Evaluation of Sustainability on Indonesia Historical Streets

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Abstract. Sustainable development mandates a user friendly design. Universal Design is sustainable concept that aimed to facilitate full range of human diversity. The evaluation based of universal design on built infrastructure can suggest more sustainable, functional and user-friendly environment. One of main infrastructure is streetscape. This study examined three historical streets of Indonesia. This study aimed to examine and compare the Indonesia cases using sustainable universal design guidelines. The research methods of this research are comparison study, site observation, and GIS-based mapping. The results of this study are: Indonesia historical street cases are averages; the local street regulations need to be improved; and the urgency of user oriented design on next improvement

Keyword: Sustainable universal design, GIS-based mapping, street scape.

1. Introduction

Streets are providing an important aspect in open public spaces and are the greatest symbol of the public infrastructures. Streets are providing answer for leasure, social, and functional demands of people and related to their economic growth, physical health of people, and a sense of community [1]. Gradually increase, many scholars suggest some thoughts of the street as a social space compared to just a infrastructure for the mobilization or movement

Universal design (oftenly named as accessible design and inclusive design) refers to sustainable product designs as facilities which having aim to accommodate the vast range of potential users. The potential users term are including the people with visual-mobility disabilities and other special needs [2]. Universal design should be comprehensive from start to end of destination for the greatest possible range of potential users. Universal design should regard all possible obstacles which may exist in everything as study components. The universal design is part of sustainable design concept to facilitate full range human diversity which will developed through cases.

Indonesia is still a developing country in Asia. One of the Indonesia’s infrastructure which being developed start from era of Europian colonialism until present is streets. Some of Indonesia streets are watching the history of Indonesia developments phases. There are three historical streets are Jalan Malioboro in Yogyakarta (former capital city of Indonesia), Braga (the cultural street) and Asia Afrika (named as the place of Asia-Africa Conference) in Bandung, West Java. Those historical street were chosen to represent Indonesia historical street. This study examined three famous historical streets of Indonesia as a country experienced on developing various urban street designs using sustainable criteria of universal design.

2. Method

Present physical situation being analyzed by universal design principles. In addition the principles adapted from literature studies and later on resumed in an evaluation sheet to analyse and compare with cases studies and the site survey result [3]. This study was performed with two research methods, such as:

1. Site observation to directly inspect the historical streets with evaluation sheet which constructed previously, and measured by interval scales of five points.

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2. Comparison study to compare the result of site observation evaluation which later on would be discussed and analysed

3. Discussion

3.1 Evaluation criteria

Resumed from user oriented design guidelines and universal designs [4] the evaluation sheet is having eight sections of observation objects and eighty nine criterias (see Table 1). The objects of observation were: Pedestrian spaces, Street materials, Street utilities, Parking lots, Bus stop/subway gates, Linkage design, Street furnitures, Signages.

