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Ecological Approach to the Design of Religion-Based High Schools Using the Appropriate Site Development Category of Greenship New Building

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ABSTRACT
Religion-based high schools encourage the practice of religion as a foundation in life, including in the design of these schools that need to pay attention to the surrounding environment. The use of the Greenship New Building Rating Tools in the design of the Santo Aloysius High School in Gedebage District is one way to pay attention to the environment in the design process with an ecological approach. In this journal, only the Appropriate Site Development category is used regarding the site aspect. In the Appropriate Site Development Category, there is 1 assessment prerequisite and 7 other assessments, namely Site Selection, Community Accessibility, Public Transportation, Bicycle, Site Landscaping, Micro Climate and Storm Water Management. The results obtained are 16 out of 17 maximum values obtained in the Appropriate Site Development category of Greenship New Building.

Keywords: *Ecology, Gedebage sub-district, Greenship new building.*

1. INTRODUCTION

Education is a necessity in this era, where school is a place to get formal education. School is a place where the children learn [1]. The word school comes from the Latin *skhola* which means free time or leisure time, where at that time school was an activity in leisure time for children in the midst of their main activity in enjoying childhood and adolescence [2].

Schools according to their auspices are divided into public and private schools. In addition, schools are also divided based on their educational basis, namely general-based schools and religious-based schools. The definition of a religion-based school is an educational institution in which it contains accompanying religious sciences [3]. The purpose of religion-based schools is to encourage students to obey the teachings of their religion in everyday life and make religion the basis of ethics and morals in their lives. Religion-based schools can also improve character education. Character education is a form of habituation carried out through related activities [4].

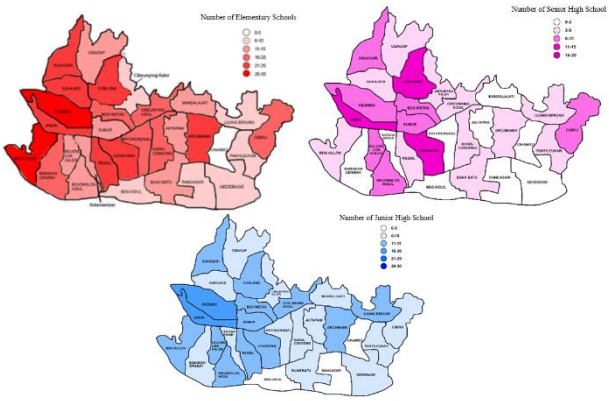


Figure 1 School mapping of Bandung City.

Judging from the mapping of schools in the city of Bandung (Figure 1), Gedebage sub-district is one of the sub-districts where the number of schools is minimal, which is far from the school-age population. Based on data from the Dapodik website of the Ministry of Education and Culture, the number of schools in Gedebage District is 14, consisting of 7 elementary schools, 6 junior high schools, and 1 high school [5]. This number is very much proportional to the number of schools in several sub-districts located in the center of Bandung City, therefore, in Gedebage District it is

necessary to increase the number of schools in order to facilitate the community in Gedebage district.

Apart from the small number of schools, Gedebage District is also planned to become the second center of Bandung City and Summarecon will be built as part of Bandung Teknopolis [6]. With more school facilities, it will support the realization of the sub-district into the center of Bandung, especially with the Bandung Teknopolis stretcher which requires advances in science and technology, one of which is the advancement of educational facilities. With the stretcher of Bandung Teknopolis, the area will be sensitive to development on a large scale so there needs to be a balance in environmental aspects. In the aspect of religion-based schools, there are also references related to the ecological context in religion, in which the religion referred to is Catholicism because the school that will be built in this research is Santo Aloysius Catholic High School.

