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Child Pedestrian Friendly Design Principle for the Settlement and Housing area

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Abstract. Children pedestrian as part of sustainable transportation requires safe and comfortable area for their activity. The design principle of a good quality children pedestrian needs in-depth research. Study involving children pedestrian are related mostly to research with an adult as a major user, behaviour and pedestrian route. This study aim is to analyse the design principle of children pedestrian in settlement and housing area. The location of the study is the city of Manado, Minahasa and North Minahasa Regency. Data is collected through questionnaire and survey on field area and recording through videos and photos of activities in children pedestrian using smartphone and camera. The samples for this research are children pedestrians in selected housing and settlement areas in Winangun area, schools in Manado and North Minahasa Regency. The number of samples is 111 children between the age of 8 to 12-year-old. The result showed children preference of object and place in the walking area. Their choice for pedestrian area is also interesting in which they consider the aspect of safety, comfort and fun for doing their activities in their neighbourhood area and the surrounding school area. A specific regulation for children pedestrian is important when considering child-friendly environments.

Keywords: Children Pedestrian, Pedestrian Friendly, Settlement Area, Housing Area, North Sulawesi

1. Introduction

The available researches regarding children pedestrian and standard have limited consideration to children behavior, movement patterns and preferences. This research focuses on design principle for children pedestrian in the area of settlements and housings in urban and rural area.

Pedestrian pathway is not always available on the street which has always been the obstacle for a comfortable walking area. Children pedestrian use all access to walk, including designated pathways and street area. They share the area with vehicles and bicycles when they walk to a certain destination. For many parts of the street, sharing areas can be a dangerous place for the users, including children. Standard that are available for pedestrian pathway has limited consideration for children as pedestrian [1]. Children are not only walking with an adult, but also with their friends or walking alone. Children also do other activities such as playing and running while walking. In designing a pedestrian area for children, adult used to be the decision maker. Children behavior have influenced the use of pedestrian area [2]. Therefore, taking children preference into account is important when designing a child-pedestrian-friendly pathway.



1.1 Children Pedestrian and Friendly Environment

Pedestrian is one of the active transportation when considering it as a sustainable transportation mode. Children pedestrian, as part of this system, has been recognized as an important role in defining pedestrian facility. Walking is a natural transportation with complex analysis [3]. Pedestrian model is based on their choice including activity, destination, mode, and route, where behaviour and interaction within pedestrian walk are important (ibid).

Based on the street classification, local street are categorized for pedestrian [1, 4]. The standard for pedestrian pathway has considered area such as housing and school where children are the most active user, though it is based on adult movement pattern. Streetscape elements are including paving, landscape planting, street lighting, street furniture and public facilities and private streetscape amenities [5]. The streetscape is a space with visual identity consisting of physical elements, such as nature elements and non-physical ones, such as artificial elements [6]. Research on children pedestrian space capacity has found that children tend to use larger space compared with standard available for adult and children due to their movement [7].

In the area of urban settlement and housing, existing researches are related to pedestrian behaviour in low-income and middle-income housing [8]. The research finding is including access and location as factors which influenced the use of facilities where the playground and local shops are placed in walking distance. In a neighbourhood plan, transportation element is recommended to include the improvement of sidewalk for pedestrian and accesses to transit [5]. Pedestrian-friendly street is related to the priority for pedestrian traffic rather than vehicle (ibid).

The concept of child-friendly environment is related to independent mobility where children have a wider area to move around [9]. The criteria for child friendly environment are affordance, the right uses of the object in which as children grow, their ability to perceive affordances is also developed (ibid). Plester et al [10], found that children can understand aerial photographs where they learn a different representation of the world including photographs. Children experience the environment from secondary sources (ibid). Children as part of the city, contribute in creating liveable and child-adult friendly city [11]. It will need an urban designer and planner to rethink and modify the participation of children in designing city (ibid).

2. Methods

This research method is a field survey with recorded video and photos, combined with a questionnaire for children between the ages of 8 to 12 years old. The samples are from 2 schools in Manado and Minahasa regency North Sulawesi and 1 neighborhood area in Winangun Manado.

