

Green Design Principles in Cardboard Garden Restaurants

Cherry Dharmawan¹ | Pika Oktaviani²

^{1,2}Interior Study Program, Universitas Komputer Indonesia, Bandung

Email: cherry.dharmawan@email.unikom.ac.id | oktavianipika@gmail.com

Abstract. This paper will describe the principles of green design in the Taman Kardus Green Forest Restaurant in Bandung. The purpose of this study is to analyze the relationship between green design principles and design elements and space in the restaurant. This study uses descriptive methods with research techniques in the form of direct and indirect observation, interviews, collection of literature studies, and is adjusted to the principles of green design in the form of space organization, materials, lighting, ventilation, energy efficiency and water sanitation based on the Five Fundamentals of Green Building written by Lakshmi and its application to interior elements such as floors, walls, room openings, windows and ceilings. The results of this study indicate that in applying these principles a building must pay attention to all aspects that are in the predetermined principles, not just applying one or two principles, so that it can be said to be a building with a green design concept. The green design principle is applied by Green Forest Cardboard Garden Restaurant Bandung fulfills 4 principles, such as material selection that does not contain hazardous materials, lighting system is oriented with natural lighting techniques, ventilation system is oriented on maximizing air circulation naturally and energy efficiency is applied to the system mechanical, electrical and minimize energy use and electricity costs. So that the conclusion can be obtained, namely Green Forest Cardboard Garden Restaurant Bandung have not fully implemented the green principle design and can not be said as restaurant with green design concept.

1. Introduction

Based on data obtained from the Department Tourism and Culture of Bandung City in 2017, there were 899 in total restaurant / restaurant in Bandung City. Meanwhile, in 2016, only a number 795. This indicates that growth of restaurants in the city of Bandung every the year continues to increase. This research is about the restaurant located at the Green Forest Resort complex, at Jalan Sersan Bajuri No. 102, Cihideung, Kec. Parongpong, Bandung - West Java. Established by three design graduate students interior since 2017. This restaurant is a one of a kind restaurant applying the green design concept to the elements design and restaurant space.

According to Priyoga (2010), development sustainable has one translation the concept of a sustainable design (sustainable design) which focuses on the concept of design philosophy in the form of an object physical, environmental, and service must according to the principles of sustainability environmental, social and sustainability economic sustainability that it strives for reduce the negative impact on environment, health and comfort humans who are in a building..

After getting to know sustainable development which is also in it implements green architecture and also the second green design this concept is starting to be in great demand According to Novriansyah (in Fitriana and Adi, 2019), green design is closely related to energy, especially those that have an impact on the environment, social, community and economy. Green design must be able to provide a good profit towards social, namely increasing the quality of life human and also does not burden the environment the surroundings. According to Fatimah (2020), green architecture is a residential design approach minimizes some of the harmful effects to human and environmental health, with benefits

include energy savings, healthy buildings, buildings that are resistant long time, and minimize maintenance costs. The two concepts have in common namely impactful energy savings on the environment, humans and surroundings. Green design itself can be applied in various things, such as buildings, material and interior elements as a whole as well as furniture. The application must be follow the principles of green design which consists over space organization arrangements, elections materials, lighting, ventilation, efficiency energy and water sanitation. One building to use the green design concept is a Garden Restaurant Cardboard Green Forest Bandung.

Therefore, the purpose of this research is to discuss anything green design principles that have been applied and which has not been applied to the Garden Restaurant Cardboard Green Forest Bandung and elements whatever these principles apply.

2. Methods

The research method used is descriptive method. According to Soebardhy, et al. (2020), descriptive research is research designed to acquire information about the facts at the time of the study done. The aim of this research is to describe the real conditions at the time of the research. Data collection techniques used in supporting the achievement of the analysisNresearch, namely:

1. Direct Observation. According to Purnomo (2011), direct observation is a research that is in there is a process of engagement directly with the object to be researched.
2. Indirect Observation. According to Hermawan and Husna (2017), are a straightforward process observe the activities that have occurred in the past and can be done by means of using the system computer, one of which is a website.
3. Interview. According to Rosaliza (2015), interview is a great way collect data in a way face to face with respondents in order to get pertinent information.
4. Documentation Study. According to Sugiyono (in Nugroho, 2019), is data collection by means of collect data on the writings, pictures, or works from someone.

