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The Dominant Impact of the COVID-19 Pandemic on Import Procurement for Construction Projects : a Case of Indonesia

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Abstract

The COVID-19 virus first appeared in China in early 2020 and spread to most countries, including Indonesia. In construction projects, one of the impacts is the procurement of imported goods. The import procurement sectors affected are materials, labor, shipping processes, schedules, and transportation which can cause uncertainty in the implementation of construction projects. Therefore, it is necessary to find out the dominant impact of the COVID-19 pandemic on import procurement so that it can benefit contractors. This study aims to determine the dominant impact of import procurement during the COVID-19 pandemic. The initial method is data collection carried out by brainstorming experts and questionnaire surveys distributed to ninety-five respondents. After that, the results of the questionnaire data were analyzed using the Relative Important Index (RII) and hierarchical clustering in determining extremely significant data to determine the dominant impact at each stage of import procurement. Based on the results of data analysis, the dominant impact of import procurement during the COVID-19 pandemic is that suppliers of imported goods increase prices, increase shipping prices, delays in the arrival of imported goods, and damage to goods.

Keywords: Impact, Import Procurement, Pandemic COVID-19, Strategy

Introduction

In 2020, most countries experienced Corona Virus Disease 2019 (COVID-19). This virus first appeared in Wuhan City, China. This virus quickly spread to all countries such as Indonesia. Therefore, the World Health Organization (WHO) on March 11, 2020 officially declared the COVID-19 Virus a global pandemic. In Indonesia, the spread of this virus was so rapid that the National Disaster Management Agency (BNPB) declared a Disaster Emergency Status Due to the Corona Virus (Susila & Arbianto, 2021). The first case of COVID-19 in Indonesia was detected on March 2, 2020, when two people were confirmed to be infected by a Japanese citizen. As of April 9, 2020, the pandemic had spread to 34 provinces with DKI Jakarta, West Java, and Central Java as the provinces most exposed to SARS-CoV-2 in Indonesia. As of May 7, 2023, Indonesia has reported 6,787,354 cases of COVID-19, ranking first in Southeast Asia. In terms of mortality, Indonesia ranks third in Asia with 161,459 deaths. In all construction project development activities as the focus of the government program has been delayed due to the transmission of the virus. The activities affected are the import procurement process for ongoing projects. The impact of import procurement on this sector, such as materials, labor, shipping processes, schedules, and mobilization are directly related to the COVID-19 pandemic which can cause uncertainty in its implementation (Nugraha & Yuwono, 2022). Imported goods which are international trade activities by entering goods into Indonesian territory are carried out by individuals or companies engaged in export-import by complying with the provisions (Andang, 2021) including steel, pipes, cables and materials that are not available domestically (Badung, 2022). For example, in the Liquefied Natural Gas (LNG) dock project, a Quick Release Hook (QRH) is required for dock security purposes. This Quick Release Hook

(QRH) is a ship mooring device that operates automatically and is not produced in Indonesia, so it requires imports of these goods. Force majeure constraints in the import procurement process that occur beyond the contractor's capabilities and cannot be avoided are the main reasons for taking the right policy response to import procurement during the COVID-19 pandemic. Therefore, it is necessary to research to analyze the dominant impact of COVID-19 on the import procurement stage for construction projects.

According to the introduction above, to analyze the dominant impact of the COVID-19 pandemic on import procurement, this research requires data identification on the impact, a literature study on the impact, and brainstorming with experts in making questionnaire designs that are distributed according to the target respondents so that the results of the questionnaire are used as a reference for validity tests, reliability tests, relative important index analysis and hierarchical clustering.

The use of validity tests and reliability tests is useful for providing valid and reliable criteria for each impact statement from the questionnaire results. The use of relative important index analysis is useful for important values at each stage of import procurement from the impact questions of the questionnaire results that are already valid and reliable. Finally, hierarchical clustering analysis is used to cluster all stages of import procurement based on the important values generated by the previous analysis.