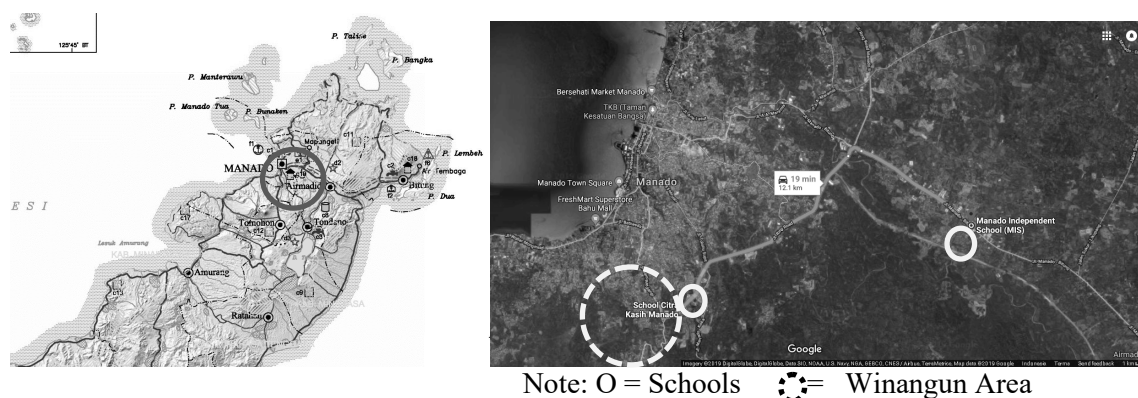


Figure 1. Map Location of Sampled Children in Manado City and Minahasa and North Regency, North Sulawesi, Indonesia

The school in the urban area is *Citra Kasih* Elementary school of Manado municipality. The school in the rural area is Manado Independent School Kolongan North Minahasa. For the neighborhood area,

the samples are from children who live in the area of Winangun Manado. This area has covered an area of Manado and Minahasa regency. Children in this area live in Citraland housing area and Winangun urban and rural settlement. For children from Manado Independent School, Kolongan North Minahasa, the area of their home is varied from the city of Manado, the city of Bitung, North Minahasa and Minahasa regency. Winangun is divided into 2 major areas, Manado and Minahasa regency. Children in this group are also going to different school in Manado and Minahasa regency. The number of children is 38 children from Citra Kasih School Manado, 25 children from Winangun Area and 48 children from Manado Independent School, Kolongan North Minahasa Regency. A total number of samples are 111 children.

Sample of children is considered varying due to the characteristics of the location of their home and school and option for transportation mode choice. Children from Winangun area live in different part of the urban and rural area. Winangun area is divided into Winangun One and Winangun Two in the city of Manado and Upper Winangun in the Minahasa Regency. Upper Winangun area is considered as a rural area which tends to be rural urban area due to the increasing number of populations. The area of farming is reduced and changed into housing area. Children from Citra Kasih School mostly use cars or motorcycles which are driven by an adult to school. While children from Manado Independent school has an option of using school bus or being drive to school by parents. The school bus picks up children at certain points where children have to walk or are driven by adults.

3. Results and Discussions

Children pedestrian area are designed for children to walk and doing their activities during their walking journey. The result shows the preference of objects and places chosen by children during their walking time along the pedestrian area and area preference as a pedestrian area based on its built environment.

For the walking area, the percentage area chosen by children is 61,6 % for neighbourhood area in settlement and housing area and 38,4% for school area. Children prefer to walk in a neighbourhood area more than school area. The reason why children chose those specific areas for walking is that they are safe, comfortable and fun. In related to the area for fun, children describe the area of the neighbourhood is fun for playing, exercising, looking at nature, exploring, walking and are good for health. While for the school area, the reasons for this choice are because it is fun for running, playing, talking, walking, relaxing, and for sport. The majority of children's choice is that the walking area is fun for many activities, including playing. Playing is the character of children when doing their activities.

