site screening strategies include a job-site health questionnaire for all workers and guests, travel questionnaires, COVID-19 tests, workers being physically examined for exposure conditions, temperature tests, and screening using onsite cameras.
4. Cleaning supplies strategies include hand sanitizer, wash stations, 3rd party cleaners, UV sanitation, and fog atomizers.
5. Protective Personal Equipment (PPE) strategies include the use of latex gloves, respirators, an N95 mask, and face shields.

### 2.3 Minister of public work and housing instruction No. 02/IN/M/2020, Indonesia requirement

Minister of Public Work and Housing Instruction No. 02/IN/M/2020 was passed and declared on March 27, 2020. This instruction is a comprehensive ministerial decree that regulates the obligations of service providers and owners. The Instruction of the Minister of Public Works and Public Housing No. 02/IN/M/2020 is part of the construction safety policy, which consists of seven steps of the COVID-19 outbreak prevention program, including:

1. First Step: Formation of the COVID-19 Prevention Task Force Team by the Project Owner and Contractor
2. Second Step: Providing COVID-19 Prevention Facilities
3. Third Step: COVID-19 prevention education by contractors
4. Fourth Step: Temperature/Fever Checks Using Thermometers by the Project Owner and Contractor
5. Fifth Step: Cooperation with Hospitals and Health Institutions in Handling COVID-19 by the Contractor
6. Sixth Step: Stop the project temporarily if the project owner and contractors are exposed to COVID-19.
7. Seventh Step: Isolation and Spraying Disinfectant on Office and Site Facilities by Project Owner and Contractor

#### 2.3.1 Formation of the COVID-19 prevention task force team

Project owners and contractors are required to form a COVID-19 Prevention Task Force Team that is part of the Construction Safety Unit [21]. The Task Force Team has the duties, responsibilities, and authorities to carry out: i) socialization; ii) education; iii) technical promotion; iv) determining the method of implementing COVID-19 prevention in the field; v) coordinating with the COVID-19 Task Force Team The Ministry of PUPR carries out COVID-19 risk identification at the site, including: vi) health checks related to the potential for COVID-19 infection for all workers and project guests; vii) monitoring of workers' health conditions and controlling the mobilization and demobilization of workers; viii) giving vitamins and supplements to increase workers' immunity; ix) procurement of health facilities; and x) reporting to the top management of the project owner if a positive worker is found and/or the status of a patient is under suspect control and recommending the temporary termination of the project [22, 23].

#### 2.3.2 Identification of potential COVID-19 hazards on site

The COVID-19 Prevention Task Force Team coordinates with the Ministry of Public Work and Housing's COVID-19 Task Force to determine the level of risk of COVID-19 hazards [24, 25]. If the identification of potential hazards for COVID-19 is found to be a high-risk project, then:

1. Has a high risk due to the project location being in the center of the spread of COVID-19
2. Positive work and/or patient status under COVID-19 control has been discovered.
3. The leadership of ministries, institutions, agencies, and heads of regions has issued regulations to temporarily stop activities due to force majeure.

2.3.3 Provision of health facilities on site

1. Contractors must provide an on-site clinic with appropriate medical equipment, including oxygen, thermostats, blood pressure monitors, medications, and medical staff.
2. Contractors should work with their nearest hospital and/or community health center to prepare for emergencies for COVID-19 health protection and prevention.
3. Contractors are obligatory to provide additional facilities including hand washing (water, soap, and hand sanitizer), tissues and masks in the office and on-site for all workers and guests; and
4. Contractors must provide vaccines, vitamins, and supplemental nutrients to boost workers' immunity.

2.3.4 Implementation of COVID-19 prevention on site

The task force team put up digital and physical posters and

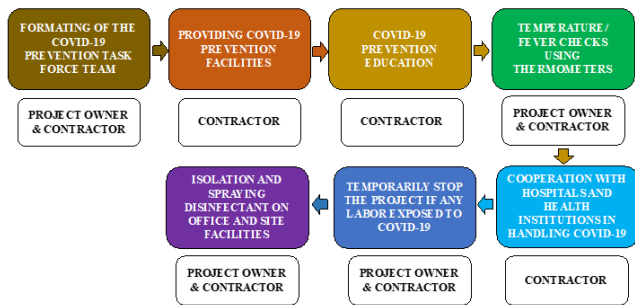
flyers for the prevention of COVID-19 [26].