Methods

This is the flowchart design :

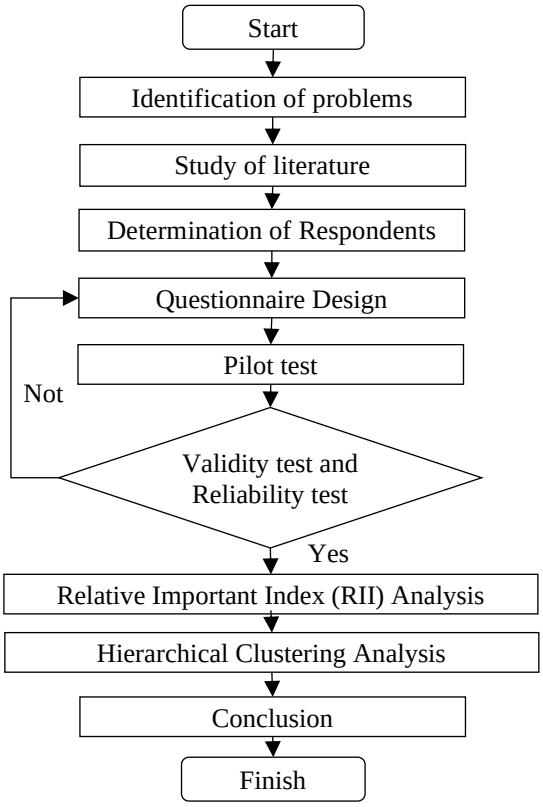

Figure 1. Flowchart method design

This research started by identifying problems in the stages of import procurement after the COVID-19 pandemic. In import procurement there are 4 general stages, namely 1) preparation, 2) delivery of goods, 3) arrival of goods in Indonesia, and 4) receipt of goods in the warehouse (Sabila et al., 2023). Then design the questionnaire by brainstorming with experts to get good

results. The next step is to determine the minimum target respondent for distributing the questionnaire. A questionnaire is an instrument for collecting data and data obtained from distributing questionnaires is primary data. The next research is a validity test to declare this questionnaire valid and a reliability test to declare this questionnaire reliable. After the questionnaire data was declared valid and reliable, it was continued with relative importance index (RII) analysis and hierarchical clustering analysis to determine the dominant impact on import procurement during the COVID-19 pandemic. This is the flowchart design :

Determination of Respondents

The population sample taken from large-scale construction companies in Indonesia is 1,750 and is assumed to have a probability of 90% with an error rate of 10%. The number of samples to be taken in each population is calculated using the Slovin formula (Creswell and Creswell, 2018). Calculation of the number of research samples:

$$n = \frac{N}{Nd^2+1} \quad (1)$$

$$n = \frac{1.750}{1.750X0.1^2+1} = 94{,}59 \approx 95$$

Where :

n = Respondent target

N = Population sample

d = Margin of error

The total number of sample results was 95 respondents.

Research Variables

The Likert scale is a psychometric scale that is commonly used in questionnaires and is the most preferred scale used in research in the form of surveys. The Likert scale values in this research are:

Table 1. Scale Likert

Response Categories	Numerical Value
Strongly Disagree	1
Disagree	2
Somewhat agree	3
Agree	4
Strongly Agree	5

Results and Discussion

Primary Data Collection

This is primary data collection, questionnaires were distributed and 95 respondents were obtained as follows:

Table 2. Respondent's job title

No	Respondent's job title	Total
1	Production	24
2	Engineering	30
3	Procurement	17
4	Financial	2
5	Contract Administration	9

6	Other	13
	Total	**95**

Table 3. Construction projects that the respondent is currently working on

No	Construction projects that the respondent	Total
1	Building projects	23
2	Road construction projects	43
3	Port construction projects	22
4	All Construction projects (by Manager)	6
5	Other	1
	Total	**95**

Table 4. Respondent's work experience

No	Respondent's work experience (year)	Total
1	1 – 5	14
2	5 – 10	57
3	> 10	24
Total		**95**

Validity Test

The validity test calculation uses a correlation formula, where the correlation for each question will be searched by calculating r-count to r-table. If r-count > r-table then the statement item is declared valid. From the value distribution table, r-table with a total of 95 respondents and a significance level of 1% is equal to 0.263 (Sugiyono, 2012). The next calculation is r-count using the Statistical Product and Service Solution (SPSS) program. The data obtained is as follows :

