

Implementation of the Construction Safety Management System in the Time of the Covid-19 Pandemic in the Bank Indonesia Representative Office Construction Project Central Kalimantan Province

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ABSTRACT: The increasingly widespread spread of Covid-19 in all corners of the world is now having a very visible impact, especially in the construction services sector. This work accident in the health sector does not just happen suddenly and so quickly, therefore it is necessary to take action as a prevention effort in the form of reducing direct contact between construction workers as a potential danger of spreading the virus, so that it can be prevented from spreading properly. The potential hazards in question are various things that can happen in the implementation of construction work, including some things in construction work procedures that change, including work procedures using new health protocols. The Ministry of PUPR made a breakthrough in accelerating construction work using innovative technology with the aim of accelerating the development process. The implementation level of the Construction Safety Management System during the Covid-19 pandemic obtained the Customer Satisfaction Index (CSI) value based on the calculation analysis obtained by 89.5%, the value lies in the range of 80% CSI 100% which means that the respondents are very satisfied with the Work Instructions. using the Health Protocol at the time of development. The results of the questionnaire analysis were calculated using the Importance Performance Analysis (IPA) method, it was found that the factor or variable of staff or employee dissatisfaction, namely the innovative technology variable, this illustrates the expectations of the respondents on the use and implementation of innovative technology, so that the use of innovative technology in the implementation of development is highly recommended in order to accelerate the development process during this COVID-19 pandemic. The solution provided with the completion step is by using innovative technology to accelerate the development process then providing socialization that continues to develop and psychological assistance on a regular basis.

KEYWORDS: Covid-19, Construction Safety, CSI, IPA, Innovative Technology

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I. INTRODUCTION

Each construction project has a different level of potential danger of spreading Covid-19 in their respective fields, such as the construction project undertaken by PT. Wika is the Central Kalimantan Province KPwBI Development Work. Where this project is included in the type of building construction project with a function as a commercial or bank that has different needs from other buildings and has different characteristics from other projects, namely projects that are carried out in more than one year or multiyears, so this has quite an impact on the existence of the spread of Covid-19 which has no certainty of completion until when.

The potential hazards in question are various things that can happen in the implementation of construction work, with the Covid-19 outbreak, one of which is that there are several things in construction work procedures that have changed, including work procedures using the new Health Protocol. Then at the stage of placing new work instructions with the Health Protocol for the spread of Covid-19. The instructions for work instructions certainly cannot be separated from being an important role in order to make it easier for construction workers to carry out construction work, several things related to the project in the field there are laying regulations regarding health protocols whose position is not strategic, so that it is one of the causes of the lack of knowledge of workers about the Covid-19 pandemic.

The change in the way of working that currently uses the Health Protocol has resulted in an adjustment process to changing work habits within the Central Kalimantan Province KPwBI Development Work Project. The Ministry of PUPR has made a breakthrough in accelerating construction work using innovative technology with the aim of accelerating the development process. The Customer Satisfaction Index (CSI) method is used to determine the extent of the implementation of SMKK in the Covid-19 Pandemic Period in the Central Kalimantan Province KPwBI Development Work Project as a whole with an approach that considers the importance of the variables measured and the Importance Performance Analysis (IPA) analysis method for the analysis between perceptions and expectations of staff and employees to the existing conditions using questionnaire data. After getting the average score (mean), then the score data is described in the form of quadrants so that indicators or variables can be sorted out in the four quadrants.

II. LITERATURE REVIEW

The Covid-19 pandemic is an immediate health emergency. SMKK is part of the management system for the implementation of construction work, either all or part of activities ranging from construction to maintenance of a building in order to ensure the realization of Construction Safety. The protocol for preventing the spread of Covid-19 based on the Work Instructions of PT. Wika has a prevention mechanism consisting of mandatory protocols and special protocols. In the mandatory protocol, there are elimination measures to prevent the spread of Covid-19, namely working at home or Working From Home (WFH). Then in the special protocol, there is an identification made by Acting. SHE and Pj. Personnel in the work unit based on the risk of exposure in the work area and job characteristics. The personnel are grouped into 3 groups and then controlled to prevent exposure. The group consists of high, medium and low risk.