1. The Task Force Team, together with medical officers, delivered explanations, recommendations, campaigns, and promotion of COVID-19 prevention techniques.
2. Medical officers, together with security staff, carry out regular body temperature measurements of all workers (morning, afternoon, and evening).
3. The Task Force Team prohibits all people who are indicated to have a body temperature of 38 (thirty-eight) degrees Celsius from entering the site.
4. If there is a patient under COVID-19 control status, work must be temporarily suspended for at least 14 (fourteen) working days.
5. Medical Officers, assisted by Security Staff, evacuate and spray disinfectants in all places, facilities, and work equipment.
6. A temporary suspension is implemented until the process of evacuation and disinfectant spraying, health checks, and isolation of workers who have had physical contact with workers exposed to COVID-19 is completed.

Based on the study of literature and Inmen policies, a health protocol for the prevention of COVID-19 was developed, as outlined in Table 1. Figure 1 shows the mechanism of covid-19 preventive health protocols.

**Table 1.** COVID-19 preventive health protocols in construction projects

Health Protocols for COVID-19 Prevention	Strategy of Health Protocols for COVID-19 Prevention		
	Code		Description
A. Formation of the COVID-19 Prevention Task Force Team	A.1	Task Force Team	The Owner and Contractor form the COVID-19 Prevention Task Force and become part of the Construction Safety Team
	B.1	Shift work	Shift work (increase social distance), Staggered breaks and lunches
B. Sosial Distance	B.2	Remote work	Separated project offices and Remote work, Increased use of remote worksite for prefabrication
	B.3	Saparate work	Separate work areas isolated via barriers
C. Minimize Group	C.1	Small Group	Shift work (minimize large groups)
	C.2	Online Meeting	Use of technologies (e.g., using Skype and Zoom for meetings)
D. Job Site Screening	D.1	Screening worker	Travel questionnaires, Workers physically examined for exposure conditions, Screening using onsite cameras
	D.2	COVID-19 Test	COVID-19 tests
E. Providing COVID-19 Prevention Facilities	E.1	Health facilities	The contractor provides additional facilities including: hand washing (water, soap and hand sanitizer), tissue, face shields, masks at the office and site for all workers and guests
	E.2	Vaccine & Supplement	Contractor provides COVID-19 Vaccine, Vitamins and supplements to increase worker immunity
	F.1	COVID-19 Posters	Task Force Team puts up posters/flyers) both digitally and physically regarding appeals/ recommendations
F. COVID-19 Prevention Education	F.2	Campaign & Promotion	Task Force Team together with medical officers provide training, explanation briefings, recommendations, campaigns, promotions of COVID-19 prevention techniques in every construction safety activity, for example Tools Box Meeting, Safety morning talk, Safety Induction, etc
	G.1	Body Temperature Check for Worker	Medical officers together with the Security Staff carry out body temperature measurements for all workers and employees every morning, afternoon and evening
G. Temperature / fever checks using thermometers	G.2	Body Temperature Check for Guest	The Covid-19 Task Force prohibits people (all workers and guests) who are indicated to have a body temperature of > 38 (thirty eight) degrees Celsius from coming to the work location
	H.1	Coorporation with another institution	Contractor has operational cooperation for health protection and prevention of COVID-19 with the nearest hospital and/or health center for emergency actions (emergency)
I. Temporarily stop project activities if it is indicated that there are workers who suspect Covid 19	I.1	Isolation	If a worker is found at the site as a suspect COVID-19, the worker must be temporarily dismissed by the contractor for a minimum of 14 working days
	I.2	Disinfectant	Medical officers assisted by the Security Unit evacuate and spray disinfectant in all facilities and work equipment
J. Isolation and Spraying Disinfectant in Office and Site Facilities	J.1	Temperory suspension	The temporary suspension of the project is carried out until the process of evacuation and spraying of disinfectants, as well as the implementation of Health checks and isolation of exposed workers who have been completed.



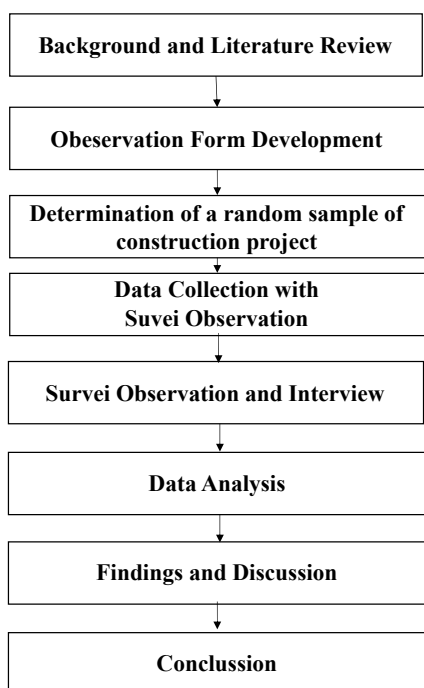
**Figure 1.** The mechanism of COVID-19 preventive health protocols refers to minister of public work and housing instruction No. 02/2020

### 3. RESEARCH METHODOLOGY

#### 3.1 Research process

Data collection was carried out by direct observation in the field of 15 under-construction projects in Indonesia. Observation and collection of authentic evidence such as project reports, cooperation documents, PPE facilities, etc. Observations were made directly by using the Observation Form on elements and sub-elements of the COVID-19 outbreak prevention protocol that had been compiled based on a literature study.

