Walkability in Banda Aceh: An approach in urban mobility development

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Abstract. Banda Aceh starts to develop the city transportation system by introducing bus “Trans Koetaradja” in 2016. It is one of the government actions to accommodate people to move within the city and expected to solve and prevent the city traffic jam that starts to happen in the last decade. On the one hand, the high growth in the number of motor vehicles reveals the needs of the people to commute in the city, however, on the other hand, this situation brings some problem that can affect city life, related to human and environment. For these reasons, early observation and questionnaire indicate that people’s willingness to walk is low due to the factors of the physical environment and local habits. For these reasons, this paper tries to approach the problem with the idea of walkability; understanding the definition of walkability and learning what variables needed to take into account to apply and evaluate the notion, in the more contextual matter through literature studies. It is necessary to consider about walkability development, to support the progress of Banda Aceh forward sustainable development.

1. Introduction

After Tsunami destroyed Banda Aceh in 2004, Banda Aceh continuously reconstructs the infrastructure of the city. One of the ways in enhancing urban mobility in Banda Aceh is the operation of the city bus “Transkoetaradja” (TransK), which firstly run on May 2016. Eleven units of the bus served people along the corridor one from Baiturrahman Grand Mosque area to Darussalam (University of Syiah Kuala area). Furthermore, the government provides two units of feeder bus to transport passenger from Lamdingin, Lambaro Skep, and Gano to the nearest TransK stop in Jambo Tape.

In 2019, the TransK serves passenger thorough five corridors, where the start of each route is from the Baiturrahman Grand Mosque area. The destinations of the bus are Darussalam (Syiah Kuala University and Arraniry Islamic State University), Blang Bintang, Ulee Lheue (Seaport), Mata Ie, and Blang Bintang via Ulee Kareeng. All trips start at 06:30 and end at 21:00, but for the destination to Blang Bintang and Ulee Lheue, they operate until 20:00.

After three years of service, Sundari (2019)[1] in KBA One News online reported that more people nowadays use TransK. For this reason, the government adds 40 units bus and 90 permanent and portable bus stops.

Meanwhile, the number of vehicles significantly increase in Banda Aceh in recent years, as shown in diagram 1. From all kind of motor-vehicles, the growth number of 2 and 3-wheels vehicles shows the most significant increase from 2009 to 2015, which is around 7.63% or 149K units on average annually. It also reported in Serambi-news[2] on January 10, 2017, that 115,777 units motorcycles increase in the year 2016. Furthermore, station wagon and minibus take the second place with 10.48% growth or 18.9K
units per annum, and other vehicles growth number is around 3.5% every year. The high growth of motor-vehicles could be a threat soon related to health and the environment. In one hand, this situation gives amenities to citizens to commute within the city, but it also brings out new phenomenon. Nasution (2018) reported that there are less pedestrian in the city. Although there are some, they only walk for 20-30 meters. People prefer to ride motor-vehicle even for only 100 meters distance. It can potentially create a dependency on vehicles and endanger human health; air pollution as well as obesity. To prevent health and environmental problems, a walkability is a prospective approach in developing urban mobility. Nasution (2018) wrote that a walkable environment is advantageous for social, economic, and environmental aspects, which will be a promising concept for sustainable development. Furthermore, this paper discusses the definition of walkability and variables need to consider in shaping the walkable environment by Banda Aceh case.

2. Research Methodology
This paper is a part of ongoing research about identification of no-pedestrian phenomenon in the area of Baiturrahman Grand Mosque Banda Aceh, Indonesia. The research uses qualitative and quantitative methods, and this paper is the part, which discusses definition of walkability in local context, determines variable needed to evaluate it, and questionnaire result shows how people commute in the city. As the first step, it is critical to understand the meaning of walkability itself; who the subject is, and which space used. Author tried to define walkability through some journals and found out that there are 3 ways on how researchers define walkability; 1) by building variables to evaluate it, 2) by defining elements shape it, and 3) by adapting other researchers’ definition. All outcomes closely related to contextual term because it related geo-location, physical environment, climate, people’s behavior, and transportation. Furthermore, this paper compares 17 Journals from 3 countries to know how the regional researchers’ perspective and what variables they used to assess walkability for the study case in these countries. The authors mostly come from the country where their research take place. They analyze and evaluate the walkability related to the planning practice, which focuses more on environment’s physical condition as well as perspective and characteristics of the pedestrian as users and these journals presented on
international events and seminars. The journals are six from Indonesia, five from Malaysia, and six from Thailand.

