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The role of site development in sustainable city (Case study: Site of the noble house in Mega Kuningan, Jakarta)

I G O S Pribadi^{1,*} and M P Achadiat²

¹ Architecture Department, Universitas Trisakti, Kyai Tapa No. 1, Grogol, Jakarta, Indonesia

² PT Barra Arkitra, Jl. Taneti 12, Jakarta, Indonesia

*okapribadi@cbn.net.id

Abstract. The availability of open space has become increasingly limited. It is important to see how urban area is developed towards sustainability. At present, the completeness of infrastructure, urban networks, transportation, utilities, public and social facilities have been often developed to meet mostly commercial aspects related to human need without environmental consideration. This research aims to recognize the condition of site development in one case of office building in Jakarta through quality measurement using green building criteria. The green area of the site is the main aspect which become prerequisite for assessing the appropriate site development. In addition, site selection, community accessibility, and public transportation are also included as criteria for this study. The steps of this research can be generally implemented in many new building cases.

1. Introduction

Sustainability becomes a global issue and it is discussed more and more by many communities in terms of achieving better living quality in our earth. The basic of physical development is the area, where we can create settlement or building and its facilities and infrastructures.

Along with the growth of urban areas, the availability of green open space that can maintain the balance between built environment and natural environment, has become increasingly limited. Hence, we should consider the area of development as an important element of environmental development to achieve natural balance [1]. Because of this environmental balance, it is important to see how urban area is developed with the aim of sustainability. Even though there are so many infrastructures developed in urban area, the connectivity between these infrastructures play significant role, not only in terms of distance and time, but also in terms of convenience of accessibility.

Connectivity between infrastructures and facilities has a chance to create flexibility to get efficiency in using low cost energy, which can finally improve the quality of life and environment [2]. Implementation of this quality of environment can be seen in urban site development as a small scope of development.

This study is focusing only on site selection, community accessibility, and public transportation, which are three criteria of the Appropriate Site Development (ASD) rating category in green building assessment. The three criteria can represent the main criteria in site development. To provide clearer site development explanation, it is important to use an example. The Noble House in Mega Kuningan Jakarta



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is chosen as a case study of this study, since the site is located in downtown area surrounded by many urban facilities, so that they influence each other in the integrated development.

2. Aims

This research aims to recognize and to assess the condition of site development through quality measurement using green building criteria from Green Building Council (GBC) Indonesia.

3. Problems

At present, urban planning is considering the completeness of infrastructure, urban networks, transportation, utilities, as well as public and social facilities. These infrastructures have been often developed to meet mostly economical aspects related to daily human activities without environmental consideration. In this study, the environmental aspect becomes the most important consideration in development of a building area.

4. Scope of study

The green area of the site is the main aspect which become prerequisite for assessing the ASD category. The three criteria (site selection, community accessibility, and public transportation) can influence the other four criteria of Appropriate Site Development rating tools of green building assessment, which are bicycle facilities, site landscaping, micro climate, and storm water management. Hence, it is important to discuss and evaluate how the three criteria play a significant role in site development.

The assessment of green building criteria in Noble House office building area, Mega Kuningan Jakarta, was conducted in 2018. The total land area is 6.477 sqm with gross floor area 84.743 sqm in 33 floors upper structure and 4 floors basement.

5. Research methodology

According to the GBC Indonesia, as part of criteria for assessment of green building (new building), the ASD has seven rating categories and one prerequisite. This research is simply assessing only three criteria in ASD. Each criterion should consider the maximum point, baseline point, and target point as well. Maximum point is the maximum point we can get from the assessment, which is 6 points in this three criteria of ASD category. The base point is the existing point from the planning or design. While the target point is the planned point in order to get more efficient through higher assessment point. Some of the target points are followed by some investment costs, for instance: cost for building closer accessibility. The steps of this research can be generally implemented in many new building cases.

6. Results and discussion

The prerequisite criteria of ASD is Basic Green Area, which is the existence of a landscape area in form of vegetation (softscape) which is free from building structures and simple hardscape structures above or below the ground. According to GBC Indonesia, for new construction, the area is minimum 10% of the total land area. For the major renovation, the area is minimum 50% of open space, which is free of basement on the site. See figure 1 below.



Figure 1. Site plan.

