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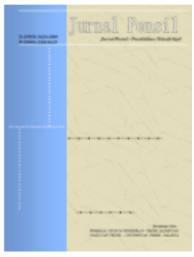

ANALYSIS OF DAMAGE LEVEL AND COST ESTIMATION OF THE SAMUDRAJAYA 04 BEKASI STATE ELEMENTARY SCHOOL BUILDING

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P-ISSN: 2301-8437
E-ISSN: 2623-1085

ARTICLE HISTORY
Accepted:
14 Oktober 2021
Revision:
8 Januari 2022
Published:
30 Januari 2022

ARTICLE DOI:
10.21009/jpensil.v11i1.23405

Abstract

This study aims to determine the level of damage to the school building using a benchmark assessment of the level of damage by DG Pauddikdasmen Kemendikbud in 2021 and investigate the building component repair-cost estimates using Works Unit Price Analysis (AHSP). The research population is a public elementary school in Samudrajaya Village with a sample building SDN Samudrajaya 04 Bekasi as the object of research. The method used in this research is a descriptive research method with a quantitative approach. The data collection technique was carried out through observation, documentation, and unstructured interviews. The results showed that the level of damage to the SDN Samudrajaya 04 Bekasi building in building one was slightly damaged, with the highest component of damage found in the wall component with brick wall sub-components or partition 8.2% glass, doors, and frames were not damaged. While the level of damage to building two was heavily damaged, with the highest component damage found in the wall components of the sub-components of brick or partition walls by 15%, glass 90.3%, doors 88.6%, and frames 96%. The results of the analysis of the estimated repair costs on the components that experienced the most serious damage based on the volume of damage were in building one of Rp. 30,522,168,48 and in building 2 Rp. 204,070,178.35, the total repair cost is Rp. 234,592,346.83 or can be rounded up to Rp. 234,593,000.

Keywords: Damage Level, School Building, Cost Estimation

Introduction

School is one of the important social infrastructures in a society, the first place for social activities and the most important indoor environment for children is the side of the house (Chithra & Shiva, 2018). The school building is one of the buildings that must be considered, this is because the school building is an infrastructure in education to interact with all humans who are in it, the interaction between educators and students, students and students, or educators with educators. The quality of school infrastructure also has a significant effect on school attendance and dropout rates (Branham, 2004). It was also found that there was a positive relationship between student achievement/behavior and the school environment (Earthman, 1995).

Facilities are direct tools to achieve educational goals such as books, while infrastructure is indirect to achieve goals such as school buildings (Agusti, 2014). In addition to teaching staff, facilities and infrastructure are very important supporting factors in the world of education. The condition of facilities also affects academic academic results (Durán-Narucki, 2008), without facilities and infrastructure, the teaching and learning process will never run well (Rahmiga, 2019). Poor school building conditions (SBC) have been associated with school outcomes bad things such as low attendance and academic achievement (Lin et al., 2019)

The need for school involvement to support student achievement, as school involvement is mainly measured by behavior that can be observed directly related to academic effort and achievement (Jimerson et al., 2003). In fact, in several developed countries the concept of green buildings has been developed to provide opportunities for students to study comfortably and create sustainable lives in their daily lives at school (Cole, 2014).Therefore, it is necessary to involve schools to maintain school buildings.

School facilities require careful planning in the provision, use, tan, and its maintenance to meet the increasing educational needs (Ojeje & Adodo, 2018). So if there is damage to school facilities, it must be repaired as soon as possible. One of the real problems can be seen from the poor educational facilities and infrastructure in Bekasi Regency. This is evidenced by the number of damaged school buildings recorded by the end of 2018, which was quite high, the number reached 9,686 classrooms. Meanwhile, the number of proper classrooms is only 3,198 units. Most of the damage occurred in public junior high schools. According to the Head of the Bekasi Regency Education Office (Dindik), Maman Agus Supratman referred to in (Suliyarti, 2019) said based on data from the local Dindik that Bekasi Regency had a total of 9,686 classrooms, the damage was to a public junior high school of 5,708 classrooms and the damage found to There are 3,978 public elementary schools. Bekasi is also one of the developing urban developments in the Jakarta Metropolitan area (Astuti et al., 2015). This causes families living in Bekasi to need schools so that the local government can provide schools according to the population. None other than to achieve a school building that is more balanced in terms of people, the environment and profits (Frankena, 2017).