Innovative Technology is a program used by the government as a breakthrough in the form of a response response in completing construction construction in the midst of a pandemic, where the implementation method utilizes fabricated materials or components that are made outside the project site or within the project site, then installed in the field. Innovative technology in the construction sector also has other types, such as BIM (Building Information Modeling) which is a digital solution in the form of software that has a major role in coordinating and integrating the exchange of information and knowledge between various disciplines and phases in the project. BIM has several benefits, namely better control over construction projects, early detection of potential conflicts during the design phase. The Customer Satisfaction Index (CSI) Analysis method is used to determine the overall level of users with an approach that takes into account the variables of SMKK implementation during the Covid-19 pandemic in Development Projects. Importance Performance Analysis (IPA) method is used to measure the relationship between consumer perceptions and priorities for improving the quality of products or services known as quadrant analysis. This analysis is also used to identify what factors are addressed by respondents in meeting service users.

III. RESEARCH METHODS

Primary data is used, namely data taken from a study using instruments that are carried out at a certain time and the results cannot be generalized and can only describe the situation at that time, primary data were collected directly by means of interviews and questionnaires using CSI analysis techniques to determine the level of users as a whole and IPA to find out what potential hazards affect the performance of workers in the implementation of the Central Kalimantan Province KPwBI Construction Construction Project.

In creating a new work culture habituation by using the health protocol on the KPwBI Construction Project Development Project of Central Kalimantan Province by PT. Wika uses secondary data or existing data, namely Work Instructions owned by PT. Wika, and the Instruction of the Minister of PUPR. This secondary data was obtained by means of direct observation and interviews in the field with the Safety Health Environment (SHE) Personnel, the Covid-19 Task Force, and Engineering Personnel then measuring responses to regulations, practices, and opportunities in using innovative technology starting from the formulation of problems and research objectives. supported by the collection of literature studies and related data and the preparation of recommendations for adjustments to new work habits using health protocols.

IV. RESULT AND DISCUSSION

4.1. RESULT

4.1.1 CSI Method

CSI is used to determine the extent of the implementation of SMKK in the Pandemic Period in the Central Kalimantan Province KPwBI Development Work Project as a whole through an approach taking into account the importance of the variables being measured.

Table 1 Results of CSI Analysis.

Variabel	Mean Importance Score (MIS)	Weight Importance Factor (WF) $WF = \frac{MIS}{\text{Total MIS}} \times 100\%$	Mean Satisfaction Score (MSS)	Weighting Score (WS) $WS = WF \times MSS$
X ₁ ,	4.59	3.41%	4.29	0.147
X ₂ ,	4.71	3.50%	4.35	0.152
X ₃ ,	4.59	3.41%	4.24	0.145
X ₄ ,	4.53	3.37%	4.06	0.137
X ₅ ,	4.35	3.24%	4.29	0.139
X ₆ ,	4.24	3.15%	4.47	0.141
X ₇ ,	4.41	3.28%	4.59	0.151
X ₈ ,	4.41	3.28%	4.53	0.149
X ₉ ,	4.29	3.19%	4.53	0.145
X ₁₀ ,	3.71	2.76%	4.35	0.120
X ₁₁ ,	3.88	2.89%	4.53	0.131
X ₁₂ ,	3.76	2.80%	4.71	0.132
X ₁₃ ,	4.24	3.15%	4.41	0.139
X ₁₄ ,	4.41	3.28%	4.53	0.149
X ₁₅ ,	4.29	3.19%	4.59	0.147
X ₁₆ ,	3.82	2.84%	4.35	0.124
X ₁₇ ,	4.29	3.19%	4.18	0.133
X ₁₈ ,	4.41	3.28%	4.41	0.145
X ₁₉ ,	3.71	2.76%	4.59	0.127
X ₂₀ ,	4.29	3.19%	4.76	0.152
X ₂₁ ,	4.24	3.15%	4.41	0.139
X ₂₂ ,	3.88	2.89%	4.59	0.133
X ₂₃ ,	4.24	3.15%	4.65	0.146
X ₂₄ ,	3.76	2.80%	4.59	0.129
X ₂₅ ,	4.06	3.02%	4.53	0.137
X ₂₆ ,	4.35	3.24%	4.53	0.147
X ₂₇ ,	3.82	2.84%	4.47	0.127
X ₂₈ ,	3.82	2.84%	4.59	0.131
X ₂₉ ,	3.82	2.84%	4.41	0.125
X ₃₀ ,	4.35	3.24%	4.59	0.149
X ₃₁ ,	4.59	3.41%	4.59	0.157
X ₃₂ ,	4.53	3.37%	4.59	0.155
Weight Average Total (WAT) Weighting Score				4.475
Customer Satisfaction Index (CSI) = $\frac{\text{Weight Average Total (WAT)}}{\text{High Scale (HS)}} \times 100\%$				89.5%

The results of the CSI analysis are obtained from a comparison between the level and level of user interest in the new Health Protocol of 4,475. obtained by 89.5%, then the value is in the CSI value range, which is between 80% (CSI (100%)), which means that the respondent is very satisfied with the work instructions using the Covid-19 Health Protocol at the time of its implementation.