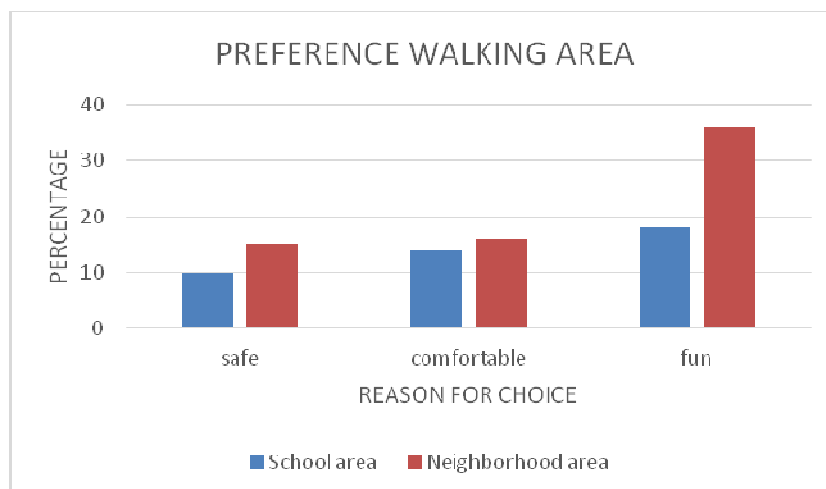


Figure 2. Children preference walking area

Moreover, object and place preference during a walking trip can be seen on the graphics as followed.

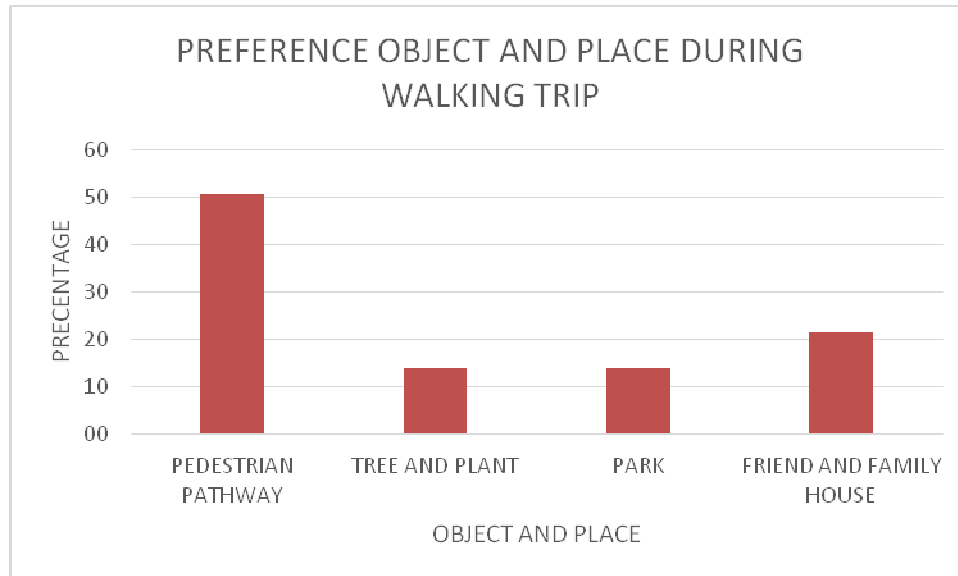


Figure 3. Children preference of object and place during the walking trip

Object and place that children chose the most is the pedestrian pathway. The next preference is friend's and family's house. This choice showed that children like to walk as well as to visit friend and family during their walking trip. In addition, when children were walking, they were also running and playing.

Children showed different responses to the pedestrian area. From 2 different photos, the first is a pedestrian pathway sharing with motorcycles in the major street with trees in bedding pots and the second is an area for pedestrian and cyclist separated from the major street with trees and plants lining along the street.



(a)



(b)

Figure 4. (a) Pedestrian sharing with motorbikes (b) Pedestrian sharing with bicycle

Source: Makalew, 2016

The pedestrian area in **Figure 4** (a) is a mix-used land area. Pedestrian pathway has always been used for parking motorbikes and street vendors. Vehicle traffic in this area is heavy due to the area being one of the major and oldest road in Manado. While **Figure 4** (b) is a pedestrian in mix-used area

where the place is designed for pedestrians and cyclists at a major street in Seoul, South Korea. The preference can be seen in the figure below.