A comfortable school building can unite residents and differentiate them according to community needs (Helfenberger & Schreiber, 2019). Student discomfort can come from poorly maintained and outdated school facilities (Nicholson, 2012). Based on initial observations made of the elementary school building in Samudrajaya Village, Bekasi, the visible damage to the school building is dominated by architectural components such as: floor coverings, ceilings, frames, and walls. Damage to the floor covering needs to be considered, because according to (Keshtkārān et al., 2017), two times improvement in the duration of the comfort zone can be achieved by

strengthening the floor covering of the building. Damage to elementary school buildings can burden the state budget and disrupt the teaching and learning activities. It is very important in maintaining a healthy and usable school building (Mydin et al., 2014). According to (Carr, 2017) the condition of the school building can affect student achievement and school culture. Damage to elementary school buildings can also threaten the safety of students and educators who are in the building (Hidayati, 2012). Building SDN contained the most damage on each component of the building in the village of Samudrajaya visually SDN Samudrajaya 04 Used

After the initial observation has been done, then got the idea to do research in the form of analysis to determine the extent of damage and estimated repair costs in buildings Samudrajaya State Elementary School 04 Bekasi. Ideally, the renovations to be carried out can be controlled on schedule and minimize repair costs (Shrestha & Zeleke, 2018). Therefore, the problem can be formulated based on the main problems in this study, namely:
"Analysis of the Level of Damage and Cost Estimation of the Samudrajaya 04 Bekasi State Elementary School Building"

Research Methods

The method used in this research is descriptive research method with a quantitative approach. Descriptive research will facilitate the construction of abductive theory and robust theory testing (Millner et al., 2020). Descriptive research aims to describe a phenomenon and its characteristics (Nassaji, 2015). Data collection techniques were carried out by means of observation, documentation, and unstructured interviews.

The population of this research is the State Elementary School in Samudrajaya Village. The sample in this study was Samudrajaya State Elementary School 04 Bekasi.

To conduct this research, data related to the problems collected were needed, the types of data in the form of primary data and secondary data. Secondary data or sources are sufficient to justify the aims or objectives of the study without a primary data approach (Choy, 2014). The types of data are described as follows:

Documentation: Data collection through documentation is a method for finding a large number of facts and data in the form of documents. Most of the documentation can be in the form of letters, diaries, souvenirs, reports, artifacts, photographs, and so on. The main nature of this data is not limited to space and time so that it provides an opportunity for researchers to find out things that have happened (Linarwati et al., 2016). In this study, data collection by means of documentation was used to find out the existing damages. in the component part of the building. It is also necessary to pay attention to administrative documentation in providing administrative services related to the process of borrowing learning support facilities (Putra et al., 2018). It is hoped that the documentation carried out can expand such as documenting construction conditions better to reduce claims and disputes and improve design/construction in the future (Liu, 1995).

Observation: Collecting data by conducting structured observations is direct observation that has been systematically designed about what will be observed, when and where. The advantage of observation is that it can be used to secure benchmark data and descriptive (Taylor-Powell & Steele, 1996). A validation plan should be considered, implemented, and reported when using observations in research content (Griffee, 2005). Data collection through observations and field notes was carried out by involving researchers and research participants (Jamshed, 2014). So that structured observations are carried out if the research variables are certain (Sugiyono, 2018). The things observed

include: (1) Buildings. (2) The damages are on the building components. (3) Classify the category of damage to building components.

One of the most commonly used data collection methods is interviews (Moser & Korstjens, 2018), according to (Musselwhite et al., 2007) interviews can also be an effective data collection method. Unstructured Interview: Collecting data by means of unstructured interviews is an interview that is free according to conditions in the field, which does not use interview guidelines that are systematically and completely arranged for research data collection (Sugiyono, 2018). Unstructured interviews are a ubiquitous tool for making screening decisions although much of the literature suggests that they have little validity (Dana et al., 2013). One of the advantages of interviewing is the presence of the interviewer, allowing complex questions to be explained, if necessary, to the interviewee (Phellas et al., 2011). This technique is carried out to find out data verbally from sources concerned with the school as the required complementary data. Data analysis in this study used descriptive statistical data analysis techniques.