| No | Research object | Section | Item |
|----|----------------|---------|------|
| 1  | Parking lot    | Free barrier parking lot < 100m |
| 2  | Ratio of ramps | 1:20 |
| 3  | Footway width minimum 2m |
| 4  | Leveling max 2cm |
| 5  | Signage |
| 6  | Bus stop/subway | Information on decision spot using local character |
| 7  |  | Clear and visible |
| 8  |  | Height clearance 2.1m |
| 9  |  | Existence of traffic calmer and rest point |
| 10 |  | Footway min.width 2m |
| 11 |  | Existence of elevator escalator |
| 12 |  | Distance from Public utility : 5-800m |
| 13 |  | Ramps criteria : max gradient of 1 in 20 or 5 per 100 |
| 14 |  | Step marked type : short straight with a 3-12 per walk |
| 15 |  | Risers : uniform height, 10-15cm , min 30cm deep |
| 16 |  | Lighting support |
| 17 | Linkage design | Bus shelters degree of closement |
| 18 |  | Street hierarchy |
| 19 |  | Cross road (x) and corner > 90° |
| 20 |  | Existence of Wind breaker (landscape) |
| 21 |  | Signage : modest and location on decision point |
| 22 |  | Local character : priority |
| 23 |  | Material usage : low variety |
| 24 |  | Location street furniture/rest area on decision point |
| 25 |  | Existence of illumination , audio visual control |
| 26 |  | Further devoplment and maintenance |
| 27 |  | Strict regulation |
| 28 |  | Public rest area at 100-125m |
| 29 |  | footway width : min 2m, less level |
| 30 |  | Existence of traffic calm protection |
| 31 |  | Public art at decision spot |
| 32 |  | Street furniture |
| 33 |  | limitation per 20m |
| 34 |  | Public chairs per 100-125m |
| 35 |  | Clear direction and local character on decision spot |
| 36 |  | Provide handrail/handgrip height 0.80m |
| 37 |  | local priority |
| 38 |  | Traffic safety and wind barrier |
| 39 |  | Support vegetation |
| 40 |  | Lid openers less than 2kg |
| 41 |  | Barrier free |
| 42 |  | Visible |
| 43 |  | Permanent installment |
| 44 |  | Non slippery |
| 45 | Street utilities | Domestic character |
| 46 |  | Material usage low |
| 47 |  | Traffic safe and wind barrier |
| 48 |  | Lid openers less than 2kg with lower knob |
| 49 |  | Manhole cover : less than 3cm |
| 50 |  | Avoid open drainage channel |
| 51 |  | Every 500-800m |
| 52 |  | Information or security booth |
|   | Description                                                                 |
|---|-----------------------------------------------------------------------------|
| 53 | Signage                                                                     |
| 54 | Background-sign contrast color                                              |
| 55 | Local character with international standard                                  |
| 56 | Clear map with you are here sign                                            |
| 57 | Location on decision point                                                  |
| 58 | Texturized sign (braille)                                                   |
| 59 | Sound signal and smell locators                                             |
| 60 | Clear view                                                                   |
| 61 | Minimum 1m from ground installment                                          |
| 62 | Building information                                                        |
| 63 | Public local art on decision point                                          |
| 64 | Hazardous area priority location                                            |
| 65 | Permanent installment                                                       |
| 66 | Street material                                                             |
| 67 | Material usage low                                                          |
| 68 | Local material                                                               |
| 69 | Non slippery                                                                 |
| 70 | Using tactile and texture                                                    |
| 71 | Permanent non slip ramp installment                                         |
| 72 | Rubberized material footway                                                  |
| 73 | Low grate paving block                                                       |
| 74 | No reflection                                                                |
| 75 | Pedestrian space                                                            |
| 76 | Footwa width min 2m clear                                                    |
| 77 | Mix used space                                                               |
| 78 | Support vegetation                                                           |
| 79 | Traffic calm protection                                                      |
| 80 | Clear traffic and wind barrier                                               |
| 81 | Ramps ratio 1: 20                                                           |
| 82 | Max leveling 2cm                                                            |
| 83 | Public seating every 100-125m                                               |
| 84 | Manhole cover grid : less 5cm                                                |
| 85 | Provide handrail/handgrip max 0.80m                                          |
| 86 | Existence of tactile and texture                                            |
| 87 | Good connected street with good view and small street block                  |
| 88 | Proper lighting                                                             |
| 89 | Avoid cross road (x) or more and corner greater than 90°                     |

(source: Bangun, 2018 [4])

3.2 Site observation scale and objects

This study sustains universal design principles in resuming literature studies into evaluation sheet in aim to compare several cases studies and the site survey result. Present physical situation analyzed which resumed from. The results came in number which gained from the criteria’s interval scale (see Table 1). The numbers were obtained from 5 scales value, which meaned 1 of the worst and 5 represented the best value.

In this study, three famous historical streets in Indonesia especialy in Java island were chosen to be evaluated in three consecutive days and avoided the holiday-weekend time using conditioned maps and evaluation sheets. There are Malioboro in Yogyakarta, Braga in Bandung, Asia Afrika in Bandung with their type (see Table 2).
3.3 Results

Figure 1. Indonesia historical Street Section’s Statistical Analysis

According to the statical graphic (see Figure 1), overall the best parking lot in Indonesia is Malioboro, the bus stop/subway exits are Asia Afrika and Malioboro. On street furniture, Malioboro followed by Asia Afrika are the best result of all. On the Street Utilities, Malioboro is the best and followed by Asia Afrika and Braga Street respectively, those results showed that other specialized streets in Indonesia also do not support the universal design. Next on signage, pedestrian space section, Malioboro has the highest result of all. The street material result showed that Malioboro scored the same with Braga. The street section of linkage design showed that Asia Afrika scored the highest followed by Malioboro on the second and Braga on the third.

Overall the Malioboro is the best-facilitated street in Indonesia and the worst is Braga. The universal design principle result also showed that Malioboro is the best performed, followed by Asia Afrika and last is Braga (see Figure 2). That condition showed that Indonesia needs to improve their historical streets to be more safe, comfortable, secure and accessible for all.

Figure 2. Data presentation of three historical streetscape

3.4 Discussion

Asia Afrika street is having huge historical meaning by Indonesia for the third world power (Asia-Africa). Asia Afrika was planned and designed to support Asia Africa regional conference. This evaluation described that Asia Afrika got the 2nd best street after Malioboro (see Figure 1), especially at linkage design section (3.71) and the principle of flexibility (3.18). However, Asia Afrika st. scored the base line in the section of parking lot (2.73) and principle of low physical effort (3.02) (see figure 1). The Parking lots being located at backstreet of Grand Mosque neighbourhood. However the parking lots in here (2.73) did not supported the special parkings (see Figure 3). Pedestrian way of Asia Afrika were (3.13) quite friendly with unproper tactile placement, eventhough it permanently installed. That situation also bring lower the identity
since no installment of Asia Afrika street furniture to emphasis, eventhough existence of the colonial types building were strong as street theme. Open drainage still exist in the pedestrian ways Street give utilities section score (2.66). Minimum signage and material use potentially related to heritage district limitation that restrict new signage and material of this street. The pedestrian ways link wasn't proper enough (3.29) especially on curbs and height. Therefore, buildings passage and setback were not flat and oftenly change give barrier for the disabled on the pedestrian way. Clearly link each part of the street showed that this street is a main line with straight condition (see Figure 3).

