Evaluation of the Implementation of Construction Safety Management System During the COVID-19 Pandemic in Apartment Construction Projects to Improve Construction Safety Performance

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Abstract

This study discusses the Evaluation of the Construction Safety Management System (CSMS) based on The Ministry of Public Works and Housing (Kemen PUPR) Regulation No 10 of 2021 concerning Guidelines for CSMS and Instructions of Kemen PUPR No 2 of 2020 regarding the Protocol to Prevent the Spread of Corona Virus Disease 2019 (COVID-19) in the Implementation of Construction Services on apartment construction projects to improve construction safety performance. CSMS is a new term introduced by Kemen PUPR Regulation No 10 of 2021 which is a new term to replace the Occupational Health and Safety (OHS) Management System where OHS Management System itself is already included in CSMS. Then due to the COVID-19 pandemic, a COVID-19 Prevention Protocol was compiled which refers to Instructions of Kemen PUPR No 2 of 2020 which was included as part of the CSMS so that in this study both were evaluated simultaneously. The purpose of this study was to find out how the process of implementing and evaluating the implementation of CSMS in apartment construction projects based on Instructions of Kemen PUPR 10 of 2021 and Instructions of Kemen PUPR No 02 of 2020 and provide recommendations for improvement and follow-up if the level of compliance in CSMS against existing regulations is still low. This research was conducted qualitatively that was designed descriptively. The results of this study are the level of compliance in CSMS based on existing regulations and provide recommendations for improvement and follow-up to improve construction safety performance.

Keywords

Construction Safety Management System, Construction Safety, COVID-19, Apartment, Kemen PUPR

1. Introduction

The Indonesian Contractors Association is also known as AKI revealed that the construction sector in Indonesia experienced a slowdown during the COVID-19 pandemic and needed fast handling. According to the Head of the International Relations Section of AKI who is also the Director of Adhi Karya Partha Sarathi, with this pandemic condition the construction sector continues to carry out its activities, there are 90 projects of PT. Adhi Karya that still running normally and 17 projects have been postponed due to financing and conditions in the field (not because of covid). This was also reinforced by the explanation of the Director-General of Construction Development Trisasongko Widianto, that the Ministry of PUPR guarantees that all construction projects in the country will continue during the COVID-19 pandemic. With these conditions, the COVID-19 protocol absolutely must be implemented at the project site, to protect workers and their families from exposure to the COVID-19 virus (Fitriani, 2020).

Construction projects during the pandemic have faced several problems, such as in one apartment construction project in the Kebon Sirih area. Due to the COVID-19 pandemic, this project was suspended for 2 months due to most of its employees being exposed to COVID-19. This termination is intended to break the chain of the spread of COVID-19 and to design risk mitigation and protocols to prevent the spread of COVID-19. After the project was discontinued, it continued with a reduction in the workforce. This is done so that social distancing can be carried out which is one of the general protocols for COVID-19. As a result of this reduction in manpower, the project experienced delays, so the management decided to work in 2 shifts and 3 groups. After the risk mitigation and COVID-19 prevention protocols have been developed the project can run again, although it is still behind schedule. However, in their daily life, there are still many workers who violate regulations such as not keeping their distance, not wearing masks, and other health protocols.

In addition, there was a phenomenon that eight-building construction project workers in Cakung Timur, Cakung, East Jakarta were exposed to COVID-19, as a result, the DKI Jakarta Provincial Government suspended the project (detiknews, 2020). Sealing is done for three days or 3x24 hours. Of the eight positive people, one was taken to the Wisma Atlet Emergency Hospital for further treatment and the other workers were self-isolating on orders from the company. Then in the Sudirman Apartment project, which is located on Jalan Jenderal Sudirman, Ujung Pandang District, Makassar City, there are 45 project workers who have tested positive after an antigen test (kumparan, 2021). After the discovery, the Makassar City COVID-19 Task Force closed the location for the construction of the apartment. Because of this phenomenon, the author decides to make this research to evaluate the implementation of construction safety management system during The COVID-19 pandemic in apartment construction projects to improve construction safety performance

Five factors cause the low implementation of Construction Safety Management System (CSMS) and protocols to prevent the spread of COVID-19 in a company, namely (Kurnia, 2020):