Table 1. Ecology in religion-based education

Comparison Study 1	Comparison Study 2	Theory	Conclusion
St. Joseph Catholic School	St. John The Baptist	The God who made the earth and all that is in it, He who is Lord of heaven and earth, does not live in temples made with human hands (Acts 17:24-25)	Based on the first, second, and theoretical comparative studies, the conclusion that can be drawn is that there is continuity between attitudes to protecting nature in religion. In addition, there are several examples that can be taken to be applied to site design, such as the provision of green open areas to support nature conservation activities
Have a gold rating ecoschool certificate [7].	Promote awareness of the school community about caring for the environment [8].		
Outdoor learning programs with integrated learning experiences in the natural environment and school community [7].	Holding Garden Club activities with adequate garden facilities for student activities and encouraging go green behavior for both students and parents [8].	All creation is a precious thing and reflects the majesty of God (Psalm 104:10)	

From this description, environmental considerations become a necessary aspect to strengthen the environmental carrying capacity of community activities in the environment. Therefore, the ecological approach is a part that can be realized to support the environment in Gedebage sub-district. Ecological principles, namely responding to the local climate, minimizing energy use, utilizing local materials, providing energy sources, water, having basic elements that can connect buildings, the environment, and humans [9]. From the ecological principles, there are parameters that refer to the ecological approach that can be used as benchmarks in the design, namely the Greenship Rating Tools launched by the Green Building Council Indonesia.

2. GREENSHIP RATING TOOLS

Starting from GBCI which has developed Greenship as rating tools and certification activities for green buildings in Indonesia. Greenship consists of various types of benchmarks, depending on the object to be certified, namely Greenship New Building, Greenship Existing Building, Greenship Neighborhood, and Greenship Home. In this design, the object under study can be included in the Greenship New Building criteria, because it is a design on vacant land. Greenship New Building is a building certification system intended for new buildings related to building design and [10].

In this study, the assessment point that will be used in the Greenship New Building is the ASD aspect, because ASD can be a benchmark or benchmark in the application of ecological principles in the design. After obtaining the score and percentage value of the criteria described in the Greenship New Building, the next stage is the ranking which will determine the rank of the certificate obtained.

Table 2. Category of Greenship New Building

No	Category	Max Score
1	Appropriate Site Development	17
2	Energy Efficiency and Conservation	26
3	Water Conservation	21
4	Material Resource and Cycle	14
5	Indoor Health and Comfort	10
6	Building Environmental Management	13
	Total Point	101

Source: GBC Indonesia

Table 3. Ranking of Greenship Rating tools

Rank	Percentage	Score Min, DR*	Score Min. FA**
Platinum	73%	56	74
Gold	57%	43	58
Silver	46%	35	46
Bronze	35%	27	35

Source: GBC Indonesia

3. METHODS

In this study, it is necessary to calculate the green open space, procurement of facilities, and rating criteria in the Greenship New Building so that the right method used is the Quantitative method. The research was carried out by means of a literature study and simple calculations. This method is also to explore continuing education has an important mission to fill this gap. Because of the need for continuous education and the need for originality of the methods to be used in this education, school buildings are an important aspect of education. The design process can be seen in Figure 2.

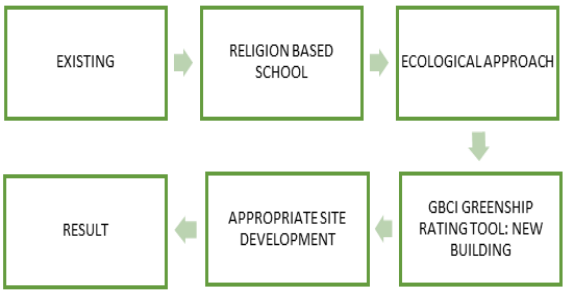


Figure 2 Design process.

3.1. Design Synthesis

Design synthesis using ASD category, can be seen in Table 4.