4.1.2 IPA Method

This IPA analysis is an analysis of the calculation between respondents' perceptions and expectations of the existing conditions using questionnaire data. After obtaining the mean score, then the score data is described in the form of quadrants so that indicators or variables can be sorted out in the four quadrants.

Table 2 Total Score of Respondents' Assessment of the level of performance and level of importance.

Variabel	Score Mean Performance (X)	Score Mean Importance (Y)
1	4.76	4.59
2	4.76	4.71
3	4.71	4.59
4	4.18	4.53
5	4.53	4.35
6	4.59	4.24
7	4.71	4.41
8	4.82	4.41
9	4.47	4.29
10	4.18	3.71
11	3.94	3.88
12	3.82	3.76
13	4.59	4.24
14	4.12	4.41
15	4.18	4.29
16	4.71	3.82

17	4.53	4.29
18	4.47	4.41
19	4.12	3.71
20	4.53	4.29
21	4.53	4.24
22	3.94	3.88
23	4.53	4.24
24	3.88	3.76
25	4.29	4.06
26	4.47	4.35
27	4.35	3.82
28	4.29	3.82
29	4.24	3.82
30	4.65	4.35
31	4.12	4.59
32	4.12	4.53
Rata-rata	4.200	4.379

From the calculation in Table 2, the position of the level and the level of importance is described by entering the mean value of each variable which will become the quadrant boundaries on the Importance Performance matrix, either a Cartesian diagram or an Importance Performance matrix, where the mean on the x-axis and the mean importance on the y-axis with points the intersection of the axes (x,y) the total mean value for the (x) level is 4,200 and the total mean importance level (y) is 4,379. Cartesian diagram and Importance Performance matrix can be seen in Figure 1.

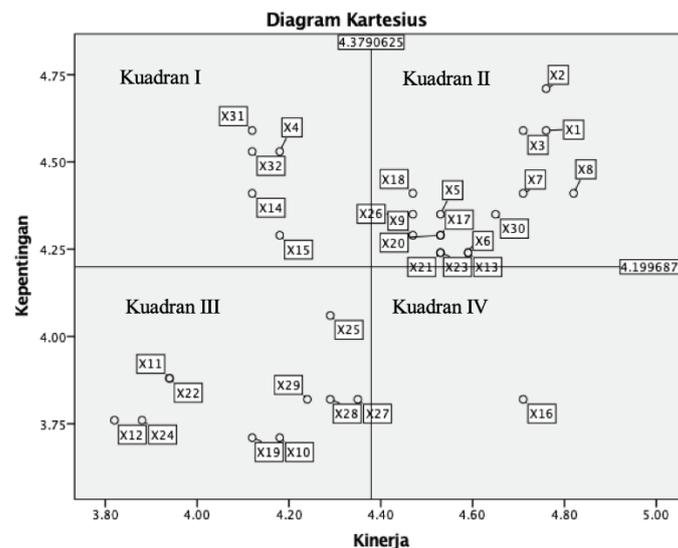


Figure 1 Cartesian diagram and Importance Performance matrix

The diagram can be classified into four quadrant diagrams:

1. Quadrant I (Top Priority)

Quadrant I shows that the factors in this quadrant need to be considered, either prioritized or increased again to meet the implementation of the Covid-19 health protocol. Because the existence of variables in this quadrant is very important but its implementation is still not satisfactory. These variables are listed in Table 3, Table 4, and Table 5.