Also, it is important to know people way of thinking related to mobility in the city. 140 Questionnaires interviewed to random respondents, who are walking or standing on the pedestrian lane, were done by two students. The result uncovers four main things; people choice of transport in visiting and moving within the grand mosque area, as well as the reason to walk and not to walk for commuting in the city.

3. Understanding Walkability

3.1. Walkability: A Definition

Walkability is about the interaction between pedestrian as the user and the lane/path as the place where he walks. From these 2 points, urban designers and planners explore the elements to understand the situation, answering the problem, test some theories, and assess the success rate of walkability, based on their expertise. They create tools to measure the level of walkability’s productivity, both in user and place perspective. In the end, the result is similar: evaluate the existing interaction to reach sustainable environment development. However, Lo (2009) in Moura et al. (2017)\(^4\) points out, although many researchers evaluate the relations between urban environment and pedestrian behavior, all have a different definition on how to measure walkability.

![Diagram 2. Interaction between pedestrian and space forms walkability.](image)

Researchers evaluate walkability from the user perspective, place perspective, or reciprocal relationship between them. Adkins et al. (2012)\(^5\) stated that success of walkable environment should not be simply measured by the number of durations of walking trips, but also by the quality of those trips in term of user experience. In this term, physical characteristics determine the user’s perception that influence behavior. He quotes Cervero and Kockelman (1997) who indicate that these micro-scale characteristics, however, have a relatively minor influence on travel behavior compared to macro-scale characteristics such as destination, proximity, density, and connectivity. When micro-scale characteristics are stronger than macro scale characteristics, the walkability will refer to the term of tourism, pleasure, and training. In contrary, when the macro-scale characteristics are stronger, it will equip the environment for mobility. Choi (2014)\(^6\) also highlighted that walking could be seen as physical activity behavior, as travel behavior, as personal recreation, as a social activity, and so on. Walking behavior will always emerge through an interplay between conscious decisions, habits, social, and cultural traditions and situations, and the various properties of the built environment.

Battista and Manaugh (2018)\(^7\) emphasize that walkability can, and should, be conceptually adjusted to include social factors shaping travel behavior for two reasons; (1) to more precisely account for travel behavior in the city, and (2) to maximize the number of potential opportunities for residents to meet their needs on foot, voluntarily and satisfactorily, regardless of their socioeconomic constraints. Latterly, social and personal factors are crucial in forming a pedestrian’s spatial engagement.

On the other hand, Jun and Hur (2015)\(^8\) uncover that physical walkability is not relevant to social interaction and has a negative relationship with the sense of community. Physical walkability does not enhance neighborhood social environment, but perceived walkability does because physical walkability
and perceived walkability do not correlate into the same direction and a neighborhood with high physical walkability does not correspond to a neighborhood with high perceived walkability.

Additionally, most researchers try to understand walkability by utilizing or building variables to evaluate walkability, rather than to make a clear definition of walkability. For instance, Winayanti et al. (2015) used parameters from Global Walkability Index consist of 9 variables; walking path modal conflict, availability of walking paths, availability of crossings, grade crossing safety, motorist behavior, amenities, disability infrastructure, obstruction, and security from crime. She adapted the definition indicates walkability is the overall support for the pedestrian environment (World Bank, 2008) that is used to describe and measure the connectivity and quality of walkways, footpaths, or sidewalks in cities. It measured through a comprehensive assessment of available infrastructure for pedestrians and studies linking demand and supply (ADB, 2011). Sutikno et al. (2013) choose parameters from Walkability Audit Tools from US Department of Health and Human Service Center for Diseases Control and Prevention that is support activity, pattern of pedestrian movement, Important Performance Analysis (IPA), and walkability consists of perception of physical condition, conflict with street/accident, the ease of crossing, maintenance and completeness of supporting facilities, effective width of pedestrian lane, buffer by roads, accessibility to pedestrian way, and pedestrian lane’s aesthetic and shade. They defined walkability is one of the principles to be addressed at the community level (Khalid, 2009) and is a tool used to measure neighborhood ability and support walking function for humans (Abley, 2005).