Descriptive statistics present the data in a meaningful way for the purpose of understanding what if anything needs to be done with the data to prepare it for analysis (McCarthy et al., 2019). Descriptive statistics is a method of collecting data by collecting, summarizing, presenting data presented in the form of tables, diagrams, histograms (Sholikhah, 2016). Descriptive statistics also offer excellent options for data visualization (Procheş, 2016). Damage is defined as a change for the worse, or harm, in the economic consistency of a particular asset, in this case the damage to buildings (Artese et al., 2022). The determination of the level of damage to school buildings uses the criteria for determining the level of damage by the Director General of the Ministry of Education and Culture in 2021 as shown in table 1 below:

Table 1. Criteria for the level of damage

Category	Score	Classification
Very Light Damage	0,2	1
Light Damage	0,4	2
Medium Damage	0,6	3
Heavy Damage	0,8	4
Very Heavy Damage	1	5

Source: Kemendikbud 2021

The results of the percentage level of damage to building components are then categorized based on the Damage Criteria for the Director-General of the Ministry of Education and Culture in 2021 (Kusumaningrum, 2017). The percentage results are calculated as in table 2 below:

No.	Category	Percentage
1	Light	≤ 30%
2	Medium	> 30% – 45 %
3	Heavy	> 45%

Source: Kemendikbud 2021

Results and Discussion

The results of research observations in the building of SDN Samudrajaya 04 Bekasi found quite a lot of damage to the components of the building. Some obvious examples of damage are floor coverings that have come off a lot, holes in the ceiling, frames that have been dislodged, partition walls that have come off and paint that has peeled off, and several other damages. The category of the level of damage is assessed based on the criteria for determining the level of damage by the Director General of the Ministry of Education and Culture Pauddikdasmen 2021, so that the level of damage to the SDN Samudrajaya 04 Bekasi building is based on observations in table 3 below:

	No	Components	Category Damage	Value & classification of
Building 1	1	Column	Good	-
	2	Walls	Very lightly damaged	0,2 & 1
	3	Ceiling	Damage is moderate	0,6 & 3
	4	Windows (glass), Doors, Frames	Good	-
	5	Floors	Very lightly damaged	0,2 & 1
	6	UtilitiesInstallation Electrical	Good	-
	7	UtilitiesInstallation Water	Good	-
	8	Utilities Drainage Waste	Good	-
	9	Finishing	Moderate Damage	0,6 & 3
Building 2	1	Column	Very Light Damage	0,2 & 1
	2	Walls	Damagedlight, Moderate damage	0,4 & 2 0,6 & 3
	3	Ceiling	Light damage, Medium damage, Severe damage	0,4 & 2 0,6 & 3 0,8 & 4
	4	Window (glass), Door, Frame	Damage Moderate, Severe Damage	0,6 & 3 1 & 5
	5	Floors	Very heavily damaged	1 & 5
	6	Utilities-Installation Electrical	Very heavily damaged	1 & 5
	7	Utilities-installations Water	Very heavily damaged	1 & 5
	8	Utilities- Drainage Sewage	Very heavily damaged	1 & 5
	9	Finishing	Moderate Damage	0,6 & 3

Source: Analysis results, 2021

The results of the value and classification that have been obtained are based on the criteria for determining the level of damage by the Director-General of the Ministry of Education and Culture in 2021 as shown in the table above, then analyzed into an assessment of the level of damage to school buildings. So that the results of the analysis of the level of damage to the SDN Samudrajaya 04 Bekasi building which experienced the highest percentage of damage were the wall components in the 2 SDN Samudrajaya 04 Bekasi buildings which are listed in table 4 below:

Table 4. Results of the highest percentage level of damage

	Component	Subcomponents	Damage Percentage	Category Damage
Building 1	Wall	brick wall / partition	8.2%	Mild Damaged
Building 2	Wall	walls brick/ partitions	15%	Heavy Damage
		Glass	90.3%	
		Door	88.6%	
		Frame	96%	

Source: Analysis results, 2021

Analysis of the estimated repair costs calculated on the components that experienced the highest damage levels. In the building 1 wall component of 0.8% and in the building 2 sub-components of the frame found in the Wall component with a

total percentage of damage of 96%. The calculation of the estimated repair costs uses the unit price analysis of Bekasi Regency 2021. The coefficient value refers to the Minister of Public Works Regulation No. 28/2016 concerning Guidelines for Analysis of Work Unit Prices in the Public Works Sector. Before calculating the Repair Budget Plan (RAB), first calculate the unit price analysis of the component work with the highest damage level. The following is an example of calculating the unit price analysis for repair work on wall components:

Table 5. Analysis of Wall Work Unit Prices

Building 1					
No.	Job Description	Unit	Coefficien	Price (Rp)	Amount (Rp)
I	WALL'S WORK				
1	Peeling Wall Paint	m2	1		
	Workers	OH	0,05	110.000	5.500,00
	Foreman	OH	0,003	196.300	588,90
	Total				6.088,90
2	Wall Painting	m2	1		
	Wall plamir	kg	0,1	12.900	1.290,00
	Wall Base Paint	kg	0,12	44.600	5.352,00
	Wall Covering Paint	kg	0,18	107.000	19.260,00
	Workers	OH	0,028	110.000	3.080,00
	Painter	OH	0,042	150.000	6.300,00
	Chief	OH	),0042	182.000	764,40
	Foreman	OH	0,003	196.300	588,90
	Total				36.635,30

Source: Analysis results, 2021

In building 1, repair work on damaged components on walls includes peeling of wall paint to be repainted. The next work is painting the entire surface of the wall, which previously did the painting, puttying on the cracks in the wall first using wall plamir. In building 2, the demolition work includes peeling the paint off the walls, dismantling the glass, doors, and frames that were damaged. The next job was to reassemble the components that were on the walls and were damaged, such as paint, glass, doors and frames. The details of the calculation of the Repair Budget Plan for the components that suffered the most damage in building 1 and building 2 are as follows:

Table 6. Repair of Wall Components at SDN Samudrajaya 04 Bekasi

Building 1					
No.	Worker's	Volume	Pekerjaan	AHSP (Rp)	RAB (Rp)
I	WALL WORK				
1	Wall Paint	714,4	m2	6.088,90	4.349.910,16
2	Wall Painting	714,4	m2	36.635,30	26.172.258,32
	Total				30.522.168,48

Building 2					
No.	Worker's	Volume	Pekerjaan	AHSP (Rp)	RAB (Rp)
I	FRAME, DOOR & WINDOW				
1	Dismantling of Door and Window	8,7705	m3	171.144,50	1.501.022,84
2	Dismantling of Doors	9,4	m2	2.396,30	22.525,22
3	Installation of	8,7705	m3	11.289.155,00	99.011.533,93
4	Installation of 1 door hinge	14	titik	27.037,04	378.518,56
5	Leaf Installation Door	7	m2	1.042.515,00	7.297.605,00
6	Ordinary Lock Installation	7	titik	341.181,50	2.388.270,50

7	Installation of Aluminum Window	7,3875	m2	221.574,03	1.636.878,15
8	Painting of frames and doors	30,4	m2	31.465,90	956.563,36
II	WALL WORK				
1	Scraping /Old Paint Surface	714,4	m2	17.088,90	12.208.310,16
2	Installation ofSeparation Wall	60	m2	875.745,00	52.544.700,00
3	Old Wall Painting	714,4	m2	36.568,10	26.124.250,64
	Total				204.070.178,35

Source: Analysis results, 2021

From table 6, the total cost of repairs needed to repair components in building 1 by repairing wall components of Rp. 30,522,168.48 and for the walls, glass, doors, and frames of the SDN Samudrajaya 04 Bekasi building, Rp. 204,070,178,35 so that the total repair cost is Rp. 234,592,346.83 or can be rounded up to Rp. 234,593,000.

Conclusion

Based on the results of the study, it showed that the level of damage to the SDN Samudrajaya 04 Bekasi building in building 1 was lightly damaged with the highest component of damage found in the wall component with sub-components of brick walls/partitions of 8.2% glass, doors, and frames. no damage. While the level of damage to building 2 was heavily damaged with the highest component damage found in the wall components of the sub-components of brick/partition walls by 15%, glass 90.3%, doors 88.6%, and frames 96%.

The results of the analysis of the estimated repair costs on the components that experienced the highest damage based on the volume of damage were in buildings 1 of Rp. 30,522,168,48 and in building 2 Rp. 204,070,178,35, so the total repair cost is Rp. 234,592,346.83 or can be rounded up to Rp. 234,593,000.

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