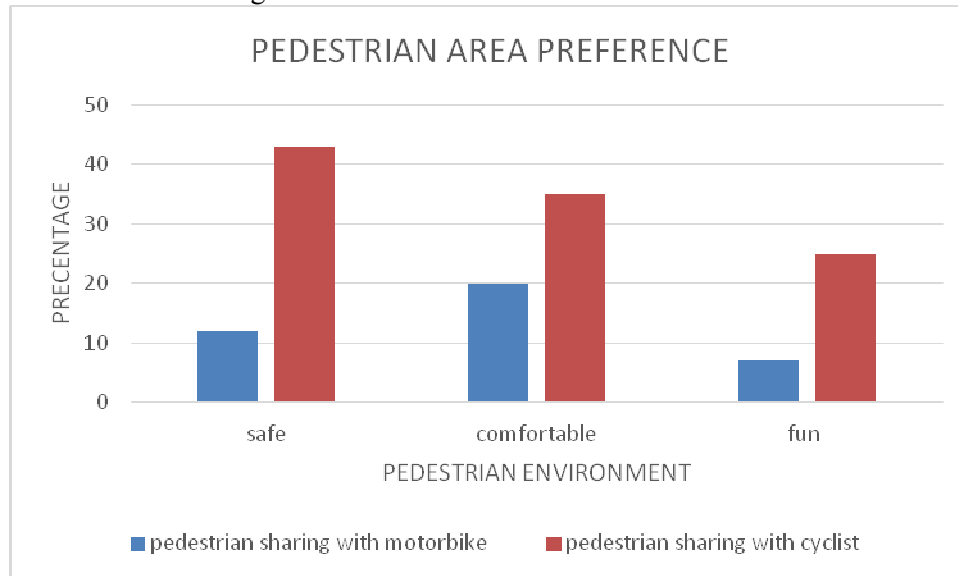


Figure 5. Pedestrian area preference

Children prefer pedestrian area in a major road with separate pathway area where pedestrians can share with cyclists. The most chosen reason for the environment area is that the area is safely followed by comfortable and fun. Both pedestrian areas are located on a major road. The pedestrian area where pedestrian shares the pathway with motorcycles is more open to the street. There are trees along the street which are planted on bedding pot. By comparison, the second pedestrian area is designed specific for pedestrians and cyclists where the landscape consist of trees and other lower plant such as flowers.

The pedestrian area where pedestrians share the pathway with motorbikes and open to the street is considered comfortable for children to go anywhere. This area is fun for children for shopping, exploring major street, and exercise. In addition, children described the area as being noisy, polluted and having many litters.

The pedestrian area with the special landscape for pedestrians and cyclists is described by children as a safe place because it is wide. Moreover, the area is fun for many activities such as for relaxing, playing, exercise, enjoying something, sightseeing, playing bicycle, and reading a book. The area is also clean and has no trash.

It is interesting that children preference can vary based on the reasons of behind their choice. The street may be seen as dangerous for children while it is considered as fun for exploring the street and comfortable due to easy access to nearby places.

In addition, children walk in the pedestrian area beyond than the access provided. Children explore the surrounding area during their walking journey. The example, these children walked on all of the access which are available and expanded their walking area to the surrounding place. This preference can be seen in figure 6 below.