Table 5. Validity test using the SPSS program

Var.	r-count	Result		Var.	r-count	Result		Var.	r-count	Result		Var.	r-count	Result
X1.1	0,657	Valid		X2.1	0,716	Valid		X3.1	0,665	Valid		X4.1	0,776	Valid
X1.2	0,626	Valid		X2.2	0,730	Valid		X3.2	0,604	Valid		X4.2	0,757	Valid
X1.3	0,675	Valid		X2.3	0,672	Valid		X3.3	0,753	Valid		X4.3	0,551	Valid
X1.4	0,757	Valid		X2.4	0,423	Valid		X3.4	0,806	Valid		X4.4	0,574	Valid
X1.5	0,611	Valid		X2.5	0,616	Valid		X3.5	0,831	Valid		X4.5	0,615	Valid
X1.6	0,743	Valid		X2.6	0,768	Valid		X3.6	0,789	Valid		X4.6	0,796	Valid
X1.7	0,736	Valid		X2.7	0,704	Valid		X3.7	0,802	Valid		X4.7	0,819	Valid
X1.8	0,662	Valid		X2.8	0,730	Valid		X3.8	0,753	Valid		X4.8	0,873	Valid
X1.9	0,666	Valid		X2.9	0,771	Valid		X3.9	0,743	Valid		X4.9	0,882	Valid
X1.10	0,658	Valid		X2.10	0,762	Valid		X3.10	0,662	Valid		X4.10	0,862	Valid
X1.11	0,665	Valid		X2.11	0,810	Valid		X3.11	0,761	Valid		X4.11	0,765	Valid
X1.12	0,728	Valid		X2.12	0,809	Valid		X3.12	0,736	Valid		X4.12	0,833	Valid
X1.13	0,720	Valid		X2.13	0,810	Valid						X4.13	0,795	Valid
				X2.14	0,800	Valid						X4.14	0,811	Valid
												X4.15	0,779	Valid

												X4.16	0,763	Valid
												X4.17	0,744	Valid

Reliability Test

This reliability test is based on the Cronbach Alpha (α) value which must be at least or greater than 0.6 to be declared reliable (Nunnally, 1978). The next Cronbach Alpha test uses the Statistical Product and Service Solution (SPSS) program. The results are as follows :

Table 6. Reliability test using the SPSS program

Variabel	Cronbach Alpha	Min	Result
X1	0,902	0,6	Reliable
X2	0,927	0,6	Reliable
X3	0,925	0,6	Reliable
X4	0,955	0,6	Reliable

Where:

X1 = Impact on preparation stage

X2 = Impact on goods delivery stage

X3 = Impact on goods arrival stage in Indonesia

X4 = Impact on goods receipt stage in a warehouse

Relatif Important Indeks (RII)

The calculation of the Relative Importance Index (RII) is used to determine the most influential factors (Guhyathama, 2021). The determination of the relative importance index (RII) is calculated using the following formula :

$$RII = \frac{\sum Rating}{n \times A} \qquad (2)$$

where :

RII = Relative important index

Σ Rating = Total assessment score for a factor

n = Total respondents

A = The highest score on the response categories

The results of the Relative Important Index (RII) calculation are a number between 0 and 1. The higher the Relative Important Index (RII) value, the more important the factor is (Djojowirono, 2005). For example, if the Relative Important Index (RII) value of a factor is 0.8, then the factor is considered very important. On the other hand, if the Relative Important Index (RII) value is close to 0, then the factor is considered not very important.

The Relative Important Index (RII) calculation is used to determine the dominant problems at each stage of import procurement by looking at the value produced.

Table 7. The results of the Relative Important Index (RII)

Var	RII	Rank		Var	RII	Rank		Var	RII	Rank		Var	RII	Rank
X1.1	0,846	4		X2.1	0,857	2		X3.1	0,800	10		X4.1	0,823	6
X1.2	0,863	1		X2.2	0,859	1		X3.2	0,815	7		X4.2	0,811	11

X1.3	0,853	2		X2.3	0,813	11		X3.3	0,787	12		X4.3	0,857	1
X1.4	0,842	6		X2.4	0,832	6		X3.4	0,798	11		X4.4	0,821	7
X1.5	0,844	5		X2.5	0,781	14		X3.5	0,815	8		X4.5	0,779	16
X1.6	0,743	12		X2.6	0,832	7		X3.6	0,819	6		X4.6	0,817	8
X1.7	0,747	11		X2.7	0,857	3		X3.7	0,813	9		X4.7	0,813	10
X1.8	0,737	13		X2.8	0,834	5		X3.8	0,842	1		X4.8	0,804	13
X1.9	0,813	10		X2.9	0,811	12		X3.9	0,829	3		X4.9	0,829	4
X1.10	0,836	7		X2.10	0,808	13		X3.10	0,827	4		X4.10	0,808	12
X1.11	0,832	8		X2.11	0,827	8		X3.11	0,821	5		X4.11	0,779	17
X1.12	0,825	9		X2.12	0,825	9		X3.12	0,838	2		X4.12	0,798	15
X1.13	0,848	3		X2.13	0,819	10						X4.13	0,802	14
				X2.14	0,844	4						X4.14	0,817	9
												X4.15	0,829	5
												X4.16	0,842	3
												X4.17	0,851	2

Hierarchical Clustering

Hierarchical clustering analysis is used as a hierarchical grouping of objects based on their similarity in nature with an unknown number of clusters formed. The hierarchical method is used on data that has a hierarchical structure or consists of several interrelated subgroups and generally the number of samples used is relatively small. The results of the clustering with the hierarchical method are displayed with a dendrogram (Apriliana & Widodo, 2023).