Figure 3. Condition of Asia Afrika street

Braga street is a narrow avenue that more suitable to be accessed by pedestrian, but it is also accessed by vehicle. Eventhough had public transportation restriction, the condition of the street during the night was becoming more crowded and dense. Braga linkage design is the highest score (3.44), and the bus stop are the lowest (1.11). Further detail, the pedestrian space flexibility is the highest score and bus stop flexibility is the lowest score (1.01) (see Figure 1 and 2).Those results showed that Braga was designed for pedestrians, not for the vehicle. That also made Braga the worst street in Indonesia case. The Parking lots are on the side of the pedestrian way. During night, the parking demand is higher than the facilities. No designed bus stop at the area, but rent bus may pass this area. Those condition resulted low score on parking lot (2.73). Street furniture scored 2.48 because some bollards are installed to calm the traffic, but the shape is 3D ball which easily moved by a passenger or rolled by itself. Good placed tactile and handrail or hand grip were installed to support pedestrians along with closed drainage under the street and pedestrian ways. Good supported international signage and language along the specialized street also provided, but the positions were not easy to be seen (see Figure 4). Low variety of material in linkage (3.25) showed by granites pavement as main material. The linkage design were built only for the pedestrian’s access and linked by a straight line until the next street.

Figure 4. Condition of Braga Street

Malioboro in Yogyakarta showed the highest score in 6 sections of Indonesia specialized street (see Figure 1 and 2),eventhough the highest scores are still below the South Korea averages score.In local detail, Malioboro got highest score in on parking equitability(3.75) and the lowest in bus stop accessibility (2.71) (see figure 5). Malioboro parking lots (scored 3.60) are mixed between cars, cycles with pedestrian ways and low-speed passage. This mixed parking was the result of no clear signage which later on, attract and excuse passengers to park everywhere. The low scores on public transportation facilities (2.93) showed that specialized design bus stop of Trans Jogja is not good. The bus stop installed with high bus platform, steep the ramps for wheelchair, and shallow-slippery passage. Street furniture showed randomized placement of resting furniture and other street furnitures made the high complexity (3.14) at this street for the elderly and passengers with disabilities. The signage of Yogyakarta which 2nd tourism city in Indonesia after Denpasar, was equipped with Malioboro street for international signages (3.53) installation to support foreigner. Multiple signages along the Malioboro street also brought complicated serial vision and vista pollutions. Themed material installed on pedestrian tiles and building setback. The condition of the material appearance (3.14) is dirty and some of it already broken as the result of poor maintenance (see Figure 5). During the day, pedestrian spaces are mixed with merchants and vehicle parking areas which made the street harder to be

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accessed by people with the impairment. This street has a good linkage design (3.55) and wind barrier by the landscape and building arcades which installed on Malioboro. The condition of three street still cant be separated from their environment capacities as shown in Table 2. The plan, design, maintenance and redesign process shall be oriented on the surrounding environment to meet the demands and solve the problems [5]. Therefore a new paradigm of development was demanded highly to change the design way especially in street development.

![Figure 5. Condition of Malioboro](image)

Table 2. Specification of the streetscape's capacities

| item                         | Malioboro | Braga  | Asia afrika |
|------------------------------|-----------|--------|-------------|
| location district            | danurejan | Sumurbandung | Sumurbandung |
| street length                | 600       | 700    | 1510        |
| street width                 | 20        | 15     | 15          |
| street type                  | monumental| commercial| cultural    |
| neighborhood population      | 19580     | 9528   | 9528        |

4. **Conclusion**

Based on analysed datas and the historical streets comparisons in Indonesia which evaluated by the sustainable universal design evaluation sheets in this research paper were concluded some points, such as: Indonesia has averages practices in universal design principles application, the local regulations need to be updated with more sustainable aspect like universal design concept and be more strictly in projects application; and Indonesia demand a change of improvement paradigm from project oriented into potential user oriented design.

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6. **References**

[1] Mehta V 2006 *Lively Streets: Exploring the Relationship Between Built Environment and Social Behavior*
[2] Aslaksen F, Bergh S, Bringa O R and Heggem E K 1997 Universal Design: Planning and Design for All
[3] Harsritanto B I R 2018 Urban Environment Development based on Universal Design Principles *E3S Web of Conferences* vol 31 p 9010
[4] Harsritanto B I R and others 2017 Universal Design Characteristic on Themed Streets *IOP Conference Series: Earth and Environmental Science* vol 99 p 12025
[5] Indrakusumo Radityo Harsritanto B 2009 Revitalisasi Taman Wilhelmina Tugu Muda Sebagai Salah Satu Node Downtown Citra Semarang