The evaluation of green performance of Miftahul Huda Islamic boarding school, Malang

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Abstract. Green building is believed to be one of the solutions to resolve the problem of the world’s climate change and energy crisis. The commitment of the government of Indonesia in increasing the number of green building has resulted in some regulation related to green certification that should be achieved by new buildings and also existing building in Indonesia. This research intends to evaluate the green performance of Miftahul Huda Islamic boarding school based on Greenship Existing Building version 1.1 developed by Green Building Council of Indonesia. It was found that the green performance of Miftahul Huda Islamic boarding school still needs to be optimized further. The main factor to be the cause is the lack of commitment of the board managerial of Miftahul Huda Islamic boarding school in achieving optimum performance of the green building criteria.

1. Introduction
Since the last decades, climate change and energy crisis have been the main issues of the worlds. International Energy Agency [1] stated that the building sector is the biggest consumer of energy in the worlds of more than one-third of the world’s energy consumption. Those amounts of energy consumption will indirectly affect the emission of green gas houses produce by this sector thus made this sector seen as one of the main causes of the world’s problem of climate change and energy crisis. Yet, on the other hand, that fact also reveals the opportunity of a significant energy saving potential in the building sector.

World Resources Institute [2] stated that Indonesia ranks fifth as the largest emitter of greenhouse gases in the world, accounted for 4.63%. Even though greenhouse gas emissions are not entirely derived from the impact of the development of the construction sector, efforts to reduce emissions must still be optimized. The development of infrastructure that has become the main priority of the Indonesian Government since the last fifth year has affected the rapid infrastructure development and the increasing number of construction project throughout Indonesia. The impact of the development process that is not environmentally friendly of course will cause a bad impact on the environment and might lead to the problem of climate change in the long term. That is why the environmental awareness and knowledge of the actors in the building and construction is very much needed so that the development process could result in an environmentally friendly infrastructure that brings a benefit for the society and the environment.

The government of Indonesia has already set a commitment in reducing the carbon emission and greenhouse gases. It is proven by the reduction of emission by 26% in 2007, and this achievement leads to an improvement to set the target of reduction of 29% by 2020 [3]. Promoting the ‘green
building could be one of the efforts of Indonesian Government to reduce the carbon emission and improve the environmental condition of Indonesia. Green building is a concept that is believed as a way in resolving the environmental problems in the building sector. A ‘green’ building means that the entire process of a building lifecycle from design, construction, operation and the demolition is conducted in an environmentally friendly way thus reduces or eliminates negative impacts to the environment and surrounding, and can create positive impacts, on our climate and natural environment. Green buildings preserve precious natural resources and improve our quality of life. There is some regulation related to Green Building that is already appointed by the government to support this commitment.

The government of Indonesia works together with the Green Building Council Indonesia (GBCI), a non-profit organization that concerns in the field green building and construction to conduct a building certification for both new and existing building in Indonesia to make sure that buildings are designed, built, and operate in an environmentally friendly way. In order to conduct the evaluation process, Green Building Indonesia develop a tool called Greenship Rating Tools [4]. This tool was developed based on another green rating tools that used internationally but with some adaptation to the Indonesian context.

This research intends to evaluate the green building performance of the facility of Miftahul Huda Islamic Boarding School in Malang based on Greenship Existing Building 1.1 version by Green Building Council Indonesia. Miftahul Huda Islamic Boarding School is among the oldest Islamic Boarding School in Malang, thus this research is hoped to provide some inputs about the strategy to improve the green performance of Miftahul Huda Islamic Boarding School.

2. Research Methods
This research is designed to be conducted in a qualitative method. The data collection is conducted by survey, documentation, literature review, and interview with the board members and students of Miftahul Huda Islamic Boarding School. The research focus was the sixth variable of Greenship rating tools including appropriate site development, energy efficiency and conservation, water conservation, material resources, and cycle, indoor health comfort, and building environment management. The existing data of the sixth greenship variable of Miftahul Huda Islamic Boarding School then being compared with the standard mentioned in Greenship Existing Building version 1.1 by Green Building Council of Indonesia to know the green performance of this building.

3. Research Findings
Miftahul Huda boarding school is one of the oldest Salafiah Islamic boarding School that was founded in 1700 M. Located in Jl Gading Pesantren Malang, this Islamic boarding school now has 915 students. All of the students live in one of the twelve boarding houses that are owned by this Islamic boarding school with 6484.34 m² total area of the boarding house.

As stated before, Greenship Existing building version 1.1 will be used to assess the green performance of this boarding school complex. Greenship Existing building is the rating tools which made to assess the performance of building which already been built, while Greenship New building is used when the building to be assessed is a new or still in the design phase. The greenship performance of Miftahul Huda Islamic Boarding school can be described as follow.

