The Physical Quality Assessment of Residential Area in Jabodetabek – Indonesia with Green and Livable Settlement Concept

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Abstract. Green architecture as one of the concepts of Green & Livable Settlement has begun to be applied on the designing of residential areas in Jabodetabek (Jakarta, Bogor, Depok, Tangerang, Bekasi). To find out whether the residential area meets the criteria specified in the Green & Livable Settlement concept, it is necessary to conduct a study on the Physical Quality Assessment of Residential Areas in Jabodetabek with the Green & Livable Settlement Concept. The study was conducted using descriptive methods, through surveys, observations and interviews. The results of the study can provide an assessment overview of the physical quality of housing in Jabodetabek. This assessment can be used to improve the architectural design of residential area. The assessment also shows that the use of the green theme gives the benefit for the promotion of property, and the physical quality of residential area better than other residential area.

1. Introduction
At present most of the world's population lives in urban areas, and will continue to increase to almost around 70-80%. Around 20-30% growth of cities in developing countries will quickly match the percentage of city dwellers in developed countries [1]. This population development requires a new residential area that is not entirely available in urban areas. The development of new residential areas on the borders of the city of Jakarta and surrounding areas, often called Jabodetabek (Jakarta, Bogor, Depok, Tangerang, and Bekasi), requires a new concept that is in line with current needs, namely the design of residential areas that are part of environmental conservation efforts. Because of this need, the concept of Green & Livable Settlement began to be applied in new residential areas.

Architecture plays a role in the development process that occurs on earth, because architecture occupies space on natural land. So that architecture can be seen as a cause of environmental degradation or damage to nature in a developing city, through the construction of various buildings for settlements and industries, as well as other supporting facilities that do not pay attention to environmental and ecological conditions. The phenomenon of global warming caused by the greenhouse gas effect on earth is also believed by researchers to be caused by development activities [2].

At the beginning of the concept of sustainable development, design focused on only one issue, namely the efficiency or use of used materials. But since the 1980s and 1990s, planners and designers have begun to realize that the integration of all factors can produce good sustainable designs. So that today, many sustainable buildings have been combined into several focus areas of discussion such as;
land selection, energy efficiency, water conservation, efficiency of material resources, and environmental quality in space [3].

Currently, one of the concepts of Sustainable Architecture, Green Architecture, has begun to be applied not only to residential design, but also to the design of new residential areas with the Green Settlement concept. Even the concept of Livable Settlement is also a concept that is used as more value in the design of residential areas. With the application of the Green & Livable Settlement concept, it is hoped that residents in the area can live more comfortably and better with quality environmental support.

To find out whether the new residential area that applies the Green & Livable Settlement concept has good physical quality according to the criteria that must be met, it is necessary to study the Physical Quality Assessment of Residential Areas in Jabodetabek with the Green & Livable Settlement Concept. The study was conducted in a new residential area in Jabodetabek. The results of the study can provide an overview of the physical quality of the residential area, which can be used to improve the architectural design of the next residential area to be better physical quality.

The sustainable framework has been submitted by the UIA (International Union of Architects) through the Copenhagen Declaration on 7 December 2009. The UIA Declaration states that buildings and the construction industry have an impact on climate change that is happening right now. And these various impacts can be reduced by determining the built environment system. UIA is committed to reducing the impact of damage through a "Sustainable Design Strategy" [4].

A study of the Physical Quality Assessment of Residential Areas in Jabodetabek with the Green & Livable Settlement Concept has never been conducted. Research that has been conducted is an assessment of the application of the concept of green architecture in residential homes in the city of Medan [5] and in Jakarta [6,7]. The results of both studies concluded that not yet fully residential design in the city of Medan and in the city of Jakarta applied all aspects specified in the criteria of green architecture.

2. Research methodology
Research on the Physical Quality Assessment of Residential Areas in Jabodetabek with the Green & Livable Settlement Concept is a descriptive study. The purpose of this study was to identify the architectural design of residential areas using the Green & Livable Settlement concept, and to enrich knowledge about the physical quality of residential areas using the Green & Livable Settlement concept. Data collection in the field is done by field surveys, observations and interviews. Data analysis was performed with a descriptive approach using Greenship Neighborhood version 1.0.

The study took place in Jabodetabek. The research setting of Physical Quality Assessment of Residential Areas in Jabodetabek with the Green & Livable Settlement Concept was carried out on new residential areas that applied the concept in the cities of Jakarta, Bogor, Depok, Tangerang, and Bekasi. The study was conducted from March 2019 to November 2019 (9 months).