3. Result

The principle of green design according to Lakshmi (in Fitriana and Adi, 2019), the same principle green building, namely:

1. In spatial organization arrangement internal accuracy is required analyze one or several activities and space requirements, space grouping, defining side space, circulation and accessibility as well direction of architectural design objects- the interior to the direction of the sun and wind.
2. In material selection, that is oriented towards the application of the material should be biodegradable naturally and not contains / made from VOC
3. The lighting system is oriented on accuracy in determining the type and lighting levels, techniques natural light reflection, heat reduction and glare, the light reflection technique natural, reduction of density and glare, as well as using energy resources renewable.
4. In the ventilation system, oriented towards maximization natural air circulation technique. There is trees around the building.
5. In the water sanitation system, oriented its application in pursuing circulation between clean water sources and manage its waste, as well apply the infiltration well around building area.
6. Energy efficiency is applied to the system mechanical, electrical and lighting in a capable building minimize / efficiency energy use and electricity costs. From the description above, the discussion will starting from the floor plan and interior design elements which will be directly linked based on green design principles above. But before that, will be discussed first, what are the elements of design and space. According to DK Ching (in Waluyo, 2017), elements forming interior space is divided into 2 namely vertical elements (walls) and elements horizontal (floor, and ceiling). Element space-forming complement, namely benefits / uses of a building, elements complements are usually required in

support the achievement of the element of comfort, safety, health, communication and mobility in buildings, while the elements space filler is existing furniture on the room.

A. Plan / Space Organization



Figure 1 Indoor Plan (Source: Oktavani, Pika (2020))

Can be seen from the image above, the building restaurant leads south so it doesn't direct sunlight so that the air won't overheat and in this direction, low levels of solar radiation. Each side of the room is named accordingly with the functions and activities that take place indoors and outdoors. Indoor circulation and accessibility very well cared for (seen from absence of furniture at a distance close together so there is no accumulation visitors while inside the restaurant).

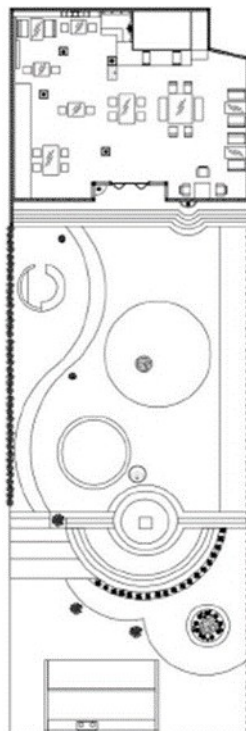


Figure 2 Restaurant Plan (Source: Oktavani, Pika (2020))

Space grouping is divided into two namely inner and outer space.



Figure 3 Outdoor Dining Area (Source: Oktavani, Pika (2019))

Outdoor circulation and accessibility too well organized, as it looks from picture, the distance between the furniture is not close together and have been grouped according to the large number of visitors who will occupy an outdoor dining area.

However, there are some obstacles that are not according to the principle that is when it rains. Visitors must hurry inside in the restaurant room and food serving restaurant employees are also hampered because the kitchen and bar are outside room. So the accessibility of the outdoor area considered less effective and efficient.

B. Material

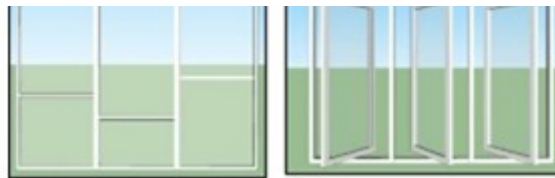


Figure 4 Window Restaurant Source: Oktavani, Pika (2019))

Windows (are elements of design and space) restaurant using window with material of transparent glass. Window sills material using a painted aluminum frame white. This frame material and white paint is not contain hazardous materials / VOCs. Material aluminum frames are also in its application can last a long time and use in time long and repetitive.