1. Factors for compliance with laws and regulations
   The implementation of CSMS in companies is not carried out consistently and is not following existing regulatory standards. Then only a small number of companies carry out compliance with laws and regulations regarding construction safety and the required protocols for preventing the spread of COVID-19.
2. Policy commitment factor
   The company's lack of firmness in implementing sanctions for violators of regulations so that workers repeatedly make mistakes and lack of priority in tackling construction safety policies and protocols to prevent the spread of COVID-19.
3. Human factors and work environment
   Many workers do not cooperate in implementing the construction safety management system and protocols for preventing the spread of COVID-19 in the work environment. Workers also have the perception that work safety is not too important and the awareness of workers about the dangers of work accidents and contracting COVID-19 is very minimal.
4. Budget or financial factors
   Limited costs and no budget regarding construction safety and protocols to prevent the spread of COVID-19 within the company.
5. The support factor from the government.
   The government itself is still lacking in monitoring the laws and regulations regarding the construction safety management system and protocols for preventing the spread of COVID-19 for each company.

To be able to overcome the problem of the low fulfillment of CSMS and the application of the protocol to prevent the spread of COVID-19, it is necessary to evaluate both. This evaluation is carried out to provide improvements in the form of recommendations for improvement and follow-up so that the CSMS and the COVID-19 prevention protocol are following applicable laws and improving construction safety performance. This evaluation will be guided by Kemen PUPR Regulation No. 10 of 2021 concerning Guidelines for Construction Safety Management Systems and the Instruction of Kemen PUPR No. 2 of 2020 regarding the Protocol to Prevent the Spread of COVID-19 in the Implementation of Construction Services. Then with the Ministerial Instruction, it means that prevention of the spread of COVID 19 is included in the CSMS as part of the adaptation of the Ministry of PUPR to the new normal (Bapekom PUPR II Palembang, 2020). So that these two regulations have become a single unit as a guideline for CSMS.

1.1 Objectives

1. Evaluate the level of compliance with CSMS in apartment construction projects based on the Kemen PUPR Regulation No. 10 of 2021.
2. Evaluating the level of compliance with the COVID-19 Prevention Protocol in the implementation of Construction Services on apartment construction projects based on the Instruction of Kemen PUPR No. 2 of 2020.
3. Propose recommendations for improvement and follow-up based on the level of compliance with the CSMS and the COVID-19 Prevention Protocol in apartment construction projects.

2. Literature Review

According to the Law of the Republic of Indonesia Number 20 of 2011 concerning apartments, apartments are multi-story buildings that are built in an environment divided into functionally structured parts, both horizontally and vertically, and are units that each can be owned and used separately, especially for dwellings equipped with shared parts, shared objects, and shared land. The construction of apartments is an alternative solution to the problem of housing and settlement needs, especially in urban areas where the population continues to increase because the construction of apartments can reduce land use, create more spacious open urban spaces, and can be used as a way of rejuvenation city for slum areas (Hutagalung, 2004).

According to Kemen PUPR Regulation No. 10 of 2021, Construction Safety is all engineering activities to support Construction Works in realizing the fulfillment of Security, Safety, Health, and Sustainability Standards that guarantee construction engineering safety, workforce safety and health, public safety, and environmental safety. The implementation of the CSMS must meet the Security, Safety, Health, and Sustainability Standards by ensuring the following:

1. Construction engineering safety, with building objects, construction assets, equipment, and materials
2. Occupational safety and health, with the object of the owner or employer, construction workers, suppliers, guests, and service sub-providers
3. Public safety, with community objects around the project and exposed communities
4. Environmental safety, with the object of the work environment, the project affected environment, the natural environment, and the built environment

The objects studied in this study were CSMS and the COVID-19 prevention protocol in the apartment construction project. The main variables of this study consisted of 5 elements of CSMS plus the COVID-19 prevention protocol on the project. The five elements of CSMS based on Kemen PUPR Regulation No. 10 of 2021 and the sixth variable, namely the COVID-19 prevention protocol in the implementation of construction services based on the Instructions of Kemen PUPR No 2 of 2020, are as follows:

1. Leadership and labor participation in construction safety
2. Construction safety planning
3. Construction safety support
4. Construction safety operation
5. Construction safety management system performance evaluation
6. COVID-19 prevention protocols in the implementation of construction services