Total area of non-structure green space is 955.19 sqm or 14.74% of total land area (6.477 sqm). It means more than the prerequisite 10%. With this condition, the site has fulfilled the prerequisite to be assessed further using the three ASD category (site selection, community accessibility, and public transportation).

6.1. Site selection

According to GBC Indonesia, the criteria of category ASD 1 (site selection) is that the area should be equipped by eight of twelve urban infrastructures as followed: road, lighting and power network, drainage network, area sewage treatment plant, waste disposal system, fire system, fiber optic network, artificial lake, pedestrian paths, gas pipeline, telephone, and clean water network.

Noble House is located in the Business District Mega Kuningan, which is surrounded by eleven urban infrastructures as above listed. The only infrastructure that is not available on the site of Noble House is artificial lake. The building is using reservoir to accommodate rain water as water sources for garden and green area maintenance purposes.

In addition, the criteria of green or sustainable site (table 1) is following the FAR (Floor Area Ratio) of more than 3. It means the higher the building is, the more sustainable the site will be.

Table 1. Criteria of site selection [3].

Criteria	Max Points	Baseline Points	Target Points	Investment (IDR)
Development area with minimum eight of twelve urban infrastructure.	1	1	1	-
1. Road network				
2. Lighting and power network				
3. Drainage network				
4. Area sewage treatment plant				
5. Waste disposal system				
6. Fire system				
7. Fiber optic network				
8. Artificial lake (Min. 1% area)				
9. Area pedestrian pathway				
10. Gas pipeline network				
11. Telephone network				
12. Clean water network				
Development area with FAR requirement > 3				
Conduct revitalization and development in area with negative value and not used due to previous development or development negative impact.	1	1	1	-
Total	2	2	2	-

The building site has reached the maximum point of 1 as target point. Hence, the site represents the sustainable site, which means that the needs for building and site users will be met by availability of infrastructure, water, communication network, other safety and convenience factors such as fire system, pedestrian path and road system as well. The convenience can also reduce the need of energy to meet the good quality works [4].



Figure 2. Land use plan in RDTR (Detailed urban spatial planning) [5].

According to Jakarta Selatan RDTR (see figure 2), this Noble House site is located in zone area with FAR 6.5 (meet the standard criteria which is more than 3). Vertical development is highly recommended to get more efficient use of vacant land. The higher the FAR score is, the less the use of land and the more sustainable the site will be.

Site development of Noble House represents a development on unproductive land. Hence, this is a good development and follow the green building criteria as well. Unproductive land particularly in business area will disturb the growth of neighbourhood, because the network of power supply, water, communication, and other infrastructure will be more expensive due to less user.

From the first criteria about infrastructure and FAR, this area has 1 point, while from the second criteria of site selection, it gets one additional point due to development on unproductive site. This means the site has total point of 2 according to GBC Indonesia rating tool. It meets the target point and maximum point.

6.2. Community accessibility

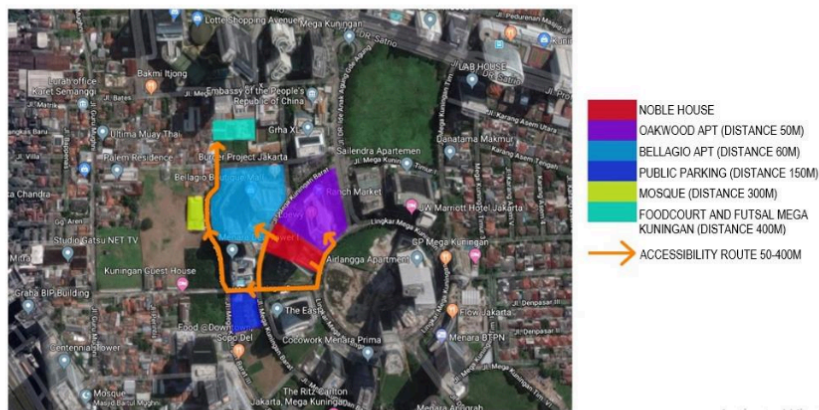
The criteria for category ASD 2 is about the community accessibility. If there are at least seven public facilities within 1500 m radius from the site, then the site will meet the target point, which is 1 point.

