

Potential and Characteristics Identification of Basuki Rahmat Corridor as Vertical Garden with Sustainable Urban Landscape Approach

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Abstract— Increased development of the city resulted in several problems, such as reduced open space and urban heat island effects. This has resulted in changes on social, economic, and environmental conditions in city corridors, so that proper improvement is required. Vegetation can be a key element in improving the state of the urban environment, where the surface of the building facade has the potential to become a green application medium into the city without spending much space. It is necessary to identify the potential and characteristics of the city corridor as medium for vertical garden application based on sustainable urban landscape approach to understand environment, social, and economy situation of the city.

This research uses walkthrough analysis approach which is used to know the potential of *Basuki Rahmat* corridor by assessing the quality of urban environment. Character appraisal is used to assess the character of *Basuki rahmat* corridor which is suitable with sustainable urban landscape.

The result from the research is expected to produce potential and characteristics of *Basuki Rahmat* corridor as vertical garden with sustainable urban landscape approach.

Keywords— *Urban heat island, vertical garden, sustainable urban landscape, City corridor*

I. INTRODUCTION

Basuki Rahmat street corridor is located in Tegalsari sub-district of Surabaya which is included in Tunjungan Development Unit with 95% building space, 4% green open space and 2% water body [1]. *Basuki Rahmat* corridor area is a central bussiness district area with high building density along the corridor. Air condition in the corridor of *Basuki Rahmat* street ranged between 22.70°C - 33.70°C with the lowest temperature in July and August 21.40°C and the highest in September was 35.70°C [1]. The condition exceeds the thermal comfort standard in humid tropical or equatorial regions that range from 22.50°C - 29.50°C [2].

The corridor has a high flow of vehicle traffic that indirectly affects the air quality of the environment, it can be seen based on airborne particulate concentration data recorded at *Basuki Rahmat* street corridor that is 227,32 ($\mu\text{g} / \text{m}^3$) it exceeds

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standard quality standard that is 150 $\mu\text{g} / \text{m}^3$ [3]. This cause the phenomenon of temperature rise in the middle of the city or commonly called urban heat island where it reduces the quality of the city environment.

Poor environmental conditions also affect the state of social condition such as corridor users who are reluctant to indulge in outdoor activities makes the social interaction that happened is decreasing, such as: walking along corridor, user interaction with building, and relaxation aspect like socialization, eating, drinking, to sit enjoying in corridor environment. Improper social conditions affect the economic process of the corridor due to the corridor user reluctant to walk along the corridor then this situation also affects the productivity of buildings along the corridor, especially retail buildings, restorant, and so forth.

The concept of landscape is by looking at the physical, human, cultural, social, economic, and perspective elements as equal parts, as to absorb conflicts between human activities and the environment condition. The definition of landscape is more than just a "visible feature of territory", which is just a part of landscape design and planning. A landscape can resolve the conflict between human activity and the environment, in which case the physical, human, cultural and social are in equity [4]. Sustainable landscapes are environmentally, generatively responsive, and can actively contribute to the development of society. The value of a sustainable landscape has economic, social and environmental benefits. As for the scale of sustainable landscape projects such as parks, parking lots, and urban open spaces. Sustainable landscape not only deals with environmental sustainability, but has a connection with the human condition within it and perception in order to create meaningful sense of place, the landscape also acts as a result of the interaction between natural forces and human activity [5].

There are 3 factors in establishing Sustainable Landscape Design:

- Landscape must have harmony with characteristics of the region and in accordance with environmental conditions, visually attractive, meet the healthy and safety criteria.
- Landscape must meet the appropriate health and safety criteria for the environment. Thus reflecting the identity of local social character and sense of place.

- Landscape should have carefully planned so that it can be able to produce landscapes that has cost effectiveness and should be easy to maintain.

Suitable mitigation pattern is required to reduce the urban heat island effect so as to achieve a thermal comfort level in the corridor of *Basuki Rahmat* street. Increasing the extent of green space is one of the efforts to reduce heat in urban areas due through evapotranspiration, shading from vegetation, it can also transform landscapes more beautifully [6].