Hierarchical clustering calculation using the Statistical Product and Service Solution (SPSS) program gets dendrogram result. The dendrogram result is below.

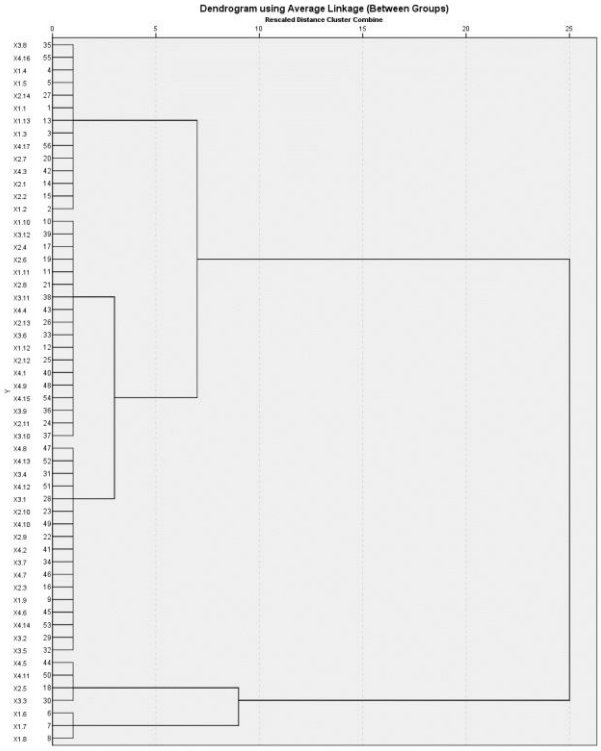

Figure 2. The dendrogram result

The dendrogram results above represent the hierarchy of the combination of all RII value calculation data which is the basis for providing data grouping. This dendrogram produces a grouping of five groups, each of which has a Range of Index and Variable Amount.

Then the resulting group is measured in five levels of data significance. The highest order in the five levels of data significance starts from extremely significant, very significant, somewhat significant, slightly significant and not at all significant (Atilola et al., 2019).

Table 8. The results of the 5 clusters

Range of Index	Var	Scale of Index
0.839 to 1.000	**14**	***Extremely Significant***
0.818 to 0.838	18	*Very Significant*
0.788 to 0.817	17	*Somewhat Significant*
0.748 to 0.787	4	*Slightly Significant*
0.000 to 0.747	3	*Not at all Significant*

The next step is to make the first group with the highest and extremely significant range of index as the dominant impact of the COVID-19 pandemic on import procurement.

Conclusion

Based on the results of the questionnaire data that has reached the target of ninety-five respondents, it can be concluded that all variables are declared valid and reliable so that the calculation of the relative importance index (RII) is continued at each stage of import procurement during the COVID-19 pandemic which produces 1) the dominant impact at the preparation stage (X1) is that suppliers of imported goods increase prices (X1.2) with an RII value of 0.863, 2) the dominant impact at the stage of shipping goods (X2) is an increase in the price of shipped goods (X2.2) with an RII value of 0.859, 3) the dominant impact at the stage of arrival of goods in Indonesia (X3) is the delay in the process of the arrival of imported goods caused by disruptions in logistics and port services due to restrictions on mobility and strict health protocols (X3.8) with an RII value of 0.842, 4) the dominant impact at the stage of receiving goods at the warehouse (X4) is damage to goods that occurs during the transportation mobilization process from the port and airport to the warehouse (X4.3) with an RII value of 0.857.

Based on the RII value of all procurement stage variables with a total of 56 variables using hierarchical clustering analysis, five groups were produced. Of the five groups, extremely significant was the dominant impact on the procurement of construction project imports during the COVID-19 pandemic with 14 variables, the highest of which was travel restrictions and lockdowns in various countries, resulting in suppliers of imported goods raising prices.

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