There are nine types of public facilities (instead of minimum seven types of public facilities) surrounding the site and within 400 m (less than 1500 m), namely: bank, public park area, shops, worship place, sport facility, pharmacy, restaurant, health facility, and market. It means, this site according to the green building assessment has 1 point and reaches the target dan maximum point.

The more public facilities available surroundings the site, the better quality of the site regarding the need of energy and convenience level to reach them, either on foot or by vehicle [6]. All facilities are mostly located in two buildings, which are Bellagio Apartment and Oakwood Apartment in West and Nord side of the Noble House site. See table 2 and the detail from figure 3-8 below.

Table 2. Criteria of community accessibility [3].

Criteria	Max Points	Baseline Points	Target Points	Invest-Ment
Minimum seven types of public facilities can be reached from main road within 1500 m from site.	1	1	1	-
1. Bank (v)				
2. Public park				
3. Public parking (outside site) (v)				
4. Shops (v)				
5. Multifunction building				
6. Security/police post				
7. Worship facility (v)				
8. Sport field (v)				
9. Childcare				
10. Pharmacy (v)				
11. Restaurant/Canteen (v)				
12. Public photocopy				
13. Health facility (v)				
14. Post office				
15. Fire office				
16. Transportation terminal/Station				
17. Library				
18. Government Office				
19. Market (v)				
Open access for pedestrian other than to main road outside, connecting to secondary road and/or other people land so that access is available to minimum three public facilities within 300 m (within walking distance).	1	1	1	10.000.000
Total	2	2	2	10.000.000

**Figure 3.** Public Facilities Surrounding the noble house.

There are five types of public facility of Apartment Oakwood, which are located only 50 m from site Noble House (bank, market, pharmacy, and sport area).



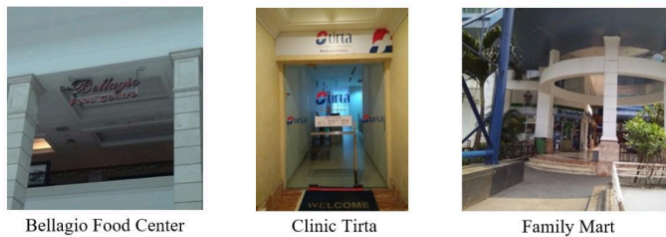
Bank

Pharmacy

Ranch Market

Figure 4. Facilities in apartment Oakwood.

There are seven types of public facility of Apartment Bellagio, which are located only 60 m from site Noble House (bank, clinic, pharmacy, convenient store, market, restaurant, sport area).



Bellagio Food Center

Clinic Tirta

Family Mart

Figure 5. Facilities in apartment Bellagio.

There are 4 types of public facilities, located 300–400 m far away from Noble House (parking area, mosque, food court, sport area).



Public Parking Area

Mosque Jami Al Istiqomah

Figure 6. Facilities located 300–400 m from noble house.

To obtain point in pedestrian paths criteria, it should be proposed a development of additional pedestrian path. It means there is an open pedestrian access to the main road outside the site of Noble House, that connects it to the secondary roads (Jl. Mega Kuningan Barat) and / or other land properties so that there is an access to at least three public facilities within 300 m of walking distance. This additional pedestrian

way connects also the stairs from Basement 1 of Noble House and Jl. Mega Kuningan Barat (secondary road), so it will be easier and more comfortable for pedestrian to reach all public facilities located in other two apartments (Bellagio and Oakwood).

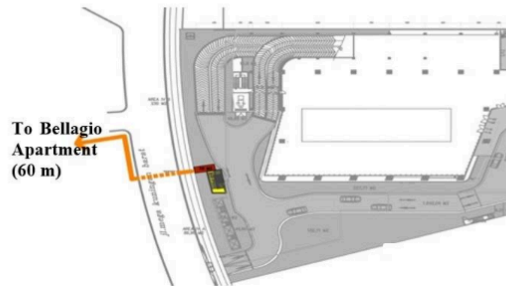


Figure 7. Ground.

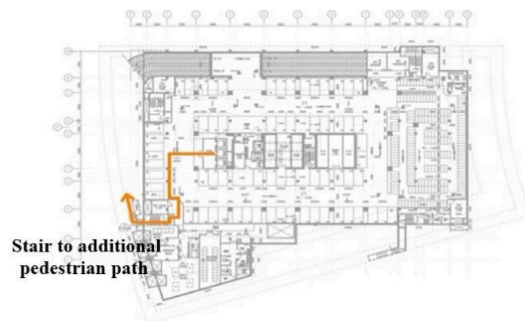


Figure 8. Basement 1.