Furthermore, the data obtained at the site is completed and reconfirmed through interviews with relevant parties directly in the field, including the contractor, represented by the project manager, site engineer, and HSE officer. The questionnaires distributed through this stage were subjected to a questionnaire reliability test involving 5 people in 1 selected project, namely the Karalloe Dam Intake Package I Project in Gowa, South Sulawesi Province to test the extent to which this questionnaire could be understood. Figure 2 shows the research process.



**Figure 2.** Research process

#### 3.2 Data collection

The selection of construction projects as a place to observe health protocol measurements for the prevention of COVID-19 was carried out at random. The selected construction projects are construction projects that are still under construction. Furthermore, 15 (fifteen) selected construction projects were obtained as outlined in Table 2.

**Table 2.** List of construction projects as research objects

No	Project Name
1	Karalloe Dam Intake Package I in Gowa, South Sulawesi Province
2	Karalloe Dam Package II in Gowa, South Sulawesi Province
3	Construction of Sewerage and Wastewater Collection System North West Catchment (Makassar Sewerage B2), South Sulawesi Province
4	Package 1 Temef Dam Development Project in NTT Province
5	Panakukang Branch Office of Bank Rakyat Indonesia (BRI) Project in Makassar City, South Celebes District
6	Warehouse in Industrial Zone, Terusan Cipatik in Bandung, West Java Province
7	Leuwikeris Dam Package 4, Ciamis District, West Java Province
8	Bendo Dam, Ponorogo District, East Java Province
9	Bener Dam Package 2, Purworejo District, Central Java Province
10	Caringin Office Building, Sukabumi District, West Java Province
11	Tapin Dam, Tapin District, South Borneo
12	Gongseng Dam, Bojonegoro District, East Java Province
13	A.P. Flyover Toll Road Pettarani, Makassar City South Sulawesi Province
14	Renovation of Seskoau . Building and Facilities, East Java Province
15	Buakana Home Stay, Malang District, East Java Province

Information related to the level of COVID-19 measurement was obtained from ratings based on a five-point Likert scale (ranging from "1" = "strongly not implemented" to "5" = "strongly implemented"). Finally, the value of measuring the level of implementation of the COVID-19 preventive health protocol is verified and re-confirmed to the parties related to the project represented by the project manager, site manager, and HSE staff.

#### 3.3 Data analysis

The data that has been collected is then processed using the SPSS Statistical Program for Social Science Analysis with a quantitative analysis approach to see a description of the distribution of the data. A total of 15 pieces of data were obtained, which were then processed to get an overview of the data by calculating. To answer the research objectives, this study analyzes data using a combination of descriptive and inferential statistical methods. Data analysis consists of: 1) data processing with descriptive analysis to identify the value of the mean, the value of the median, and the value of the standard deviation, and p value 2) The research team assessed potential differences between COVID-19 preventive health protocols using a non-parametric inferential statistical approach based on observations. The test is carried out by using p-value analysis with equation 1.1. The analysis used is a statistical analysis which consists of descriptive analysis

which aims to describe and illustrate the data while inferential analysis is used to test hypotheses and make conclusions based on samples taken from the population.

#### 4. RESULT AND DISCUSSION

Based on the average measurement of the implementation of the COVID-19 prevention health protocol, there are 10 strategies, namely (i) task force establishment; (ii) social distance; (iii) minimize group; (iv) job site screening; (v) providing health facilities on site; (vi) COVID—19 education; (vii) temperature/ fever checks using thermometers; (viii) cooperation in handling COVID-19 suspects with health institutions; (ix) temporarily stop project activities if it is indicated that there are workers who suspect COVID-19; and (x) isolation and spraying disinfectant for facilities and infrastructure.

From the 10 strategies for implementing COVID-19 preventive health protocols, there are indicators of these strategies including (i) task force team; (ii) shift work, remote work, separate work; (iii) small group and online meeting; (iv) screening worker and COVID-19 test; (v) health facilities and vaccine & supplement; (vi) COVID-19 posters and campaign & promotion; (vii) body temperature check for worker and body temperature check for guest; (viii) corporation with another institution; (ix) isolation and disinfectant; and (x) temporary suspension.