Table 3 Construction safety variables in Quadrant I

Variable	Measurement Variable	Quadrant	Handling
X ₄	Implementation of occupational health refers to work productivity in construction safety.	I	Main Priority

Table 4 Variables of Covid-19 Health Protocol in Quadrant I

Variable	Measurement Variable	Quadrant	Handling
X ₁₄	Organizing training and socialization related to Covid-19	I	Main Priority
X ₁₅	Providing psychological assistance for working personnel.	I	Main priority

Table 5 Variables of Innovative Technology in Quadrant I

Variable	Measurement Variable	Quadrant	Handling
X ₃₁	Use of Modular Technology	I	Main Priority
X ₃₂	When applying the Modular method	I	Main Priority

There are 5 variables, consisting of 1 variable from the construction safety factor, 2 variables from the Covid-19 Health Protocol implementation factor, and 2 variables from the innovative technology factor. Variables in quadrant I indicate that the interests or expectations of respondents are high and the level of implementation is still not satisfactory, therefore the handling of variables in quadrant I becomes a top priority. And it needs to be improved again so that the employees who work reach high levels. It can be seen from the results of quadrant I variables (X4, X14, X15, X31, X32) which can be seen in Table 3, Table 4, Table 5 of the measurement variables, for importance it turns out that there are Construction Safety Variables and Covid-19 Health Protocols (see attachment variables-variable to quadrant I), meanwhile for the level of performance or performance, respondents are dissatisfied with the innovative technology variable but have a very important interest in accelerating existing work.

2. Quadrant II (Middle)

This quadrant shows factors that are considered important and are expected to be supporting factors for respondents so that they must be able and able to maintain their performance. This quadrant also has a high level and level of importance, in other words the respondents are already satisfied. Generally, the implementation has been in accordance with the interests and expectations of the implementation of the process so that the respondents have achieved it. The variables included in this quadrant can be seen in Table 6 and Table 7.

Table 6 Construction safety variables in quadrant II

Variable	Measurement Variable	Quadrant	Handling
X ₁	Implementation of construction safety in the scope of work	II	Keep Performance
X ₂	Implementation of construction safety in field conditions	II	Keep Performance
X ₃	Use of personal protective equipment as part of construction safety	II	Keep Performance
X ₅	Implementation of occupational health includes health protection, disease prevention, occupational health requirements	II	Keep Performance
X ₇	Implementation of the formation of the covid-19 task force	II	Keep Performance

Table 7 Variables of Covid-19 Health Protocol in quadrant II

Variable	Measurement Variable	Quadrant	Handling
X ₈	Working air circulation system	II	Keep Performance
X ₉	Application if there are personnel / workers showing symptoms of COVID-19, they are separated in an isolation room	II	Keep Performance
X ₁₃	Pemantauan Kesehatan hingga 14 hari setelah bekerja di area risiko tinggi	II	Keep Performance
X ₁₇	Health Monitoring up to 14 days after working in high risk areas	II	Keep Performance
X ₁₈	Reduce face-to-face meetings, if possible using the intercom	II	Keep Performance
X ₂₀	Monitoring body temperature and health condition before entering the workplace	II	Keep Performance
X ₂₁	Provision of facilities for success, for example hand sanitizer with at least 60% alcohol	II	Keep Performance
X ₂₃	Use of Special PPE according to the level of risk of the personnel (Gloves, Protective Clothes (Gown / Hamzat), Face shield (if needed), Safety Goggles, Masks / Respirators)	II	Keep Performance

X ₂₆	3M Implementation (Mask Use, Hand Washing, and Keeping Distance)	II	Keep Performance
X ₃₀	Temporary suspension if there are workers who are positive for Covid-19	II	Keep Performance

There are 15 variables, consisting of 6 variables from the Construction Safety factor and 9 variables from the Covid-19 Health Protocol factor, where the level and level of importance/expectations are high in this handling, it is necessary to maintain its performance, it can be said that the respondents are satisfied with the implementation of the Health Protocol. Covid-19 in Work Instructions

3. Quadrant III (Low Priority)

Quadrant III shows factors that have a level or level of importance that are considered not too important so that they are not a priority for handling or are improved because they are low priority. These variables are listed in Table 8:

Table 8 Variables of Covid-19 Health Protocol in quadrant III

Variable	Measurement Variable	Quadrant	Handling
X ₁₀	Installation of physical barriers, for example installing clear plastic barriers at security posts	III	Low Priority
X ₁₁	Minimize exposure, can place the minimum number of personnel if you have to work in high risk areas	III	Low Priority
X ₁₂	Arrangement of safe work paths to reduce encounters with outside parties that have the potential to transmit disease	III	Low Priority
X ₁₉	Monitoring body temperature and health conditions before entering the workplace	III	Low Priority
X ₂₂	Provision of Special PPE according to the level of risk of the personnel (Gloves, Protective Clothes (Gown / Hamzat), Face shields (if needed), Safety Goggles, Masks / Respirators)	III	Low Priority
X ₂₄	Availability of facilities for cleaning / disposing of disposable PPE	III	Low Priority
X ₂₅	Use of special PPE for high-risk personnel (minimum N95 mask, Safety Goggles, protective clothing (if needed)	III	Low Priority
X ₂₇	Regular health checks, provision of vitamins and nutrition	III	Low Priority
X ₂₈	Monitoring the health condition of workers (check temperature, wash hands, keep a distance)	III	Low Priority
X ₂₉	Procurement of health facilities in the field	III	Low Priority