These six variables were obtained based on the related regulations. This variable is used as a benchmark for the level of compliance of the flat construction project to the applicable regulations. Measurement of the level of compliance is carried out as an effort to reduce the rate of construction accidents and improve construction safety performance through recommendations for improvement and follow-up. To measure the level of compliance, the six variables will be analyzed using a gap analysis of the applicable regulations, namely the Kemen PUPR Regulation No. 10 of 2021 for CSMS and the Instructions of Kemen PUPR No 2 of 2020 for the COVID-19 prevention protocol. Gap analysis in this study was conducted using a questionnaire as a research instrument. Where in addition to filling out the questionnaire, the informants will also be interviewed referring to the questionnaire. So that it can be assessed whether the implementation of the CSMS and the COVID-19 prevention protocol that has become part of the CSMS, has been complied with or not and if it has complied with the extent to which it complies with the applicable regulations. Evaluation of the implementation of the CSMS is very important because every Service User and Service Provider in the implementation of Construction Services must implement the CSMS. The implementation of CSMS is carried out based on the duties, responsibilities, and authorities as stated in the applicable regulations. The COVID-19 prevention protocol is designed to support the sustainability of development activities and the community's economy as well as

to ensure that the implementation of construction services at the Ministry of PUPR is carried out safely, effectively, and efficiently during the COVID-19 pandemic.

After a gap analysis has been carried out for each variable that does not meet these regulations, recommendations for improvement and follow-up will be given based on the literature study and expert's judgment. To obtain an expert's judgment, interviews with construction safety experts will be conducted by discussing the results of the previous gap analysis. After recommendations for improvement and follow-up have been developed, it is hoped that they can be used as a reference for future projects so that the CSMS and the COVID-19 Prevention Protocol that will be used are based on the latest regulations.

2.1 Hypothesis

The compliance rate of CSMS and COVID-19 prevention protocols implementation in apartment construction projects is 60-84% so recommendations for improvement and follow-up are needed to make it perfect.

3. Methods

This research has three Steps to achieve the main purpose of this research which is to evaluate the implementation of construction safety management system during the COVID-19 pandemic in apartment construction projects to improve construction safety performance, these three steps are as follows:

Step 1 : Validate research instruments. Validate research instruments are required to validate content and constructs carried out by experts to ensure that the questionnaires that have been made are following existing regulations and standards and complete the shortcomings of the questionnaire if any. This questionnaire contains research variables and their sub-variables, indicators, and references. The variables, sub-variables, and indicators have all been adjusted according to the references listed.

Step 2 : Collecting data. Data collection was carried out by distributing questionnaires to respondents to obtain gap analysis of predetermined indicators. The data that has been collected will be tested using statistical tests, namely homogeneity test, data adequacy test, validity test, and reliability test.

Step 3 : Gap analysis. Gap analysis is carried out between the regulations and the existing conditions where the level of compliance has been assessed by the respondents. Based on the results of the calculation of the fulfillment of indicators that are worth below 85%, recommendations for improvement and follow-up will be given because they do not meet the criteria for the gold flag.

Step 4 : Recommendations for improvement and follow-up. Recommendations for improvement and follow-up are provided based on the results of the gap analysis. Data collection will be carried out by interviewing construction safety experts based on the results of the gap analysis. Each variable that does not meet the requirements will be analyzed to find solutions so that the variable requirement can be met. Fulfillment of variables can be done by making new regulations, better management processes, or making new document requirements. The literature study is also used as an additional reference in providing recommendations for improvement and follow-up.

4. Data Collection

Data collection in this research is obtained by the questionnaire result. These questionnaires are made to calculate the compliance rate of CSMS and the COVID-19 Prevention Protocol that will be used to conduct a gap analysis. The rating scale used is the Likert scale which consists of 5 gradations, namely (Table 1):

Table 1. Likert Scale

Scale	Description
1	Very unsuitable
2	Not suitable
3	Sufficiently Suitable
4	suitable
5	Very suitable

The variables for which the compliance rate will be assessed are as follows in table 2:

Table 2. Variables

Variables	
X.1	Labor leadership and participation in Construction Safety
X.2	Construction Safety Planning
X.3	Construction Safety Support
X.4	Construction Safety Operation
X.5	Construction safety management system performance evaluation
X.6	COVID-19 Prevention Protocol in the implementation of Construction Services

Then the compliance rate is calculated using the following formula:

$$Compliance\ Rate = \left(\frac{Total\ Score}{Max\ Score}\right) \times 100\%$$

Based on the results of the calculation of the compliance rate, variables that are worth below 85% will be given recommendations for improvement and follow-up because they do not meet the criteria for the gold flag.