Table 4. Synthesis using ASD category

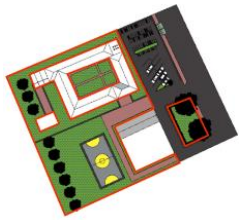
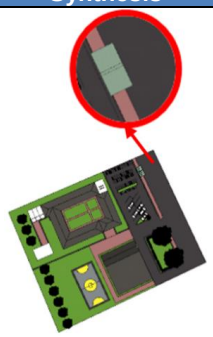
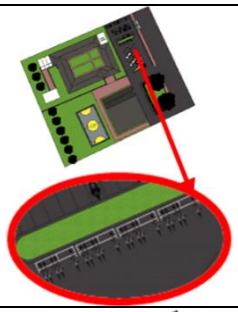
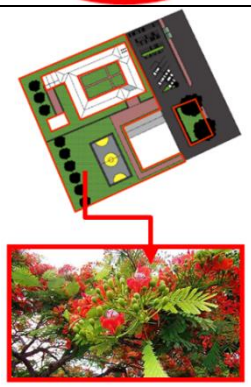
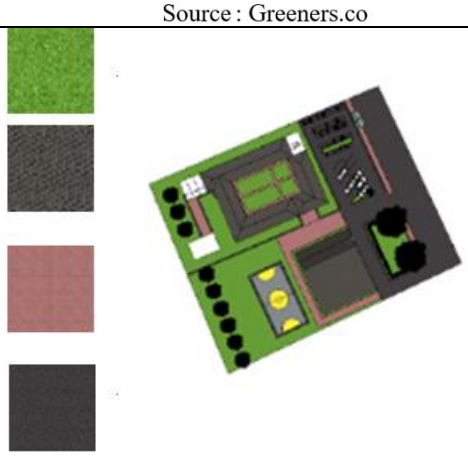
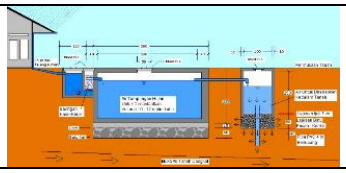
Parameter	Criteria	Value Earned		Synthesis
ASD P	Basic Green Area	ASD P. 1	P	
		ASD P. 2	P	
ASD 1	Site Selection	ASD 1. 1A	1	
		ASD 1. 2	1	
ASD 2	Community Accesibility	ASD 2. 1.	1	 
		ASD 2.2	0	
		ASD 2.3	1	
		ASD 2.4	0	

Table 4. Cont.

Parameter	Criteria	Value Earned		Synthesis
ASD 3	Public Transportation	ASD 3. 1A	1	
		ASD 3. 2	1	
ASD 4	Bicycle	ASD 4.1	1	
		ASD 4.2	1	
ASD 5	Site Landscaping	ASD 5. 1A	1	 Source : Greeners.co
		ASD 5. 1B	1	
		ASD 5. 2	1	
ASD 6	Micro Climate	ASD 6.1	1	
		ASD 6.2	1	
		ASD 6.3A/3B	0	
ASD 7	Storm Water Management	ASD 7.1 A	1	
		ASD 7.2	1	
		ASD 7.3	1	
Total Value			16	

4. DISCUSSION

4.1. Overview

Google Earth

Santo Aloysius Catholic High School is planned to be built in the Summarecon area, Cisantren Kidul Village, Gedebage District, with the coordinates of -6.958971048024928, 107.69683620976066. Land area 7508 m².

Source : Google Earth

Figure 3 Site through.

4.2. Assessment Explanation

4.2.1. Basic Green Area

This aspect aims to present a landscape area that is free from building structures and simple garden structures above ground level, with a minimum area of 10% of the total land area, the landscape area in this design has an area of 4047.17 m² so that it gets a P value, namely Prerequisites. This aspect also aims to follow the Minister of Home Affairs Regulation No. 1 of 2007 Article 13 (2a) with the types of plants according to the Minister of Home Affairs Regulation No. 5/PRT/M/2008 regarding Green Open Space (RTH) Article 2.3.1 concerning Vegetation Criteria for Yards so that it gets a P value and the total value for this aspect is P.

