Redesign pedestrian-way in blok m area as a pathway of sustainable urban mobility

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Abstract. This paper presents a study of the redesign of pedestrian-way in the Blok M area as part of the implementation of sustainable urban mobility. The background of this study is to create sustainable transport planning in order to minimize the impact of traveling to the environment. Jakarta is among the most polluted cities in the world with the biggest contributor to pollution in the transportation sector. According to this case, there needs to encourage the public can shift using mass public transportation and leaving private vehicles as a commuter vehicle. Promotion of public transportation mode must be accompanied by the construction of road infrastructure that focuses on pedestrian according to sustainable urban mobility principles. Pedestrian-way had a role of connecting between modes. By consider the criteria that exist in public spaces design, it is necessary to adjust the facilities provided in order to create an attractive and comfortable space for users who pass through it.

Keywords: sustainable urban mobility, polluted cities, pedestrian way, public spaces design

1. Introduction

Sustainable transport planning needs to be considered in order to minimize the impact of traveling to the environment. Jakarta, a polluted city ranked 11 in 2018 based on AirVisual data and even had become the first rank on 29 July 2019. The Leaded Gasoline Elimination Committee (KPBB) released data showing the contribution of 10-small particles of air particles that can penetrate the channel breathing - the largest in Jakarta is motor vehicles, by 47%. This shows that the use of private vehicles to travel is still a big problem in Jakarta.

Sustainable Urban Mobility is essentially a transport masterplan looking at the way people move around by different modes of transport [1]. Public transport and non-motorized transport essentially reduce transport emissions and improved human health. To encourage more sustainable travel patterns and safer streets, pedestrians should place at the top of the user hierarchy [2]. The purpose directed in this case is the modal-shifting from private vehicles to non-motorized transportation and mass public transportation.

The Blok M terminal area was established in 1992 and since 2004 Transjakarta (BRT) has begun to occupy bus lanes at the terminal. Development of the transportation mode in Blok M then continues with the existence of the MRT with Blok M route, although the location is not directly connected. According to ITDP (Institute for Transportation and Development Policy), the Blok M area is included in 53 locations in Jakarta that have the potential for integration of BRT and MRT at the regional level [3]. Regional integration is focused on accessibility and connectivity within a 500-meter radius of each
station or mass public transit stop. Pedestrian movements are facilitated to be comfortable, safe and attractive in the intermodal area with the following elements: wide sidewalks, good shade & lighting, and activation of public spaces for interaction.

2. Literature Review

2.1. Sustainable Urban Mobility

Sustainable Urban Mobility emphasizes the realization of accessibility and mobility. In some cases, this approach is called a "road diet" (space for cars are explicitly reduced) or "complete road" (all road users are served). Pedestrians are a top priority in planning public areas, therefore good public spaces are needed to facilitate urban-pathways [2].

2.2. Criteria of good public space

Pedestrian pathways can act as attractive and comfortable public spaces for users pass through it. There are three progressive levels of perception and interaction between the human body and the physical space in the following order [4].

| Safety                  | Traffic flow, Accidents | Traffic flow, Accidents |
|-------------------------|--------------------------|--------------------------|
| Safety                  | Safeguard for foot-travelers; b) reducing fear of traffic. |
| Crime and Violence      | The realm of the lively public; vigilant; overlapping functions during the day and night; adequate night lighting. |
| Unpleasant Sensory Experiences | Hot or cold, windy or not windy, pollution, dusty, glare and noise. |
| Opportunities to Walk   | Space for walking; no obstruction; proper surfaces; ease accessibility for everyone; attractive façades. |
| Opportunities to Stand/Stay | Standing/staying area; that supports for standing. |
| Opportunities to Sit    | Sitting zone; that utilizing advantages such as view, sun, people; comfort places to stay; with benches for resting. |
| Opportunities to See    | Reasonable distances for viewing; unhindered sightlines; interesting and attractive views; with good lightning (when dark). |
| Opportunities to Talk and Listen | Low noise levels; Street furniture that provides "talkscapes" for peoples to meet and greet. |
| Opportunities to Play and Exercise | Providing creativity's space, to do physical activity, exercise and play; at day and night; hot and cold |
| Delight                 | Human Scale              |
|                         | Spaces designed to human scale. |
|                         | Positive Aspects of Climate | Sun, shade; heat, cool; breeze or windy. |
|                         | Positive Sensory Experiences | Good design and detailing; good materials; fine views; trees, plants, water. |
2.2.1. To allow the use of the space: Protection
To minimize unpleasant experiences protecting the person from crimes and from the high traffic of vehicles, more easily accessible in places with mixed-use and active facades. To protect against uncomfortable sensory experiences as stench, pollution and adverse weather [4].