5. Results and Discussion

5.1 Statical Test

1. Homogeneity test

The homogeneity test is used to determine whether several population variants are the same or not, i.e. the differences are not caused by differences in the basic data (inhomogeneity of the groups being compared). The homogeneity test in this study was carried out with the help of the SPSS Statistics application. The homogeneity test used in this study was the Levene test. The data that was tested was said to be homogeneous based on its significance value, namely:

a. The significance value (p) 0.05 indicates that the data group comes from a population that has the same variance (homogeneous).
b. The significance value (p) < 0.05 indicates that each data group comes from a population with different variances (not homogeneous).

The results of the Levene's test carried out with the help of the SPSS Statistics application are as follows in table 3:

Table 3. Homogeneity Test Results

Variable	Levene Statistic	df1	df2	Sig.
X.1	.635	4	25	.642
X.2	.744	4	25	.571
X.3	.733	4	25	.578
X.4	.472	4	25	.756
X.5	.756	4	25	.564
X.6	.536	4	25	.711

Based on the results of the Levene test above, it was found that the significance value of all variables was 0.05 where which indicates that the data group comes from a population that has the same variance (homogeneous).

2. Data Adequacy Test

The data adequacy test is used to see the data adequacy requirements in factor analysis. The data adequacy test in this study was carried out with the help of the SPSS Statistics application. In this study, the data adequacy test was used with the Kaiser Meyer Olkin (KMO) and Bartlett's Test methods. The results of the tests that have been carried out are as follows:in table 4

Table 4. Data Adequacy Test Results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.843
Bartlett's Test of Sphericity	Approx. Chi-Square	223.785
	df	15
	Sig.	.000

Based on the test results, it was found that the KMO value of the data was 0.843 which was in the range of 0.8 KMO < 0.9 which means the data is good. Then the results of Bartlett's Test of Sphericity get a sig value. 0.000 which is less than 0.05 which means the correlation between variables is high and the factor analysis process can be continued. From the results of the data adequacy test, it was found that the adequacy of the data was good.

3. Validity Test

A validity test is a test that serves to see whether a measuring instrument is valid or invalid. The validity test in this study was carried out with the help of the SPSS Statistics application. In this study, validity measurements were used by correlating each item indicator score with the total construct score. The test carried out in this study is the Spearman Correlation Coefficient Test where the basis for decision making in the Spearman Correlation Test is as follows:

a. If the value of sig. <0.05 then, it can be concluded that there is a significant correlation between the variables connected.
b. On the other hand, if the value of sig. > 0.05 then, it can be concluded that there is no significant correlation between the variables connected.

The criteria for the level of relationship (correlation coefficient) between variables ranged from ± 0.00 to ± 1.00 the + sign was positive and the - sign was negative. The interpretation criteria are:

a. 0.00 to 0.20, meaning: almost no correlation
b. 0.21 to 0.40, meaning: low correlation
c. 0.41 to 0.60, meaning: moderate correlation
d. 0.61 to 0.80, meaning: a high correlation
e. 0.81 to 1.00, meaning: a perfect correlation

Based on the results of data processing that has been carried out and analyzed based on decision making and the criteria mentioned above, the results of the validity test are as follows in table 5-10:

Table 5. Variable X.1 Validity Test Results

Variable	N	Sig.	Coefficient Correlation	Conclusion
X.1.1.1	30	0.000	0.641	Valid
X.1.1.2		0.001	0.584	Valid
X.1.1.3		0.003	0.530	Valid
X.1.1.4		0.000	0.780	Valid
X.1.2.1		0.001	0.567	Valid
X.1.2.2		0.000	0.732	Valid
X.1.3.1		0.000	0.629	Valid
X.1.3.2		0.000	0.741	Valid
X.1.3.3		0.001	0.559	Valid
X.1.3.4		0.000	0.806	Valid
X.1.3.5		0.000	0.624	Valid
X.1.3.6		0.000	0.779	Valid
X.1.3.7		0.000	0.854	Valid
X.1.4.1		0.000	0.854	Valid