There are 10 variables, all of which come from the same factor, namely the Implementation of the Covid-19 Health Protocol, where the level and level of importance or expectations are low but in handling it is at a low priority.

4. Quadrant IV

To show the factors that are considered not too expected by the respondents. This area has a high level while the level of importance is low. For this reason, its performance can be reduced by looking at the level of urgency in its implementation. Because the respondents consider it not too important to the existence of these

variables, while the quality of the implementation is very good so it is very satisfying. The variables included in this quadrant can be seen in Table 9:

Table 9 Construction safety variables in quadrant IV

Variable	Measurement Variable	Quadrant	Handling
X ₁₆	Installation of physical barriers, for example installing clear plastic barriers at security posts	IV	Excessive

There is 1 variable, where the level of implementation quality is very good and the level is quite satisfactory for respondents to the regulations on the Work Instructions so that the implementation of performance that is considered excessive by respondents can be reduced.

4.1.3 Analysis of Respondents' Research Results on the Field Actual

Analysis of the Variables Affecting the Implementation of the Construction Safety Management System During the Covid-19 Pandemic During the field implementation in quadrant I, it was stated that there were 5 variables, namely X4: Implementation of occupational health refers to work productivity in construction safety, X14: Implementation of training and socialization related to Covid-19 19, X15: Provision of psychological assistance for working personnel, X31: Use of Modular Technology, and X32: When the Modular Method is applied, from all these variables it is known that the level of interest or expectations of respondents is high but the level of performance is still low, especially on the construction safety variable and variables The Covid-19 health protocol is the first priority where improvements can be made in the form of methods and strategies to improve the implementation of these variables. Meanwhile, the innovative technology variable will be a suggestion from the researcher for the planning consultant. Then with this in mind, to look more deeply into whether there are still things lacking so that observations and interviews are carried out again to several representatives of the workers with a total of 3 people, as well as to observe directly and equate perceptions with the results of calculations from the questionnaire with the respondents being employees and staff, then a consultation was carried out to get directions from SHE Personnel, Covid-19 Task Force Personnel, and Engineering Personnel so that results and considerations were obtained that could be used as solutions and recommendations related to Construction Safety using the Covid-19 Health Protocol, as well as advice on the use of innovative technology. in accelerating the development process. The basis for observations and interviews from the results in Quadrant I are regarding "Are there any Covid-19 instructions?", "Are the placements appropriate and strategic to be achieved by workers?", and "Has the performance activities shown in the implementation of the new work instructions with Covid-19 Health Protocol? The hope is to reduce and avoid ignorance in the Covid-19 Health Protocol, with this it is possible for workers to work by keeping a distance and forming work groups that are far apart so as to minimize the occurrence of violations of new Work Instructions with the Covid-19 Health Protocol. Table 10 is the result of observations regarding the implementation of SMKK during the Covid-19 pandemic in the Central Kalimantan Province KPwBI Development Work, with classifications based on their respective potential hazard categories.

Table 10 Overview of the Implementation of SMKK during the Covid-19 pandemic at work Construction of Bank Indonesia Representative Office for Central Kalimantan Province

Category	Handling	Documentation	
		Before	After
High Risk	<p>Engineering Handling</p> <ul style="list-style-type: none"> • Ensure the air circulation system is available and running • Installing separators (physical barriers) • Personnel showing symptoms of Covid-19 are separated in isolation rooms 		

	Administrative Control	<ul style="list-style-type: none"> • Minimize exposure, can place the minimum number of personnel if you have to work in high risk areas • Arrangement of safe work paths to reduce encounters with outside parties that have the potential to transmit disease • Health Monitoring up to 14 days after working in high risk areas • Organizing training and socialization related to Covid-19 • Provide psychological assistance for working personnel 	
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Category	Handling	Documentation	
		Before	After
High Risk	Safe Work Practices <ul style="list-style-type: none"> • Provide a means for success, for example a hand sanitizer with at least 60% alcohol 		
	Additional APD <ul style="list-style-type: none"> • Gloves • Protective Gown (Gown / Hamzat) • Face Shield (If needed) • Safety Goggles • Mask/ Respirator 		
Medium Risk	Engineering Handling <ul style="list-style-type: none"> • Installing physical barriers, for example installing clear plastic barriers at security posts 		