4.2.2. Site Selection

Building in urban areas is equipped with infrastructure and has met the standards of the Regulation of the Minister of State for Public Housing of the Republic of Indonesia Number 32/PERMEN/M/2006 article 68. There is access to drinking water sources through PDAM Tirtawening, access to electricity through PLN GIS Gedebage, and waste disposal systems to TPS Gedebage. However, in this aspect, development is not on land that has a negative value, so it only gets 1 point.

4.2.3. Community Accessibility

There are 7 types of public facilities within the reach of the main road as far as 1500 m from the site, namely minimarkets, gyms, Aloysius chapel and its library, parks, stadiums, and gas stations so that they get a score of 1. In addition to the first point, the next point is to provide safe facilities/access, comfortable, and free from intersections with motorized vehicle access to directly connect the building with other buildings, where there are at least 3 public facilities, namely between separate school buildings, chapels, and canteens. for this point gets a value of 1 so that the total score on the aspect of community accessibility is 2.

4.2.4. Public Transportation

The first point in this aspect is that there are stops or public transportation stations within 300 m (walking distance). At this point it gets a score of 1. Then the next point is to provide pedestrian path facilities in the building area to go to the nearest public transportation station and gets a score of 1. In this aspect, the total score obtained is 2.

4.2.5. Bicycle

There is a bicycle parking area per unit per 20 occupants, which is 28 units, and 1 unit shower is available for every 10 bicycle parking spaces. Scored 2 points.

4.2.6. Site Landscaping

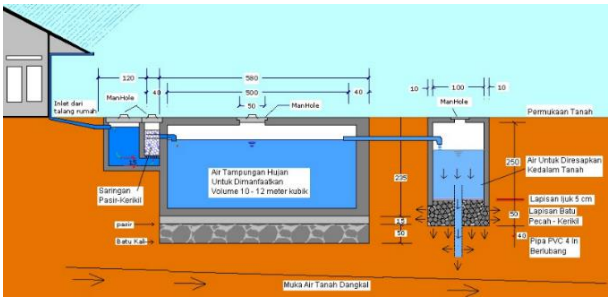
Softscape area with a total area of 3460 m2 which is more than 40% of the total land area, so it gets a score of 1. Because the softscape area has an additional 10%, then there is an additional value for the next point, namely 1. For the last point in this aspect is the use of Patrakomala tree plant which is a local plant adds a value of 1 in this aspect so that the total value in this aspect is 3.

4.2.7. Micro Climate

The use of concrete roof tiles in the roof and non-roof areas produces an albedo value that does not exceed 0.3, concrete 0,35 [11], grass 0.25 [12] paving brick 0,2 – 0,5 [13] and new asphalt 0.04 – 0,12 [14] so that it gets a value of 1 on the first point and a value of 1 for the second point, so that the total score obtained in this aspect is 2.

4.2.8. Storm Water Management

The planned volume load of 50% of rainwater is accommodated in the Rainwater Utilization System. The Rainwater Utilization System \ consists of a Rainwater Storage System and a rainwater treatment system. The Rainwater Storage System is equipped with gutters, sand filters, reservoirs and infiltration wells [15]. Got a score of 1 on this starting point. For the next point, it also gets a value of 1 because it shows efforts to reduce the flood load. Then SPAH is also a technology that can reduce rainwater runoff, getting a score of 1. So the total value in this aspect is 3. Rainwater Utilization System (SPAH) can be seen in Figure 4.



Source: Department of Environment, Bantul Regency Government

Figure 4 Rainwater Utilization System (SPAH).

5. CONCLUSION

In the process of designing the Santo Aloysius Catholic High School through an ecological approach, it turns out that the use of Appropriate can generate theoretical concepts through the benchmarks that have been described in it. The results of the master plan of the Santo Aloysius Gedebage Catholic High School have been assessed quantitatively with 16 out of 17 maximum scores. This parameter focuses on how the design can respond to the environment for a balance between humans, the environment, and the building.

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