Table 6. Variable X.2 Validity Test Results

Variable	N	Sig.	Coefficient Correlation	Conclusion
X.2.1.1	30	0.000	0.799	Valid
X.2.1.2		0.000	0.706	Valid
X.2.1.3		0.000	0.820	Valid
X.2.1.4		0.000	0.735	Valid
X.2.1.5		0.000	0.770	Valid
X.2.2.1		0.000	0.613	Valid
X.2.2.2		0.000	0.786	Valid
X.2.2.3		0.000	0.765	Valid
X.2.2.4		0.000	0.844	Valid
X.2.2.5		0.000	0.737	Valid
X.2.2.6		0.000	0.725	Valid
X.2.2.7		0.000	0.849	Valid
X.2.3.1		0.000	0.620	Valid
X.2.3.2		0.000	0.629	Valid
X.2.3.3		0.000	0.634	Valid

Table 7. Variable X.3 Validity Test Results

Variable	N	Sig.	Coefficient Correlation	Conclusion
X.3.1.1	30	0.000	0.813	Valid
X.3.1.2		0.000	0.774	Valid
X.3.1.3		0.000	0.677	Valid
X.3.2.1		0.000	0.857	Valid
X.3.2.2		0.000	0.743	Valid
X.3.2.3		0.000	0.786	Valid
X.3.2.4		0.000	0.895	Valid
X.3.2.5		0.000	0.716	Valid
X.3.3.1		0.000	0.857	Valid
X.3.3.2		0.000	0.854	Valid
X.3.4.1		0.000	0.859	Valid
X.3.4.2		0.000	0.885	Valid
X.3.5.1		0.000	0.753	Valid

Table 8. Variable X.4 Validity Test Results

Variable	N	Sig.	Coefficient Correlation	Conclusion
X.4.1.1	30	0.000	0.745	Valid
X.4.1.2		0.000	0.638	Valid
X.4.1.3		0.000	0.819	Valid
X.4.1.4		0.000	0.761	Valid
X.4.2.1		0.000	0.744	Valid
X.4.2.2		0.000	0.826	Valid
X.4.2.3		0.000	0.796	Valid
X.4.2.4		0.001	0.562	Valid
X.4.2.5		0.000	0.852	Valid
X.4.2.6		0.000	0.808	Valid

X.4.2.7		0.000	0.699	Valid
X.4.2.8		0.000	0.642	Valid
X.4.2.9		0.000	0.782	Valid
X.4.2.10		0.000	0.888	Valid
X.4.2.11		0.000	0.800	Valid
X.4.2.12		0.000	0.891	Valid
X.4.2.13		0.000	0.790	Valid
X.4.2.14		0.000	0.850	Valid
X.4.2.15		0.000	0.812	Valid
X.4.2.16		0.000	0.859	Valid
X.4.2.17		0.000	0.908	Valid
X.4.2.18		0.000	0.893	Valid
X.4.2.19		0.000	0.836	Valid
X.4.2.20		0.000	0.772	Valid
X.4.2.21		0.000	0.821	Valid
X.4.2.22		0.000	0.803	Valid
X.4.2.23		0.000	0.677	Valid
X.4.2.24		0.000	0.658	Valid
X.4.2.25		0.000	0.813	Valid
X.4.2.26		0.000	0.851	Valid
X.4.2.27		0.000	0.902	Valid
X.4.2.28		0.000	0.851	Valid
X.4.2.29		0.000	0.837	Valid
X.4.2.30		0.000	0.890	Valid
X.4.2.31		0.000	0.827	Valid
X.4.2.32		0.000	0.903	Valid
X.4.2.33		0.000	0.898	Valid
X.4.2.34		0.000	0.726	Valid
X.4.2.35		0.000	0.739	Valid
X.4.3.1		0.000	0.870	Valid
X.4.4.1		0.000	0.856	Valid