Figure 5 Restaurant Terrace Floor (Source: Oktavani, Pika (2020))

Restaurant terrace floor (is one design elements and space) uses natural stone material. So it's deep the decomposition does not have a bad effect on environment and can decompose naturally as well it is certain it does not contain ingredients dangerous / VOC.



Figure 6 Restaurant Bar (Source: Oktavani, Pika (2020))

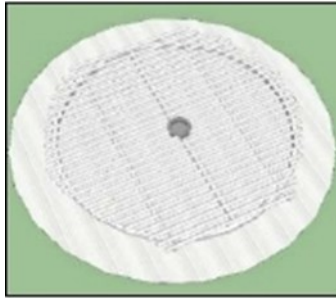


Figure 7 Restaurant Bar Ceiling (Source: Oktavani, Pika (2020))

Outdoor ceiling bar which is an element of design and space use a wooden frame combined with a fiberglass skylight roof. The advantage of this roof is that it does not result noise, leak-proof and anti-rust so it is suitable for use in a period of time long and does not contain ingredients dangerous / VOC.

Besides skylights made from fiberglass, there are also wooden and bamboo frame that white paint on the material of wood and it is known that bamboo is not made from VOC and easy to deep decomposition and can also be used in a long period of time but still can decompose naturally because it is pure material from nature without any ingredients other mixtures.

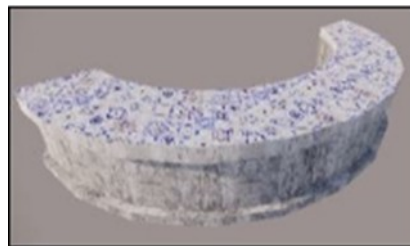


Figure 8 Restaurant Bar Table (Source: Oktavani, Pika (2020))



Figure 9 Restaurant Bar Table Surface (Source: Oktavani, Pika (2020))

Bar table material in the restaurant made of exposed cement. So that this material can also be said to be no made from VOC. Because of the content of cement material in the form of clay and stone quartz. The resistance level of this material too long enough because it has a level of resistance against high friction, and is biodegradable easily because it contains content lime which when exposed to water in the long term long and continuous, will happen salting and causing weathering automatically

Bar table surface material using tile material because it is not difficult inside maintenance and cheaper if compared to ceramics. Tile material is also still considered a floor material durable (according to 99.co). Other than that, tile material which is one of the materials the manufacture is cement, also biodegradable by itself without destroying nature around it.

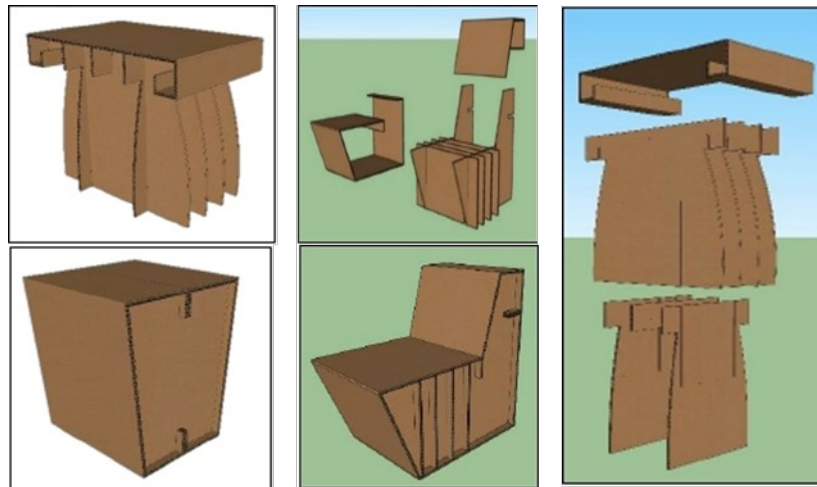


Figure 10 table and chair made from card board (Source: Oktavani, Pika (2020))

Furniture using materials from cardboard without any other additives. Only using a lock technique in the form of a knock down, folds and the half blind joint. Cardboard ones used is a type of double face cardboard wall. According to Willy and Yahya (2001), Cardboard made of wood pulp (pulp) so it is not there is a substance / hazardous content in the material.