Rafieanzelat et al. (2017) started defining walkability by defining walking. Generally, in the urban context, walking defined as short distance moving from one point to another point. Furthermore, walkability is a concept which is known as a measurement of the pedestrian friendly’s degree of an area. Recently, this term has been focused by urban designer and planners to make a sustained environment for communicating, recreation, and shopping by pedestrian based. Much studies from the earliest terms of walkability until now worked on the concept of walkability in various areas such as architecture, transportation, urban design and planning, and public health. They quote Lo (2009) that said walkability is more than physical activity to health term in a physical environment; it also includes “social environment,” “perception of the area” and “comfort of pedestrian.” In the same time, Moura et al. (2017) adopt the definition from Leslie, Butterworth, and Edwards (2016), that define walkability as the extent to which the urban environment is pedestrian friendly; to address the quality of pedestrian environment, supporting more objective, effective, and comprehensive walking-related strategies and intervention.

Lo (2011) investigated the definition of walkability by defining elements shaping walkability itself. She started explaining the meaning of pedestrian and path in Indonesian instead of English and conclude that ethnography should become a standard part of urban research, planning, and design because in her case, for instance, the notion of what is pedestrian, is further complicated by linguistic ambiguity. In the Indonesian language, the meaning of walking (Jalan) can be defined to verb, noun, and have other definitions when it comes with a prefix, suffix, and both. Besides that, planning is a culturally-embedded language that conveys discourse and either deliberately or unknowingly shapes planning parameters such as that of streets, public spaces, and even the “design pedestrian” itself. It shows that planning, or in this term is walkability, is contextual, which tied to culture, geographic location, weather, and climate.

Spoon (2005) underline that the basic definition of walkability is an area in which encourage people to walk. It obtained from the fact that potential variables interpret common variables, so these variables are valid to represent other variables. He got it by comparing variables from authors and figure out the fact that not only between one author to others but even between documents by one author there a small discrepancy exists. These documents’ comparison shows there are similar variables used in projects and some variables used in one project only.

Based on the above explanations and the case of the research, there are two principal points need to define, that is pedestrian and walkability. Firstly, Pedestrian is anything that moves with a certain speed - include human, human with a device (wheelchair and other moving devices) – and a certain dimension. Since the development of technology in mobility significantly grow during the last decade, it is critical
to consider that the pedestrian is not only human and disability, but also someone with moving device. Secondly, Walkability is a degree that shows the level of interaction between the pedestrian and the space to walk, which measured with some contextual variables. In this definition, the word “contextual” emphasized since walkability can be contextually measured depends on where it takes place.

3.2. Determining Variables

The author chooses 17 journals from Indonesia, Malaysia, and Thailand because there are some similarities of (1) socio-culture and (2) geographical location, which located in south-east Asia around the equator line. The resemblance is such as the human physical character, behavior, culture, habits, the way of social interaction, interaction with the environment, environment characteristics, weather, and climate. However, since there is still no identical culture between people in these countries, and there is the difference of planning policy, it is interesting to know how the authors of the journals assess or evaluate the topic.

- Indonesia

Table 1. Indonesian authors and the variables they use.