Table 9. Variable X.5 Validity Test Results

Variable	N	Sig.	Coefficient Correlation	Conclusion
X.5.1.1		0.000	0.906	Valid
X.5.1.2		0.000	0.827	Valid
X.5.1.3		0.000	0.904	Valid
X.5.1.4		0.000	0.854	Valid
X.5.2.1	30	0.000	0.871	Valid
X.5.2.2		0.000	0.854	Valid
X.5.3.1		0.000	0.884	Valid
X.5.4.1		0.000	0.846	Valid
X.5.5.1		0.000	0.881	Valid

Table 10. Variable X.6 Validity Test Results

Variable	N	Sig.	Coefficient Correlation	Conclusion
X.6.1.1	30	0.000	0.715	Valid
X.6.2.1		0.000	0.795	Valid
X.6.2.2		0.000	0.818	Valid
X.6.2.3		0.000	0.790	Valid
X.6.3.1		0.000	0.829	Valid
X.6.3.2		0.000	0.821	Valid
X.6.3.3		0.000	0.731	Valid
X.6.3.4		0.000	0.840	Valid
X.6.4.1		0.000	0.728	Valid
X.6.4.2		0.000	0.880	Valid
X.6.4.3		0.000	0.823	Valid
X.6.4.4		0.000	0.753	Valid

Based on the results of the validity test, it was found that all indicators are valid because each indicator has a significant correlation with the variable because it gets a sig value < 0.05. In addition, for all indicators, the correlation coefficient is above 0.41, which means that the correlation is moderate from 0.41 to 0.60; high correlation for values 0.61 to 0.80; and perfect correlation for values 0.81 to 1.00.

4. Reliability test

A reliability test is used to determine the consistency of the measuring instrument, and whether the measuring instrument used is reliable and remains consistent if the measurement is repeated. The method used in this study is the Cronbach's Alpha method. Reliability means that it can be trusted, that is, the instrument can give the right results. The measuring instrument is categorized as reliable if it shows the constant of the measurement results and has the determination of the measurement results so that it is proven that the measuring instrument can be justified. The basis for the decision in Cronbach's Alpha Reliability Test is as follows:

a. If the value of Cronbach's Alpha > 0.60 then the questionnaire or questionnaire is declared reliable or consistent.
b. If the value of Cronbach's Alpha < 0.60 then the questionnaire or questionnaire is declared unreliable or inconsistent.

Based on the results of data processing and the basis for making decisions above, the results of reliability tests for each research variable and indicators are as follows (Table 11-16):

Table 11. Variable X.1 Reliability Test Results

Keterangan		N	%
Cases	Valid	30	100.0
	Excluded	0	.0
	Total	30	100.0

Cronbach's Alpha	N of Items
.905	14

Table 12. Variable X.2 Reliability Test Results

Keterangan		N	%
Cases	Valid	30	100.0
	Excluded	0	.0
	Total	30	100.0

Cronbach's Alpha	N of Items
.940	15

Table 13. Variable X.3 Reliability Test Results

Keterangan		N	%
Cases	Valid	30	100.0
	Excluded	0	.0
	Total	30	100.0

Cronbach's Alpha	N of Items
.955	13

Table 14. Variable X.4 Reliability Test Results

Keterangan		N	%
Cases	Valid	30	100.0
	Excluded	0	.0
	Total	30	100.0

Cronbach's Alpha	N of Items
.987	41

Table 15. Variable X.5 Reliability Test Results

Keterangan		N	%
Cases	Valid	30	100.0
	Excluded	0	.0
	Total	30	100.0

Cronbach's Alpha	N of Items
.968	9

Table 16. Variable X.6 Reliability Test Results

Keterangan		N	%
Cases	Valid	30	100.0
	Excluded	0	.0
	Total	30	100.0

Cronbach's Alpha	N of Items
.933	12

Based on the results above, it is found that each variable and indicator data have a Cronbach's Alpha value > 0.60, so the questionnaire is declared reliable or consistent.