2.2.2. To Attract and Retain People in The Space: Comfort
To offer conditions for movement and stay in the environment, offering opportunities to walk freely, sit, look, listen and talk. To support both the active and passive recreation, allow self-expression [4].

2.2.3. For people to want new experiences in the same space: Pleasure
To give a good sensory experience and the opportunity to take advantage of the positive climate. It depends on good architecture and design respecting human scale [4]. The criteria can be use as urban design tool for the enhancement of pedestrian and qualification of public space.

3. Research Methodology
The method that use to obtaining data in this study was literature review and qualitative observation that are detailed in table 2. The data needed are as follows:
- Existing condition of pedestrian-way in Blok M Area as a sample of case study.
- Criteria of public space to evaluate pedestrian-way quality.

4. Result and Discussion
This session of this result and discussion emphasizes on the result on the mentioned tables. Furthermore, the discussion that is elaborated in this paper constitutes the details discussion.

4.1. Pedestrian-Way as a Good Public Space

| Safety                        | Traffic flow, Accidents | Provide a buffer between the vehicle and pedestrian lanes. |
|-------------------------------|-------------------------|------------------------------------------------------------|
| Crime and Violence            |                         | Encourage active pedestrian with facility space as natural surveillance. |
| Unpleasant Sensory Experiences|                         | Canopy to protect travellers for weather.                  |
| Opportunities to Walk         |                         | Continuous road without obstacles and use of ramps.        |
| Opportunities to Stand/Stay   |                         | Provide a place to stop, with a kiosk to support the needs.|
| Opportunities to Sit          |                         | Bench for a short rest while traveling.                     |
| Opportunities to See          |                         | Provide interesting views; lightning (when dark).          |
| Opportunities to Talk and Listen |                   | Space that accommodates users for meet.                    |
| Opportunities to Play and Exercise |                   | Create interaction with communal area.                     |

| Comfort                       |                         |                                                          |
|-------------------------------|-------------------------|------------------------------------------------------------|
| Human Scale                   |                         | Keeping the space & height in human scale.                 |
| Positive Aspects of Climate   |                         | Put road furniture in an open area & canopy area that applies natural lighting. |
| Positive Sensory Experiences  |                         | Use of plants as a buffer between pedestrian.               |

Table 2. Pedestrian-Way Based on Criteria of Good Public Space
4.2. Connecting Pedestrian-way

Based on observations obtained mapping of existing pedestrian paths that display pedestrian-way that is not connected and does not facilitate crossings.

![Figure 1. Existing Condition](image1.png)

Connecting pedestrian that has not been connected, removing obstacles on the pedestrian path and facilitating crossings in the above areas is intended to improve the continuity of pedestrian paths so that they can be accessed more easily and safely.

![Figure 2. Linked Pedestrian-Way](image2.png)

4.3. Curb Extension

Curb extension is a strategy to extend the sidewalk into parking lane and shorten pedestrian crossing. In addition to improving safety, curb extension can provide a space for green infrastructure like bioretention cell to capture and clean stormwater run-off.
4.4. Active Pedestrian-Way
This pedestrian-way is a new path formed to form a continuous road. The circulation path is free from pre-existing obstacles then on the inside it provides a social area that facilitates its users to make social interaction with others. The target is to create an interactive and comfortable space for its users so that the transfer between modes can occur safely.

Figure 4. Active Pedestrian-Way
5. Conclusion
Creating a sustainable transportation system is an effort to minimize the impact on the environment. Jakarta as a city that has a level of air pollution caused by the transportation sector needs to encourage the promotion of public transportation which aims to increase the users and reduce the private vehicle use. By applying the principle of sustainable urban mobility, the priority in designing the Blok M area focuses on users, especially non-motorized vehicles. Pedestrian pathways become important things to be addressed.

The redesign in this research is focused on solving the problem of pedestrian access continuity, and quality of the spaces created based on the criteria of good public spaces. As a result, the pedestrian-way can solve factor of protection, comfort, and delight space, also can change people's perception in choosing modes of transportation to travel.

6. References
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