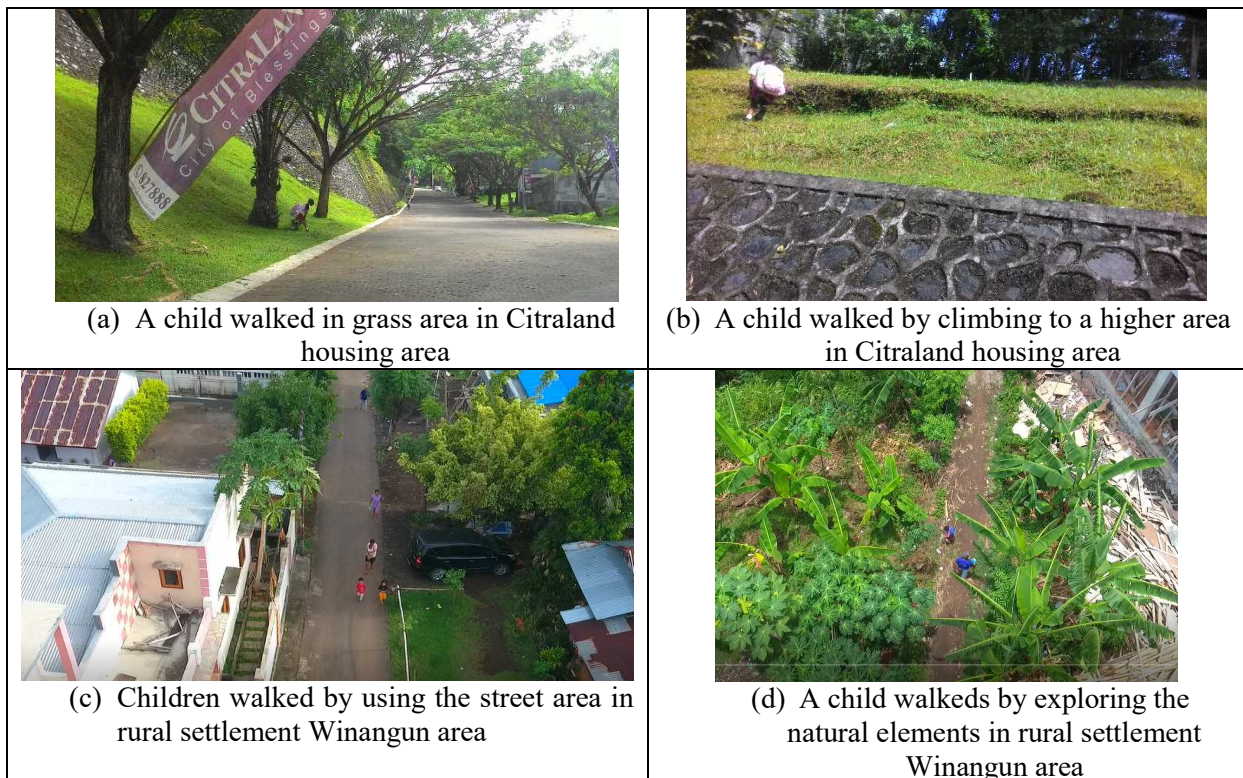


Figure 6. Children walked with many activities in housing and settlement area

Source: Makalew (2016, 2018)

As can be seen in **Figure 6**, children in the housing area used the grass area for walking. This housing area only has sharing street without pedestrian pathway. Children walk on the grass area including the steep grass area to go to the next street. Citraland Manado housing area is located in an area with a different level of land with the hill and the valley. While for the rural settlement area of Winangun, children use local street and small path in the local plantation area. A child who walks with an adult is exploring the natural element surrounding the small path area.

The principle for children pedestrian considers the priority for children safety. Moreover, the pedestrian area should be comfortable and fun for children to do their activities. In order to fulfil this aspect, the quality of children pedestrian area should include facilities such as a good area of landscape and objects that support children activities. Facility for children pedestrian consists of area for relaxing, playing, exercise and sitting area. Children explore the pedestrian pathway area during their walking trip. They use natural objects as well as a man-made object while walking. Planners should have the ability to accommodate children preference for an area for many activities, as well as to create a safe place. The area of the pedestrian as children preference is part of the street that needs to consider pedestrian movement. The example of children pedestrian friendly environment can be seen on the street section and plan as followed.