5.2 Gap Analysis

After carrying out statistical tests, it is continued by calculating the compliance rate to perform gap analysis by comparing indicators and variables based on applicable regulations to existing conditions. The results of the calculation of the compliance rate of the CSMS and the COVID-19 Prevention Protocol are as follows in table 17:

Table 17. Variables Compliance Rate

Variables		Compliance Rate
X.1	Leadership and labor participation in Construction Safety	87.67%
X.2	Construction Safety Planning	86.27%
X.3	Construction Safety Support	85.08%
X.4	Construction Safety Operation	85.48%
X.5	Construction safety management system performance evaluation	84.89%
X.6	COVID-19 Prevention Protocol in the implementation of Construction Services	84.11%

Based on the results of the compliance rate above, it was found that 2 variables have a compliance rate below 85%, which means that these variables have poor existing conditions so recommendations for improvement and follow-up need to be given. The variables that have a compliance rate below 85% are (X.5) Construction safety management system performance evaluation and (X.6) COVID-19 Prevention Protocol in the implementation of Construction Services.

The existing condition of Construction safety management system performance evaluation that needs improvement are as follows:

1. Documentation of monitoring and measurement results is not done properly.
2. Internal audits related to the implementation of construction safety are not done periodically.
3. Documentation of audit results is not done properly.
4. The evaluation conducted is not well structured.
5. Recommendations for improvement and follow-up based on the evaluation results are not prepared properly and periodically.

And the existing condition of the COVID-19 Prevention Protocol in the implementation of Construction Services are as follows:

1. Health facilities in the field do not meet the requirement.
2. Follow-up, when a worker is exposed to COVID-19, has not been carried out properly.
3. Inadequate medical clinic space in the field.
4. Lack of cooperation between construction service providers and hospitals or health centers for follow-up if there are workers who are exposed to COVID-19.
5. Lack of efforts by service providers to increase the immunity of workers, either through the provision of vitamins or vaccinations.
6. Lack of COVID-19 education for workers.
7. Temperature measurement for all workers is not carried out routinely.

5.3 Recommendations for Improvement and Follow-up

Based on the gap analysis conducted recommendations for improvement and follow-up are made based on literature, expert judgment, and regulation. To improve the Construction safety management system performance evaluation, the evaluation must be well planned. Everything that will be done in the process must be planned, such as what will be evaluated, who will evaluate, and how the evaluation will be conducted. In addition, the evaluating officer must also understand the importance of this evaluation process. This evaluation should be scheduled and done regularly. the results of the evaluation in the form of monitoring and measurement must also be well documented. An evaluation report containing the results of the audit and recommendations for improvement and follow-up as the result of this evaluation activity must also be made.

To Improve the COVID-19 Prevention Protocol in the implementation of Construction Services, we must focus on efforts for prevention and follow-up to be done if the prevention fails. The most important thing to do in preventing COVID-19 is to keep social distancing and use masks that have been done well, but what is no less important is to

increase the immunity of workers through vaccination and vitamin consumption. vaccination and provision of vitamins must be carried out by service providers. Vaccination can be carried out in collaboration with hospitals, health centers, or other vaccine providers. the provision of vitamins must be carried out by health facilities as one of the requirements for completeness in the applicable regulations. In addition, briefing to workers must also be carried out to increase awareness about the dangers of the spread of COVID-19. Then follow-up, if any workers are exposed, should also be well planned. Things that must be planned include self-isolation for workers who are exposed and potentially exposed, the need for replacement of workers, and risk management when there is a temporary layoff or lack of human resources that can result in project delays. Details of The Recommendations for Improvement and Follow-up are as follow in table 18:

Table 1**8**. Recommendations for Improvement and Follow-up

Variable		**Compliance Rate**	**Existing Condition**	**Recommendations for Improvement and Follow-up**	**Reference**
X.5	Construction safety management system performance evaluation	84,89%	Documentation of monitoring and measurement results is not done properly.	Documentation of the results of monitoring and measurement must be done by putting them in a web-based performance monitoring and evaluation report.	Expert Judgement
			Internal audits related to the implementation of construction safety are not done periodically.	Internal audit needs to be included in the responsibilities attached to the company's organizational structure and applied as a unit price contract so that if it is not carried out, the contract payment value is reduced.	Expert Judgement
			Documentation of audit results is not done properly.	Documentation of audit results can be contained in a performance evaluation report, made web-based, and digitized into cloud-based storage.	Expert Judgement
			The evaluation conducted is not well structured.	Performance evaluation Standard operating procedure must be made by assessing the elements of the CSMS that are planned and implemented, included in the Contract Quality Plan, and socialized to evaluators and field workers.	Expert Judgement
			Recommendations for improvement and follow-up based on the evaluation results are not prepared properly and periodically.	Recommendations for improvement and follow-up must be carried out and ordered by Top Management and socialized to evaluators and field workers.	Expert Judgement
X.6	COVID-19 Prevention Protocol in the implementati	84,11%	Health facilities in the field do not meet the requirement.	Health facilities costs must be calculated according to need and accommodated with financing and applied as a unit price contract so that if this is not done, the value of the contract payment is reduced.	Expert Judgement