3.1. Appropriate site development
The variable of appropriate site development consists of nine sub variable including site management policy, motor vehicle reduction policy, community accessibility, motor vehicle reduction, site landscaping, heat island effect, stormwater management, and site management.

From the interview that has been conducted to explore the policy of site management and motor vehicles, it can be stated that there are no written rules that especially made in that case, yet there are general rules to maintain and clean the environment surrounding periodically in the form of “environmental caring” activities. As for to reduce the use of motor vehicle, the board of Miftahul
Huda Islamic Boarding School has been stated a rule that students do not allow to bring their own vehicles unless they are already in the second year of their study or more.

After conducting a survey for the sub variable of community accessibility, we can mention that there is only one public transportation that can access the site within the distance of 500 m. There is no bus stop and special pedestrian that specifically built for that purpose. In the sub variable of landscaping, we can conclude that the area in this Islamic boarding school that is dedicated to the green area is only less than 20%. There is some local and productive vegetation including mango, star fruit, bamboo, and some local flower. Most of the vegetation is planted in the pot instead of directly grown in the ground. As for the heat island effect sub variable, this complex building of Islamic boarding school does not get any score since the albedo of the roof material is lower than standard. In the storm water management, it is noticeable that some effort in reducing the storm water flow to the environment drainage had been conducted by conducting a rain harvesting by collecting it and used it to wash the vehicles and watering the plant, yet the amount is still below 75% of all the storm water.

The sub variable of site management focuses on the animal habitation on site and the management in pest and weed disease. It is noticeable from the observation that there is some chicken found on the site but the area for their activities is less than 5% of the total area. As for the prevention of the pest and weed disease, there is no special treatment, from the interview we can get the information that they never use poison form of treatment to prevent pest and weed disease.

The last sub variable in the appropriate site development is building the neighborhood. From the interviewed conducted, we know that some effort has been conducted by this Islamic boarding school to improve the quality of life of the society periodically by providing the toilet improvement program and sharing a place for praying, also to serve some training for the society as a community service.

3.2. Energy efficiency and conservation

This sub variable mainly focuses on the effort of reducing the energy consumption of the building. It consists of nine sub variable including policy and energy management plan, minimum building energy performance, optimized efficiency building energy performance, testing, recommissioning or retro-commissioning, system energy performance, energy monitoring, and control, operation and maintenance, on-site renewable energy, and less energy emission. From the interview conducted to get some information on the policy and energy management plan, we know that the commitment of reducing energy consumption is only conducted spontaneously without any structured plan. Some campaign related to energy saving is conducted by putting some sticker in some strategic place reminding to turn off the lamp when not in use.

In the sub variable of minimum building energy performance, optimized efficiency building energy performance, and testing, recommissioning or retro-commissioning, Miftahul Huda Islamic boarding school does not get any score. It is because the information on the detail of energy consumption per month until a year is not provided. Hence, by looking only at the last three-month bills of energy consumption provided, we can still assume that the energy consumption of the complex building is still meet the required standard of green building. The amount of energy consumed is still fluctuated month by month and does not show a gradual reduction. Testing, recommissioning or retro-commissioning is also never been conducted in this building since they do not use any air conditioning.

In the variable of system energy performance, it was found that nearly all lamp for lighting in the Miftahul Huda Islamic boarding school is already replaced with an LED lamp to save the energy. Only a few lamps in the canteen, parking area counted for 10% of all the lamps uses. While for the mechanical air conditioning and ventilation systems since as stated before that this building does not use any air conditioning but the fan, it can be stated that the efficiency target is already reached at this stage.

In the sub variable of operation and maintenance, on-site renewable energy, and less energy emission, the complex building of Miftahul Huda Islamic boarding school again gets no score. There are never been conducted an energy audit in this complex building, there is no use of air conditioning
so there is no need to maintain the AC system. There is no on-site renewable energy gain in this site, and they never conduct any audit of CO2 emission gained.

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3.3. Water conservation

The variable of water conservation consists of eight sub variable which is water management policy, water sub-metering, water monitoring control, freshwater efficiency, water quality, recycled water, potable water, deep well reduction, and water tap efficiency.

In terms of water management policy, again there is still no real commitment shown by the Miftahul Huda Islamic boarding school management as it is shown that there is no written regulation about water management system neither structured plan or auditing plan in the water-saving management system. Yet, some campaign had been conducted spontaneously by placing some stickers reminding to use water wisely.

There is no water sub-metering that was found on the site. As for the water monitoring control, the checking maintenance of the water and plumbing system does not conduct periodically but only when there is a problem found. The amount of water consumed every month was also never being recorded thus they never know if there is a reduction in water consumption or not. The quality of the water in the Miftahul Huda Islamic boarding school is also never been tested in the laboratory to get a water quality certification.