| Authors – Journal Title | Parameters/Variables | Source of Parameters |
|-------------------------|----------------------|----------------------|
| Lana Winayanti & Antoni Tsaputra | - Walking path modal conflict - Availability of walking plan - Availability of crossing - Grade crossing safety - Motorist behavior - Amenities - Disability - Obstruction - Security from crime - Government policy and institutions | Global Walkability Index (GWI) |
| Putu Mandiartha | | |
| Bakti Setiawan & Lukluk Zuraida | [Walkability and Pedestrian Facilities in Three Indonesian Cities: Padang, Yogyakarta, dan Mataram, 2015] | |
| Danoe Iswanto | - Category and facility - Positioning - Dimension - Material - Supporting elements - Circulation of motor vehicle | Rubenstein, 1987 Highway Capacity Manual, 1993 |
| [Pengaruh Elemen-elemen Pelengkap Jalur Pedestrian terhadap Kenyamanan Pejalan Kaki, 2006] [Translation: The Influence of Complementary Elements on Pedestrian Line for Walkers, 2006] | | |
| Sony S. Wibowo, Natalia Tanan, Nuryani Tinumbia | - Pedestrian conflict with other motorized mode - Presence walking facilities - Crossing availability - Safe crossing - Motorist behavior - Walking amenities - Walking infrastructure for disability - Obstruction - Walking secure | ADB Sustainable Working Paper Series, 2011 |
| [Walkability measures for City Area in Indonesia (Case Study of Bandung), 2015] | | |
| Fauzul Rizal Sutikno, Surjono, Eddi Basuki Kurniawan | - Support activity - Pattern of pedestrian movement - Important performance analysis (IPA) - Walkability - Perception of physical condition - Conflict with street/accident - The ease of crossing - Maintenance and completeness of supporting facilities - Effective width of pedestrian way - Buffer by roads - Accessibility to pedestrian way - Pedestrian way aesthetic and shade | Walkability Audit Tool – US Department of Health and Human Services Centers for Disease Control and Prevention |
| Fritz Akhmad Nuzir, Haris Murwadi, Bart Dewancker | Online Questionnaire - Mobility choice - Public transportation usage - Employment and education background - Social cultural capital | |
Iswanto (2006)\cite{14}, Sutikno et al. (2013)\cite{10}, and Nuzir et al. (2016)\cite{15} assume that physical condition is one of the crucial variables, that determine the success of a walkable environment. This term includes dimension, material, supporting elements, maintenance and completeness of supporting facilities, the effective width of pedestrian way, and pedestrian way aesthetic and shade.

Winayanti et al. (2015)\cite{9}, Wibowo (2015)\cite{16}, and Sutikno et al. (2013)\cite{10} have the same idea that conflict happened between pedestrian and other street users should noticed as a parameter. It is not only between pedestrian and motorized vehicle but also between pedestrian and other non-motorized vehicles such as bike or becak (Indonesia rickshaw). Also, they also agree to use the variable of amenities, although Sutikno (2013) use a more specific term, which is the ease of crossing. Furthermore, both Winayanti (2015) and Sutikno (2013) choose similar variables about the availability of a walking plan and pattern of pedestrian movement. Sutikno (2013) stated that age, gender, and motives influence pedestrian movement patterns. Based on the age of pedestrians, pedestrian movement divided into day and night movement.

On these six journals, it is only Winayanti (2015) and Wibowo (2015) mention that safety is a crucial parameter consist of crossing safety and security from crime. They also agree that availability of crossing and walking infrastructure for disability are vital to measure walkability.

Moreover, Winayanti (2015) and her team are the only ones who assess government policy. She concluded that at the national level, there are no regulations that specifically address the issue of the planning and management of pedestrian networks. Private vehicles such as cars and motorcycle are the dominant transport mode and are prioritized compared to non-motorized transport modes. Although local regulations to support pedestrians exist, there are still obstacles in the limited budget, lack of coordination among related agencies, and non-existence of technical guidelines to support appropriate pedestrian infrastructure.

Meanwhile, although it does not mentioned specifically in the table, Agustin (2014)\cite{17} also uses a parameter of ecology and community – that indeed related to environment and people – as well as mobility that shows an interaction between environment and users.

Malaysia

| Authors – Journal Title | Parameters/Variables | Source of Parameters |
|-------------------------|----------------------|----------------------|
| Shuhana Shamsuddin, Nur Rasyiqah Abu Hasan, Siti Fatimah Ilani Bilyamin [Walkable Environment in Increasing the Livability of a City, 2012] | - Pedestrian walkway - Destination - Safety - Pedestrian Facilities - Enjoyable element - Questionnaire - Public travel pattern (walking, public transport, private car, w-pt-w, pc-pt-w) - Reason for using private vehicle - Reason for not to walk in city center | Independent study |
| Juriah Zakaria, Norsidah Ujang [Comfort of Walking in the City Center of Kuala Lumpur, 2014] | - Physical attributes and condition - Questionnaire - Comfort - Connectivity - Accessibility | Independent study |
Shamsuddin et al. (2012)\textsuperscript{(18)} and Zakaria et al. (2014)\textsuperscript{(19)} assume that safety and physical factors, such as pedestrian facility as well as physical attributes and condition, are defining factors in walkability concept.