Variable		Compliance Rate	Existing Condition	Recommendations for Improvement and Follow-up	Reference
	on of Construction Services		Follow-up, when a worker is exposed to COVID-19, has not been carried out properly.	Handling the safety and health of workers must be cooperating with the nearest hospital/clinic	Expert Judgement
			Inadequate medical clinic space in the field.	Health clinic room costs must be calculated according to need and accommodated with financing and applied as a unit price contract so if this is not done, the value of the contract payment is reduced.	Expert Judgement
			Lack of cooperation between construction service providers and hospitals or health centers for follow-up if there are workers who are exposed to COVID-19.	The cooperation agreement is socialized and coordinated with health service agencies such as hospitals and health centers and is applied as a unit price contract so that if it is not carried out, the value of the contract payment is reduced.	Expert Judgement
			Lack of efforts by service providers to increase the immunity of workers, either through the provision of vitamins or vaccinations.	Program the provision of vitamins and vaccinations to workers regularly and accommodated by financing and applied as a unit price contract so that if it is not carried out, the value of the contract payment is reduced.	Expert Judgement
			Lack of COVID-19 education for workers.	Education can be replaced by giving slogans, banners, stickers, or announcements through audio media that are short, clear, and interesting.	Expert Judgement
			Temperature measurement for all workers is not carried out routinely.	Temperature measurement can be done with a thermal camera and accommodated with financing.	Expert Judgement

6. Conclusion

1. Based on the calculation results of the CSMS compliance rate in the apartment construction project based on the Kemen PUPR Regulation No. 10 of 2021, it was found that 1 variable out of 5 variables had a compliance rate that did not meet the criteria for an achievement level of 85-100% (given a certificate and gold flag). The variable that does not meet the criteria is (X.5) Construction safety management system performance evaluation.
2.
3. Based on the results of calculating the compliance rate of the COVID-19 Prevention Protocol in the implementation of Construction Services in the construction project of apartments based on the Instructions of Kemen PUPR No 2 of 2020 it was found that (X.6) the COVID-19 Prevention Protocol in the implementation of

Construction Services did not meet the criteria for the level of achievement of 85- 100% (given a certificate and gold flag). Then 7 of the 12 existing indicators, also did not reach these criteria.

4.

5. Based on the results of the calculation of the compliance rate of CSMS and the COVID-19 Prevention Protocol in apartment construction projects, variables that do not meet the 85-100% achievement level criteria (given a certificate and gold flag) need to be given recommendations for improvement and follow-up. These variables are (X.5) Construction safety management system performance evaluation and (X.6) the COVID-19 Prevention Protocol in the implementation of Construction Services. The recommendations for improvement and follow-up care are based on trusted references and expert judgment.

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Biographies

Muhammad Indra Nur Pratama joined the University of Indonesia in August 2017 as an undergraduate student majoring in civil engineering and continued his study in August 2021 as a master's student majoring in civil engineering. His reason to continue his study is to gain a deeper understanding of civil engineering, especially construction management. His previous research also has a topic in Construction Safety Management System (CSMS) that is a part of construction management. He currently finishing his second study on the same topic to get a better

understanding of the topic. His vision is to raise awareness of the importance of construction safety which must be seen as the number one aspect of construction management.

Prof. Yusuf Latief is a professor in civil engineering that focuses on construction and project management. He is one of the best lecturers at the University of Indonesia and already achieved more than 170 publications in both reputable international journals and conferences. He also guides many undergraduate, postgraduate, and doctoral students. His persistence in guiding has led many students to graduate. His love for education has led him to become a professor in the field of civil engineering majoring in construction and project management. He is also a role model in the engineering faculty at the University of Indonesia.