II. METHOD

This research examine characteristics and potential of physical aspect and visual aspect on *Basuki Rahmat* street corridor, therefore it using two analytical tool as follows :

A. Walkthrough Analysis

Walkthrough analysis is used to assess the physical condition of city corridor and usage potential to vertical garden application which is done by direct observation. The observations were recorded using graphical methods such as photographs and sketches. The result of this analysis is to know the quality of urban corridor from the side of the building, human as well as clarity in the corridor, it is used as a deepening in preparing the structuring criteria in the study area. The discussion on this analysis is done by considering the following aspects:

1. Building layout
2. Building condition
3. Human and vehicle circulation
4. Clarity

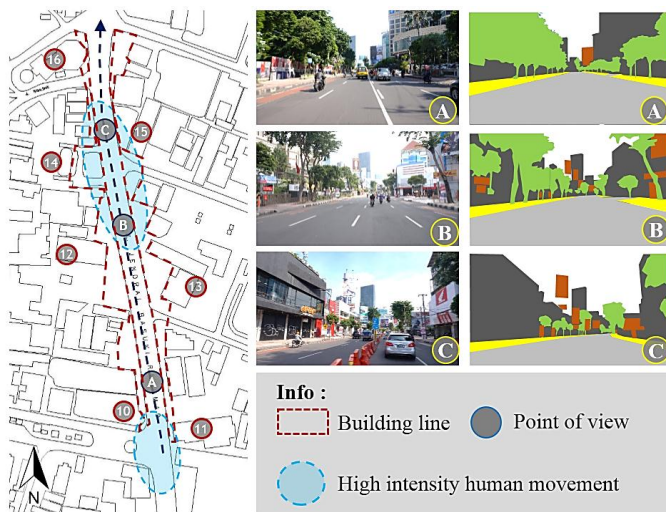


Fig. 1. Example of a walkthrough analysis

B. Character Appraisal

Character appraisal analysis is used to assess visual condition of *Basuki Rahmat* street corridor environment with sustainable urban landscape approach. This analysis is done by direct observation and assess from the patterns of development that make up an environment. The purpose of this analysis is to identify the appropriate corridor identity with the characteristics of the landscape, so as to highlight the existing potential and improve the quality of the corridor. The discussion on this analysis is done by considering the following aspects:

1. Visual condition of corridor
2. Landscape condition of corridor



Fig. 2. Example of a character appraisal – visual condition

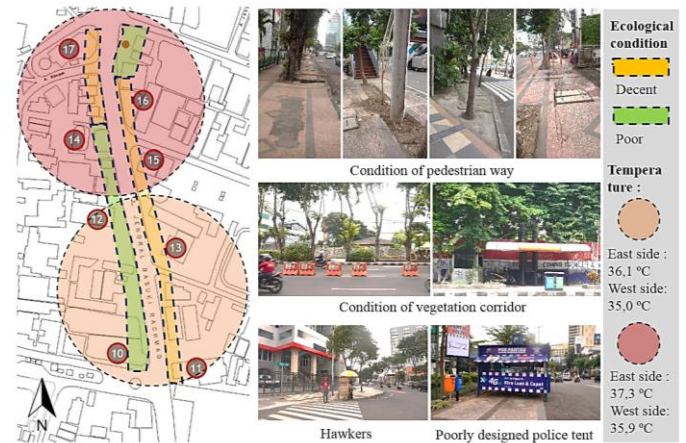


Fig. 3. Example of a character appraisal – Landscape condition

III. RESULT

A. Physical characteristics and potential

In assessing the physical condition of city corridors conducted by walkthrough analysis process. This analysis is used to examine areas appropriate for vertical garden applications. Data on the physical condition of the area is needed. The results obtained from this analysis are:

1. Building layout

- The irregular skyline of the building makes the rhythm rather chaotic, so it need medium that can be applied to any building and form a unity.
- There are several buildings that form the image / atmosphere in the corridor, has potential for the application of vertical garden, and more visible when entering the north area of the corridor due to low building line
- There is the highest office building upon entering the corridor area, while the opposite side is just a common outdoor space. This could potentially be developed as appealing form of open space when entering the corridor area.
- The difference in the distance of the space between building with the road form an imbalance where the western side is more space to overgrown vegetation while the eastern side is maximized for parking so much that boast in use of pavement with little vegetation grown, this is worsened by the east side that has great exposure of sunlight.

2. Building condition

- The majority of building facades uses glass and concrete material with paint finishing, which has horizontal glass window openings. In northern side of corridor the majority building facade using composite material with a few openings. So it is necessary for vertical vegetation application with a distance from the facade with intention for not to damage the facade of the building
- The comparison of vegetation area scale with building is unbalance, so it certainly has an effect on the ecological condition of the corridor environment, especially the water absorption, so it need appropriate materials for land surface.
- There are some building facades that are damaged so that the paint began to peel, and there is some building facade that overgrown with natural vines.
- The number of buildings that use a guardrail effect public space, such as narrow pedestrian and has no connection with the private outdoor space of the building, resulting in private spaces that are exclusive and not harmonious with the urban corridor.
- Escalation of vandalism on the facade of the building worsens the condition of the building in the corridor.