3. Results and discussion
The building and green area assessment system in Indonesia was developed by the Green Building Council Indonesia (GBCI). The GBCI, which was founded in 2009, is an independent and non-profit institution committed to implementing the principles of sustainability by developing parameters or benchmarks called the Greenship. The assessment in the application of building practices and environmentally friendly areas can be carried out starting from the planning, construction and maintenance of buildings.

The research to evaluate the application of the green concept by using the greenship parameter took the case study locations in the cities of Jakarta, Bogor, Depok, Tangerang, and Bekasi, which were chosen purposively, namely in residential areas which claimed to apply the Green concept (see figure 1). The locations of selected residential areas are GLC housing in West Jakarta, SC housing in Bogor, TGS housing in Depok, BSDC housing in Tangerang, and LC housing in Bekasi.
These five housing locations were chosen because they have a residential area that is almost the same size, and also has a theme with a Green Insight Residential Area design with the Green Architecture theme approach. The development of residential areas also has the same design model which is divided into residential clusters, where each cluster is equipped with supporting facilities to meet their social and economic needs (see figure 2).

The development of residential type models in clusters in five housing locations has a similarity, that is, the developer designs dwellings as needed with a facade that adopts architectural forms and elements based on foreign architectural characteristics / styles (European, Mediterranean, American, etc.). This condition has become a challenge for Indonesian architects to develop and introduce modern (contemporary) Indonesian architecture in order to be able to host their own country.

Before doing the assessment, it is necessary to analyze the feasibility of the five housing estates. After being considered feasible, an assessment of compliance with the green architecture criteria of the five residential areas was carried out by using Greenship Neighborhood version 1.0. (see figure 3). The assessment results are then adjusted to the Greenship Ranking Level (see table 1).
The results of the simulation assessment for the submission of residential area greenship show that of the five residential areas that claim to apply the concept of green architecture, they have tried to make it happen in the area and residential design. Proven five of them showed the results of the

| No | Aspect                                      | Benchmark | GLC | SC  | TGS | BSDC | LC  |
|----|---------------------------------------------|-----------|-----|-----|-----|------|-----|
| 1  | Enhancement of land ecology                 | Green Base Area | P  | OK  | OK  | OK  | OK  |
|    |                                             | Public Green Area (25% - 35%) | 4  | 3   | 2   | 3   | 2   |
|    |                                             | Habitat Preservation       | 6  | 2   | 0   | 0   | 2   |
|    |                                             | Land Revitalization        | 4  | 0   | 0   | 0   | 0   |
|    |                                             | Micro Climate              | 3  | 2   | 1   | 1   | 3   |
|    |                                             | Local Food                 | 2  | 0   | 0   | 0   | 0   |
|    | Sub Total                                   | 19 | 7   | 3   | 3   | 8   | 3   |
| 2  | Movement and Connectivity                   | Movement and Connected Areas Study | P  | OK  | OK  | OK  | OK  |
|    |                                             | Pedestrian Path Design Strategy | 10 | 6   | 4   | 4   | 4   |
|    |                                             | Public transportation       | 6  | 4   | 2   | 0   | 4   |
|    |                                             | Utilities and Public Facilities | 2  | 2   | 2   | 2   | 2   |
|    |                                             | Universal accessibility     | 3  | 2   | 0   | 0   | 0   |
|    |                                             | Bike Networks and Place     | 3  | 3   | 3   | 1   | 0   |
|    |                                             | Shared Parking              | 2  | 1   | 1   | 1   | 1   |
|    | Sub Total                                   | 26 | 18  | 9   | 8   | 11  |
| 3  | Water Conservation and Management           | Calculation of Water Consumption | P  | OK  | OK  | OK  | OK  |
|    |                                             | Alternative Water Sources   | 6  | 2   | 0   | 0   | 0   |
|    |                                             | Rainwater Runoff Management | 7  | 7   | 4   | 3   | 4   |
|    |                                             | Preservation of Water Bodies and Wetlands | 2  | 2  | 0   | 0   |
|    |                                             | Liquid Waste Management     | 3  | 3   | 0   | 0   | 0   |
|    | Sub Total                                   | 18 | 15  | 4   | 3   | 4   | 3   |
| 4  | Solid Waste Material                        | Operational Solid Waste Management | P  | OK  | OK  | OK  | OK  |
|    |                                             | Advanced Solid Waste Management | 4  | 2   | 2   | 2   | 2   |
|    |                                             | Construction Waste Management | 4  | 3   | 3   | 2   | 3   |
|    |                                             | Road Infrastructure Regional Materials | 4  | 4  | 4   | 4   | 4   |
|    |                                             | Road Infrastructure Recycled Materials | 2  | 0   | 0   | 0   | 0   |
|    | Sub Total                                   | 14 | 9   | 9   | 8   | 9   | 9   |
| 5  | Community Welfare Strategy                  | Community Facilities        | 2  | 2   | 2   | 2   | 2   |
|    |                                             | Social and Economic Benefits | 4  | 4   | 2   | 2   | 4   |
|    |                                             | Community Concern           | 4  | 2   | 1   | 1   | 2   |
|    |                                             | Mixed Area                  | 2  | 2   | 2   | 2   | 2   |
|    |                                             | Local Culture               | 2  | 0   | 0   | 0   | 0   |
|    |                                             | Safe Environment            | 2  | 2   | 2   | 2   | 2   |
|    | Sub Total                                   | 16 | 12  | 9   | 9   | 12  |
| 6  | Buildings and Energy                        | Greenship Green Building    | 6  | 0   | 0   | 0   | 0   |
|    |                                             | Balanced Occupancy          | 1  | 1   | 1   | 1   | 1   |
|    |                                             | Energy Efficiency in the Region | 4  | 2  | 2   | 2   | 2   |
|    |                                             | Alternative Energy          | 4  | 3   | 0   | 0   | 0   |
|    |                                             | Light Pollution Reduction   | 2  | 2   | 2   | 2   | 2   |
|    |                                             | Noise Pollution Reduction   | 2  | 2   | 2   | 2   | 2   |
|    | Sub Total                                   | 18 | 17  | 7   | 7   | 9   | 7   |
| 7  | Innovation and Innovation Development       | GA / GP empowerment for Managers | 3  | 1   | 1   | 0   | 1   |
|    |                                             | Area Management             | 2  | 4   | 2   | 2   | 2   |
|    |                                             | Innovation                 | 6  | 2   | 0   | 0   | 2   |
|    | Sub Total                                   | 11 | 7   | 3   | 2   | 5   | 4   |
|    | TOTAL                                       | 122| 74  | 40  | 57  | 47  |