In terms of recycled water sub variable, the effort that being conducted in the Miftahul Huda Islamic boarding school is using the rainwater collecting for the purpose of plant watering and vehicle washing. They do not use any recycled water for WC flushing. They also do not have any standardize water recycle system, thus they do not use recycled water for consumption.

There is no deep well reduction effort in the site since 100% of the consumption is obtained from the deep well. Hence, this Islamic boarding school uses a water tap efficiency strategy since they use water tap with an auto stop in more than 50% of the water tap in the site.

3.4. Material resource and cycle

The variable of material resource and cycle consist of seven sub variables of fundamental refrigerant, material purchasing policy, waste management policy, non-ODS usage, material purchasing practice, waste management practice, hazardous waste management, and management of used good.

Since as stated before that the complex of Miftahul Huda Islamic boarding school does not use any air conditioning system, so they do not have any concern with anything related to the sub variable of fundamental refrigerant and non-ODS usage.

In terms of the material purchasing policy and waste management policy, from the interview, we get the information that there is no statement of commitment from the management related to that matters. Yet, campaign and some effort of waste separation and recycle have been conducted regularly. They also encourage the use of food-grade packaging and prohibit the use of Styrofoam for food packaging. There is no information about material purchasing practice that we can obtain from the interview, but we notice that in some part of the building they use reuse material and pre-fabricated material.

In the hazardous waste material variable, Miftahul Huda Islamic boarding school is again cannot get any point since they never conduct any training related to hazardous waste management. Yet, in terms of management of used good, even though there is no written standard procedure related to that, there are unwritten rules to donate the uses goods that can still be used by other people.
3.5. Indoor health and comfort

The variable of indoor health and comfort is including nine sub variable of no-smoking campaign, outdoor air introduction, environmental tobacco smoke control, CO\(^2\) and CO monitoring, physical, chemical, and biological pollutants, visual comfort, thermal comfort, acoustic level, and building user survey.

In the no-smoking campaign sub variable, it was found that there is no written statement of commitment related to that matter. There is also no campaign in terms of poster or sticker that stated “no smoking”. Hence there is some oral regulation to not smoking in a certain area. This condition is also applicable to the sub variable of environmental tobacco smoke control since there is no specific regulation for a place that can be used as a smoking area.

In terms of outdoor air introduction, it is noticeable from the survey that not all of the room in the complex building of Miftahul Huda Islamic Boarding School get an outdoor air introduction. There are some rooms including the rooms in the dormitory that are not really well ventilated. Hence, the thermal measurement shows that the thermal condition of the room is already meet the standard of 24°C – 27°C with the relative humidity accounts for 60% + 5%.

In terms of visual comfort, the measurement from the lux meter showed that in general the illumination in the working room is already meet the standard. Even though in some cases the illumination obtained from the natural lighting is not enough, but after the lamp is turned on, there is a significant increase of illumination obtained to meet the standard.

As for the acoustic level, there had been conducted measurement of the noise level in a random location in the site, and the result stated that the noise is still considered to be acceptable according to SNI 03-6386-2000.

Sub variable of physical, chemical, and biological pollutants focus on the measurement of air pollution level and kinds of air pollutant on site. The management of Miftahul Huda Islamic boarding school had never conducted any measurement on the air pollution level, so there is no information regarding this subject that we can get from the interview and observation.

The last sub variable in the variable of indoor health and comfort is the sub variable of building user survey. In this sub variable, Miftahul Huda Islamic boarding school management cannot get any point since they had never conducted this kind of survey yet.

3.6. Building environment management

The variable of building environment management consists five sub variable including operation maintenance and policy, innovations, design intent and owner project requirement, green operational and maintenance team, green occupancy or lease, and operation and maintenance training.

Based on the survey and interview that already conduct, we can state that there are no single criteria in this variable that is already being conducted in the Miftahul Huda Islamic boarding school.

4. Conclusion

From the findings stated above, it can be seen that no single variable of the greenship rating tools that can meet the optimum requirement the greenship criteria. It might be due to the lack of commitment of the management related to the target to achieve a green performance of the building. It can be noticed that the lack of commitment of the management resulted in no written statement nor clear regulation related to green building. A written statement of commitment and regulation might function as the guideline to make the plan to achieve the real target. From the plan, then we might evaluate and analyze the action to do in order to achieve the target. The plan then functions as a guideline of the activities at the operational level.

It can be stated that without the clear commitment from the managerial board, it might be impossible that Miftahul Huda Islamic boarding school can optimize the green performance of their
building. Therefore, the commitment of the management team should be stated clearly first, before creating the plan of action in optimizing the green building performance.

It is suggested that the board management of Miftahul Huda Islamic boarding school conduct such building user survey to know the opinion of the building user related to the preference and facility comfort. The result of the survey than can be used as a reference in determining the priority variable that needs to be improved.

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