Furthermore, this site is located at the opposite of Bellagio Apartment which has seven types of public facilities (more than the requirement of three) within 60 m radius (less than requirement of 300 m).

Investment Cost

1. Pedestrian path 10 sqm x Rp. 350.000,00/sqm	= Rp. 3.500.000,00
2. Renovation of fence	= Rp. 500.000,00
3. Door, fence and gate	= Rp. 6.000.000,00
TOTAL	= Rp. 10.000.000,00

The investment for building additional pedestrian path is approximately Rp 10.000.000,-. By this additional investment cost, therefore the site has one more point and meet the target point and maximum point. By adding pedestrian paths, the number of connection between the site and its surrounding community will be increasing. Furthermore, the quality of this connection can be measured by the proximity of site to above public facilities and its convenience as well.

6.3. Public transportation

The criteria of ASD 3 category is public transportation (table 3). According to GBC Indonesia, the existence of a public transportation or station should be within 300 m (walking distance) from the gate of the building location. A shuttle bus (bus stop) for permanent building users with a minimum number of units for 10% of permanent building users is also recommended to provide. The target and maximum point of this standard is 1 point.

In addition, pedestrian facilities in building area to the nearest public transportation station that is safe and comfortable by considering the Regulation of the Minister of Public Works 30 / PRT / M / 2006 regarding Technical Guidelines for Facilities and Accessibility in Buildings and the Environment Appendix 2B should be also available. Similar to the previous criteria, if there is pedestrian path to reach the bus stop, then the site gets additional 1 point more.

By the above criteria, public transportation become an important facility to reduce the use the private transportation. The location of the bus stop and train station may not be too far away from the building site, in order to be easier and faster to access. Accordingly, the number of private car and parking area could be reduced to get the building operational cost more efficient and consequently less pollutant produced by emission of the private vehicles.

Table 3. Criteria of public transportation [3].

Criteria	Max Points	Baseline Points	Target Points	Investment (IDR)
Availability of public transportation shelter or station within 300 m (walking distance) from building gate, excluding the length of pedestrian bridge and ramp, or Provide shuttle bus for minimum 10% building regular users.	1	1	1	-
Provide safe and comfortable pedestrian pathways in building area to closest public transport station, taking into account Minister for Public Works Regulation Number 30/PRT/M/2006 regarding Technical Guidelines for Facilities and Accessibilities in Building and Environment, Appendix 2B.	1	1	1	-
Total	2	2	2	-



Figure 9. Access to Bellagio bus stop.

In terms of public transportation, the Mega Kuningan neighbourhood is quite well designed. It can be seen that the pedestrian gate is only 50 m away from Bellagio Bus Stop (less than the prerequisite of 300 m). This means that this site has one point from this criterion.

The building user can use elevator to get to the basement and go up through existing stair, and get out through additional pedestrian paths to Bellagio Bus Stop, which represents the closest bus stop from Noble House site. Other than from basement stair, the building user can also utilize ground area to access the additional pedestrian path to get Bellagio Bus Stop (see Figure 9), hence, the Noble House site has one additional point.

7. Conclusion

The total 6 point from the criteria 1, 2, and 3 (each has 2 points) means that the site has good performance and contributes or supports green city according to the green standard of GBC Indonesia. The 6 point represents the maximum point and achieves the target point of the green assessment of three of seven criteria of ASD in GBC Indonesia rating tools.

The Noble House site has been equipped by eleven of twelve urban infrastructures. Moreover, its FAR is more than 3. The higher the building and the more complete the infrastructure, the more sustainable the site will be. In addition, this Noble House building has been erected on an unproductive site, which gives additional point towards the sustainable development.

The site is also surrounded by many public facilities within 50-60 m away and equipped by pedestrian path to reach all facilities. This represents the sustainable development related to less energy consumption.

In addition, there is also bus stop close to the site, only 50 m, which is equipped with pedestrian path to reach the bus stop. The building users are able to easily utilize the pedestrian path from basement to the ground and across the road to get to the bus stop. It is then safer and more comfortable, which contributes to strengthen the sustainable city.

Acknowledgment

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