| Ranking          | I/P | 4/BKS | 5/B | 2/G | 3/S |
|------------------|-----|-------|-----|-----|-----|

**Figure 3.** Assessment of the application of green architecture to the residential area.

**Table 1.** Greenship ranking level points.

| Points to be earned | Planning & Design | Built Project |
|--------------------|-------------------|---------------|
| Platinum (P)       | 56                | 74            |
| Gold (G)           | 44                | 58            |
| Silver (S)         | 35                | 47            |
| Bronze (B)         | 27                | 35            |

The results of the simulation assessment for the submission of residential area greenship show that of the five residential areas that claim to apply the concept of green architecture, they have tried to make it happen in the area and residential design. Proven five of them showed the results of the
assessment that made it possible to get a greenship ranking with varied results. The results of the assessment are:
1. GLC housing has the highest rating (platinum) which means that the results of the simulation assessment meet almost all of the standards that must be met from green architecture criteria (74/122 = 60.7%).
2. BSDC housing received a high rating (gold) which means that the results of the simulation assessment met most of the standards that must be met from the green architecture criteria (57/122 = 46.72%).
3. LC housing has a medium rating (silver) which means that the results of the simulation assessment meet some of the standards that must be met from the green architecture criteria (47/122 = 38.5%).
4. SC housing has a sufficient rating (bronze to silver) which means that the results of the simulation assessment will soon reach some of the standards that must be met from green architecture criteria (44/122 = 36.1%).
5. TGS housing received a sufficient rating (bronze) which means that the results of the simulation evaluation were sufficient to meet some of the standards that must be met from the green architecture criteria (40/122 = 32.8%).

The results of the assessment of the application green architecture concept chasing targets at high (gold) and highest (platinum) positions. Of the 5 selected locations, only 2 locations have reached that position, namely GLC and BSDC housing.

4. Conclusion
Assessment of the application of the concept of green architecture in residential areas in Jabodetabek using Greenship Neighborhood version 1.0. of 5 housing locations showing the results that only 2 residential areas (GLC and BSDC) can be considered successful in meeting green architecture criteria. There are opportunities in 3 other residential areas (LC, SC and TGS) to improve themselves in order to meet all the architectural design parameters and green areas based on Greenship Neighborhood version 1.0. The assessment also shows that the use of the green theme for the benefit of the promotion of property developers to buyers has been pursued and applied well by the developer in the design of residential areas and buildings.

5. References
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