3. Human and vehicle circulation

- Parking on the side road is not enforced in the *Basuki Rahmat* street corridor, so the parking spaces of vehicles are within the private space of each buildings. On the west side of the corridor the building area is not as large as the east side, so the majority is utilized as parking space, this further reduces the extent of green open space in the corridor.
- The intensity of vehicle circulation in east side buildings is higher than the opposite side of corridor. This is because much more buildings than the opposite side and functions of buildings on the east side majority used as stores and offices compared to the opposite side of the corridor.
- The circulation of vehicles entering the building wreck the pedestrian path, this is due to usage of materials that are not suitable for vehicles to pass.
- There is an unsuitable drainage cover that endangers pedestrians passing for through it.
- There are puddles at some point of the pedestrian path, this is due to the absence of drainage holes and materials that can absorb water.

4. Clarity

- Vegetation placement in the middle of the pedestrian pathway leads the path to split into two, reducing the direction of view, reducing comfort and causing pedestrians difficult to orient themselves.
- There are some street signage that less strategic placement, such as: too low, covering the monument, covered in vegetation.
- The presence of emergency police tents covered the open green spaces behind them, as well as providing unfavorable, irregular, and grungy images.

- Unplanned placement of billboards give the impression of chaos and worsen the building facade and disrupt the focus of the user view of the road corridor with massive numbers of placement.

B. Visual characteristics and potential

1. Visual condition of corridor

- There are several spaces that can generate open space designs with attractive landscapes, thus having the opportunity to be a space that can represent corridor.
- The majority of the highest air temperature is on the east side of corridor with the majority having tight open space and little vegetation.
- The building line on both sides of the corridor is relatively unequal, this indirectly form a chaotic impression. So that required adaptation vertical garden application in order to solve the problem.
- There are some undeveloped outdoor areas with potential, so they can be processed in order to establish a good and sustainable landscape condition.
- A good arrangement of vegetation is required, allowing a comfortable space to be used for both day and night and visually appealing.
- Attractive vertical plant arrangement is required for outer space in order to connect between private space with public space and create theme in corridor.

2. Landscape condition of corridor

- Improper vegetation arrangement reduces the comfort and clarity of pedestrians when using city corridors, this is further worsened disorderly interval of treesplacement that assemble at some point which is certainly uncomfortable when pedestrian passing at night.
- The need of vegetation design that takes care of the road corridor and the improve the building condition especially with high-intensity sun exposure.
- The need of vertical garden applications that can form a pattern that can unify the diversity of forms in the corridor
- Attention on pedestrian ways material is required due to poor conditions can endanger the environment and road users.

IV. DISCUSSION

Based on the concept of sustainable urban landscape approach that to process the elements of *Basuki Rahmat* street corridor especially vertical garden to improve social, environmental and economic condition to support and invite people to play an active role in an integrated corridor management.

So the corridor should have a physical condition that can support well such as circulation, marking, street furniture, and green spaces that can support the activities in the corridor With good physical condition supported by good design, it can create an interesting and comfortable corridor to be used for all elements that exist in corridor into one excellent unity. If the condition is achieved then it can improve the social, economic,

and environmental conditions in the *Basuki Rahmat* street corridor.

In order to create an integrated and responsive environment on *Basuki Rahmat* street corridor to be able to support all the activities that exist inside it, there are compiled several general criteria as follows:

- City corridors that can support activities in a sustainable way
- City corridors can provide safe and comfortable pedestrian paths both morning and night
- Attention for spatial arrangement of private and public, to provide a connected impression that can directly improve the quality of both buildings and corridor space.
- There are sustainable arrangements of green elements, especially vegetation that can improve environmental quality based on issues and problems also can be managed easily.
- The availability of city space that allows users to orientate themselves with attractive visuals that further increase social activity.
- There are elements within the corridor that can connect and make balanced condition and creating a harmonious unity.
- City corridors must have a functional and aesthetic visual form, massive elements must function in forming corridor patterns and be able to present significant local expressions with visual form and location
- There is potential for public open space in corridor that can be developed into an appealing focal point.

V. CONCLUSION

Based on the results of the research, the following conclusions are obtained:

- The *Basuki Rahmat* street corridor has the potential especially in dense urban environments that are able to

apply vertical garden according to the concept of sustainable urban landscape so as to provide benefits to the environmental, social, and economic conditions of the corridor.

- Physical, landscape, and visual condition on corridor can improve the sustainability of *Basuki Rahmat* street corridor.
- With the increase of vertical garden area, it can reduce the temperature of *Basuki Rahmat* street corridor.
- Vertical garden applications can be used to be thematic elements that unite the corridor atmosphere visually.
- Some open spaces in the corridor can be processed into an attractive and useful focal point that benefit on environmental, social, and economic condition.
- There is a potential linkage between the private and public space that can be developed to improve the corridor condition.
- It is required to select appropriate material for the road surface in accordance with the goal for durability, environmentally friendly, and safety for corridor users.

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