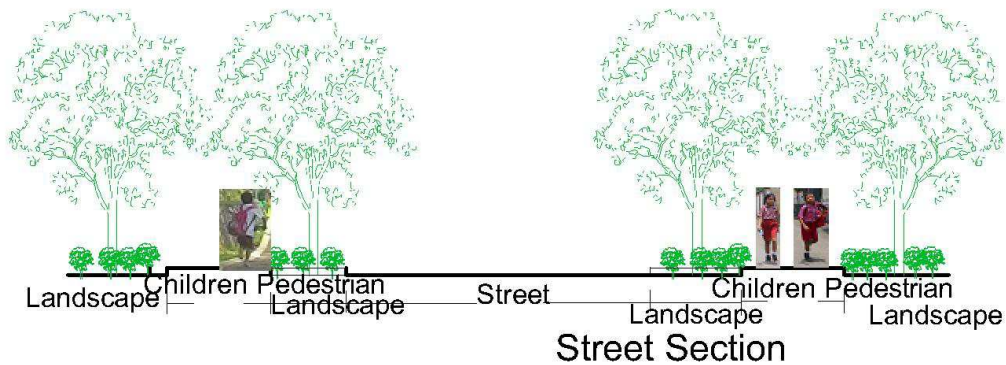


Figure 7. Street Section



Figure 8. Street Lay Out Plan

4. Conclusion

In designing children pedestrian, it is important to provide space for their activities. The standard for children pedestrian has only considered children as part of the adult pedestrian. Neighborhood area, which is fun for doing children activities, is the most chosen preference by children for the pedestrian area. Children also have their preference as a pedestrian in terms of object and places choices and quality of the area. The area of the pedestrian pathway is the most chosen preference by children during their walking time. Moreover, friends and family house are the second most chosen preference in which shape their movement pattern on their trip. Children can describe the quality of the pedestrian based on their point of view. A good pedestrian pathway is not only for a safe and comfortable area but also fun for doing their activities such as exploring and playing. Area of walking for children are school and neighborhood where they live.

In designing pedestrian area for children, is important to look out for their needs as well as to allow them to move freely. As safety is the most important aspect for children pedestrian based on adult and

children preference, the pedestrian area should be contained within the facility to support their activity. Therefore, it is crucial for further research in terms of other aspects of children preference and other places to create a more children pedestrian friendly environment.

References

- [1] Ministry of Public Works. Kementerian Pekerjaan Umum. 2014. Manual for Planning, Supplying and Using Pedestrian facility in the Urban area. Pedoman Perencanaan, Penyediaan, Dan Pemanfaatan Prasarana Dan Sarana Jaringan Pejalan Kaki di Kawasan Perkotaan, Peraturan Menteri Pekerjaan Umum No: 03/PRT/M/2014
- [2] Makalew, F P., Adisasmita S A., Wunas S., Hamid S. 2017. Influence of Children Pedestrian Behaviour on Pedestrian Space Usage, *IOP Conf. Ser.: Mater. Sci. Eng.* 271 012028
- [3] Bierlaire, Michel and Robin, Thomas. 2009. Pedestrian Choices in Timmermans, Harry (ed), *Pedestrian Behaviour- Models, Data Collection and Applications*. Chapter 1 pp. 1-26 Emerald UK
- [4] Indonesia National Standard Board (INSB) Badan Standarisasi Nasional Indonesia. 2004. SNI 03-1733-2004 *Guideline for Housing Planning in Urban Area, Tata Cara Perencanaan Lingkungan Perumahan DiPerkotaan*
- [5] American Planning Association – APA. 2007. *Planning and Urban Design Standard*, John Willey and Son Inc, New Jersey
- [6] Eun-Jung Ko, Bur-Deul Yoon, Sung-Won Choi and Hong-Kyu Kim. 2011. The Effects on the People's Preference on the Cityscape by the Spatial Characteristics of the Streetscape-Centered on 'Design Seoul Street', World Academy of Science, *Engineering and Technology* Vol:5 2011-11-29
- [7] Makalew, Febriane Paulina., Adisasmita, Sakti Adji., Wunas. Shirly and Aly, Sumarni Hamid., 2018 Pedestrian Space Capacity and Movement Pattern For Elementary Students In Urban And Rural Area, *International Journal of GEOMATE* Vol.15 Issue 50, pp. 63 -69
- [8] Azmi, Diyanah Inani & Karim, Hafazah A. 2012. A Comparative Study of Walking Behaviour to Community Facilities in Low-Cost and Medium Cost Housing, Asia Pacific International Conference on Environment-Behaviour Studies, *Procedia - Social and Behavioral Sciences* 35 (2012) 619 – 628, Elsevier B. V
- [9] Kytta, Marketta. 2003. *Children in Outdoor Context, Affordances and Independent Mobility in the Assessment of Environment child friendliness*, Espoo, Thesis Chapter 4 -5 pp. 43 -94
- [10] Plester, Beverly., Blades, Mark and Spencer, Christopher. 2006. Children's Understanding of Environmental representations: aerial photographs and model towns, in *Children and Their Environments- Learning, Using and Designing Spaces*. Chapter 1 pp 42-56. Cambridge University Press
- [11] Francis, Mark and Lorenzo, Ray. 2006. Children and City Design: Proactive Process And The Renewal Of Childhood, in *Children and Their Environments- Learning, Using and Designing Spaces*. Chapter 4 pp 217-237, Cambridge University Press