	Administrative Handling	<ul style="list-style-type: none"> • Require sick personnel and guests to wear masks • Limiting guest visits only to the Living Room, not allowed to enter the work area • Reduce face-to-face meetings, if possible using intercoms • Monitoring body temperature and health condition before entering the workplace 	
	Additional APD	<ul style="list-style-type: none"> • Gloves • Protective Gown (<i>gown</i>), if needed • <i>Safety Glasses</i> 	

Category	Handling	Documentation	
		Before	After
Resiko Rendah	Engineering Handling	-	
	Administrative Handling	<ul style="list-style-type: none"> • Spread the latest information regarding Covid-19 • Encouraging active personnel to report suspicious conditions 	
	Additional APD	-	

Potential hazards that affect the spread of Covid-19 in the implementation of construction project development can be seen from the calculation results of the analysis of the implementation level of the Construction Safety Management System during the Covid-19 pandemic with a Customer Satisfaction Index (CSI) value of 89.5%, located in the range 80% CSI 100%. It can be concluded that respondents were very satisfied with the new Work Instructions using the Covid-19 Health Protocol at the time of development, which means that potential hazards in the field can be handled properly through the implementation of this new Work Instruction. The existence of interest or expectations from respondents on the use and implementation of Construction Safety using the Covid-19 Health Protocol, Implementation of SMKK in Work Instructions at the Bank Indonesia Representative Office Development Project in Central Kalimantan Province, it is felt that it needs to be improved again with new strategies and new working procedures that more efficient and have an impact on increasing worker productivity. At the time of the implementation of the new Work Instructions regarding the use of the Covid-19 Health Protocol when it was implemented in the field, it was already good, so this achievement needs to be maintained with several strategies to remind the health protocols through strategic positions so that they are easily accessible by workers, then visually color schemes so that they can be used. reduce and avoid ignorance in the Covid-19 Health Protocol, with this it is possible for workers to work by keeping a distance and forming work groups that are far apart so as to minimize direct contact or violations of new Work Instructions with the Covid-19 Health Protocol.

Judging from the actual conditions in the field, the use of Innovative Technology in the Project Work of the Bank Indonesia Representative Office of Central Kalimantan Province is still not fully using Innovative Technology, so it can be suggested to the Wika Gedung or planning consultant to use Innovative Technology to speed up the development process so that it can help minimize the spread Covid-19. Then the Implementation of Work Instructions using the Covid-19 Health Protocol can also be helped by this innovative technology. The sensitivity of the workers to the new work culture using the Covid-19 Health Protocol requires socialization in the form of verbal and visual explanations such as brochures, banners, and others. As well as psychological assistance so that they can assist workers in adjusting to a new work culture using the Covid-19 Health Protocol. The corrective analysis in Quadrant I is that new work procedures should be made as a strategy in increasing worker productivity while still paying attention to Construction Safety by using the Covid-19 Health Protocol.

Then socialization about Covid-19 can be carried out as a strategy in minimizing the spread of this pandemic which is updated both verbally and visually, and psychological assistance on a regular basis and periodically. As well as additional advice, in the use of innovative technology, the planning consultant can be reconsidered both in terms of costs and terms of what types of projects can use this technology. Considering that this project is a building construction project with commercial or bank functions, so it has different needs compared to other buildings.

V. CONCLUSIONS

The results of the level of importance or satisfaction in the Implementation of SMKK during the Covid-19 Pandemic on the use of new Work Instructions randomly for both staff and employees showed that the respondents were very satisfied. The results of the questionnaire analysis using the IPA method showed that respondents' dissatisfaction factors or variables were the Construction Safety variable, the Covid-19 Health Protocol variable, and the Innovative Technology variable.

The solution provided as a completion step is to carry out several strategies to increase worker productivity during the Covid-19 Pandemic, such as conducting socialization and psychological assistance that is updated and periodically to project workers, as well as monitoring implementation in the field, then the use of innovative technology can be a suggestions for further research to accelerate the development process during this Covid-19 pandemic.

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