The temporary suspension of the project is carried out until the process of evacuation and spraying of disinfectants, as well as the implementation of health checks and the isolation of

exposed workers, have been completed (p-value 0.01). This is in line with the confirmation with parties represented by the Project Manager, Site Manager, and HSE Staff through interviews stating that the protocol is considered the most effective in preventing the COVID-19 outbreak.

Furthermore, for the COVID-19 prevention health protocol which has not yet been strongly implemented, it is a protocol that includes: (i) The Owner and Contractor form the COVID-19 Prevention Task Force and become part of the Construction Safety Team, (ii) Travel questionnaires, Workers physically examined for exposure conditions, Screening using onsite cameras, (iii) COVID-19 tests, (iv) Contractor has operational cooperation for health protection and prevention of COVID-19 with the nearest hospital and/or health center for emergency actions (emergency) ((p-value > 0.01).

Research conducted in Iraq states that the main protection or strategy implemented at public construction sites is the Covid-19 standard which addresses hazards including maintaining a stay-at-home policy for sick employees [26]. In addition, prevention and protection measures from COVID-19 at low risk are reducing the number of people in the same room, by considering the density of 1 person every 10 square meters which are in accordance with the results of this study, namely implementing small groups [27]. Research conducted in several construction works in North Sumatra stated that contractors provide health facilities to prevent the spread of COVID-19 [28]. Table 3 shows results of processing data on the level of measurement of the implementation of health protocols for the prevention of COVID-19 on Construction Projects.

**Table 3.** The results of processing data on the level of measurement of the implementation of health protocols for the prevention of COVID-19 on construction projects

Strategy of Health Protocols for COVID-19 Prevention	Code	Min	Max	Mean	SD	p-Value
A. Task Force Establishment	Task Force Team	4	1	2.933	0.961	0.023
	Shift work	5	2	3.467	0.834	<0.01
B. Sosial Distance	Remote work	5	2	3.267	0.799	<0.01
	Separate work	5	3	3.200	0.561	<0.01
C. Minimize Group	Small Group	5	3	3.733	0.594	<0.01
	Online Meeting	5	3	3.667	0.617	<0.01
D. Job Site Screening	Screening worker	4	2	2.733	0.594	0.013
	COVID-19 Test	5	1	2.667	1.113	0.223
E. Providing Health Facilities on site	Health facilities	4	3	3.533	0.516	<0.01
	Vaccine & Supplement	4	1	3.200	1.082	<0.01
F. COVID-19 Education	COVID-19 Posters	4	3	3.600	0.507	<0.01
	Campaign & Promotion	4	3	3.533	0.516	<0.01
G. Temperature/ fever checks using thermometers	Body Temperature Check for Worker	4	2	3.000	0.655	<0.01
	Body Temperature Check for Guest	4	3	3.571	0.514	<0.01
H. Cooperation in Handling COVID-19. Suspects with health institutions	Cooperation with another institution	3	2	2.400	0.507	0.458
I. Temporarily stop project activities if it is indicated that there are workers who suspect COVID-19	Isolation	5	2	3.867	0.990	<0.01
	Disinfectant	5	2	3.733	0.884	<0.01
J. Isolation and spraying disinfectant for facilities and infrastructure	Temporery suspension	5	2	3.333	1.047	<0.01

#### 5. CONCLUSION

The prevention protocol for construction projects is an attempt to maintain continuity of construction operations and prevent the spread of COVID-19 around construction projects. There are ten COVID-19 prevention health protocol strategies in construction projects including task force establishment,

social distance, minimize group, job site screening, providing health facilities on site, COVID-19 education, temperature/fever checks using thermometers, cooperation in handling COVID-19 suspects with health institutions, temporarily stop project activities if it is indicated that there are workers who suspect COVID-19, and isolation and spraying disinfectant for facilities and infrastructure.

Out of the 10 strategies available, each has a code that is an indicator of a health protocol strategy for COVID-19 prevention. Health protocols that have been implemented strongly in construction projects with a mean value >3.5 are COVID-19 prevention strategies: (i) isolation if it is indicated that there are workers who suspect COVID-19 (3.867), (ii) Disinfectant (3.733), (iii) Small Group (3.733), (iv) Online Meeting (3.667), (v) COVID-19 Posters, (vi) Campaign & Promotion (3.533), (vii) Health Facilities.

The strategies from this study are expected to serve as guidelines for future studies on other infectious diseases. In addition, these strategies can provide an overview of the extent of implementation of COVID-19 preventive health protocols in construction projects and input for future policy improvements.

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