C. Lighting System



Figure 11 Dead Glass Window (Source: Oktavani, Pika (2020))



Figure 12 Bar Ceiling Details (Source: Oktavani, Pika (2020))

Based on Figure 11, it can be seen if a window is used in a restaurant one of them is a dead glass window with relatively large window size. The glass used is transparent glass thus allowing sunlight go into the room and produce natural reflection. So that it can minimize the use of lighting artificial during the day.

Based on Figure 12, it is known when the roof of the bar outside the restaurant room uses wooden and bamboo frame as roof retainer skylight fiberglass. Bamboo frame made at a distance of about 2-5 cm for sunlight can still enter through the bamboo frame gap to a minimum in the use of light artificial (lamp).

D. Air Conditioning in Restaurants



Figure 13 Restaurant (Source: Oktavani, Pika (2019))

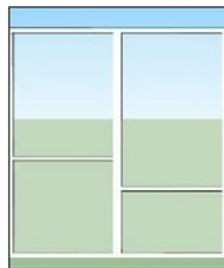


Figure 14 Wall Restaurant Bar (Source: Oktavani, Pika (2019))

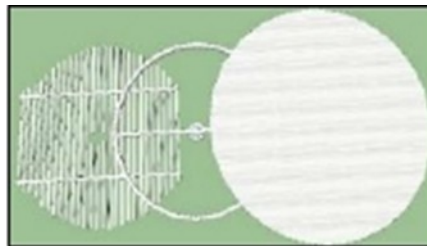


Figure 15 Details of Restaurant Bar Wall Pivot Window (Source: Oktavani, Pika (2019))

In Figure 17 above, it is known if restaurants also use pivot windows with a size that is also quite large with the aim of maximizing the circulation process natural air from outside to indoors vice versa, and minimize use of artificial ventilation. From the picture it can also be seen if there is one trees around the restaurant area

In the bar area, the wall (is an element design and space) the bar is not made of walls cement intact. But from cement blocks with a number of small holes nine in one cement block. Of things that, it can be ascertained if the bar area is not need artificial ventilation. (figure 14 and figure 15)

E. Energy Efficiency



Figure 16 Restaurant View (Source: google maps, accessed 23 August 2020)



Figure 17 Restaurant Right Side Window (Source: google maps, accessed 23 August 2020)

From the previous explanation, it can be seen if the Green Forest Cardboard Park Restaurant Bandung is very little in use artificial lighting system due to parts the front of the restaurant is full of nice windows stained glass windows or pivot windows. The restaurant on the right is also filled with windows so as to minimize costs mechanical and electrical. In the making even the rooftop bar, the restaurant does not use artisan fees because it can be made itself as in figure 16 and figure 17

F. Water Sanitation and Reservoir Well

At the time the research was ongoing, not yet found the location of the reservoir wells and how ways of disposal / handling of waste and dirty water around the restaurant.

4. Conclusion

Based on the description above, it can be seen if the green design principle is applied by Green Forest Cardboard Garden Restaurant Bandung fulfills 4 principles, namely:

- Not in material selection contains hazardous materials
- The lighting system is oriented with natural lighting techniques
- The ventilation system is oriented on maximizing air circulation naturally
- Energy efficiency is applied to the system mechanical, electrical and minimize energy use and electricity costs.

So that the conclusion can be obtained, namely Green Forest Cardboard Garden Restaurant Bandung have not fully implemented the green principle design and can not be said as restaurant with green design concept

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