Azmi et al. (2012)\textsuperscript{(20)}, Abdullah et al. (2016)\textsuperscript{(21)}, and Rahman et al. (2014)\textsuperscript{(22)}, the three of them agree that distance, which could relate to land use, is one of the key points that makes people walk. Azmi et al. (2012) reported that in the Malaysian context, based on a planning report on a special development area in Malaysia (Berjuntai Bestari, Selangor) the comfortable walking distance of the various age groups within five minutes is different. Her earlier study showed that the resident tends to walk maximum 200 meters or less only to reach their community facilities from their houses before they choose to drive. At the same time, Rahman et al. (2014) write that distance from residence does affect the people frequency of a visit to the street (location of research), which means the shorter it is, the often they use it. People are much more likely to walk to a given destination if they perceive that it is not too far. The perceived distance influenced by the right type of land use and design characteristics. The elements, such as a continuous walking system that connects door fronts with transit stops or other destinations, can create good connections. In contrast, Abdullah et al (2016) said that the majority of housing units, especially the low-cost apartments are within 800 meters from LRT stations. Thus, most units are within the recommended comfortable walking distance from the LRT stations.

It is only Rahman et al. (2014) think that attraction and activities, as well as engagement with public spaces make people use the street. He said that attraction or desirability is related to the qualities engaged with by eyes, aesthetic values, and entertainment quality. The result of his study shows that functional factors were the form that contributed to the use of the street rather than physical factors. According to the occasional and daily users, the reason is the existence of shopping centers and it is the best place to earn money. It also proves that most people came to this street for shopping. The numbers of people will increase during festive seasons, especially for preparing for a religious festival. Thus, when the time of these festivals is approaching, the street will move into high gear with lots of people on the streets and many trade activities. Moreover, it also indicates a significant function in supporting economic and social events. Although there are different types of development, the most vital generators are business and commercial activities. The result from the observations survey upon the street activities found that it focused around shopping areas. Another reason for being on the street was meeting friends. People met friends together, enjoying in restaurants or shopping together. The presence of outdoor cafés and restaurants that provide wireless internet and air conditioning make the place suitable as a meeting place.
for people. Other activities, such as visiting, relaxing, and entertaining were optional activities that were present on the street.

- Thailand

### Table 3. Thai authors and the variables the use.

| Author – Journal Title | Parameters/Variables | Source of Parameters |
|------------------------|----------------------|----------------------|
| Chatdanai Luadsakul Vatanavongs Ratanvaraha [The Study of Walkability Index: a Case Study in Nakhon Ratchasima Province, 2013] | - Walking path modal conflict - Security from crime - Crossing safety - Motorist behavior - Amenities - Disability infrastructure - Maintenance and cleanliness - Obstruction - Availability of crossing | - Clean Air Initiative (CAI) – Asia - Global Walkability Index (GWI) |
| Pornraht Pongprasert Hisashi Kubota [Switching from Motorcycle Taxi to Walking: a Case Study of Transit Station Access in Bangkok, Thailand, 2016] | - Questionnaire - User: age, gender, status, income, occupation - Car ownership - Access distance - Residential location in CBD - Commuting during peak hours - Frequency of using transit - Commuting with family members - Picking up/dropping-off family members - Acceptable walking time and distance | |
| Sathita Malaitham Atsushi Fukuda Varameth Vichiensan Vasinee Wasuntarasook [Measuring Pedestrian Environment in Term of Connectivity under Catchment Area of TOD in Developing Country: Case of Bangkok, Thailand, 2015] | - Road classification and pattern - Intersection density - Proximity | Independent study |
| Yardphol Tanaboriboon Jocelyn A. Guyano [Analysis of Pedestrian Movements in Bangkok, 1991] | - Speed measurements - Sidewalks - Stairways - Siganized crossings | Independent study |
| Chalat Tipakornkiat Thirayoot Linanond Hyunmyung Kim [Determining an Influencing Area Affecting Walking Speed on Footpath: A Case Study of a Footpath in CBD Bangkok, Thailand, 2012] | - Walking speed - Influencing area (length) - Pedestrian density | |
| Craig Townsend John Zacharias [Built Environment and Pedestrian Behavior at Rail Rapid Transit Stations in Bangkok, 2009] | - Walking behavior - Built environment - Floor space - Road networks - Road density - Road connectivity - Type of destination (that determines both land use and activity) | |

Among the six journals from Thailand, five of them have their focus that has some similarity one each other. This focus determines the specific terms of their research. It is only Luadsakul et al. (2013)\textsuperscript{[23]} utilize nine variables from CAI (Clean Air Initiative)-Asia that based on variables from Global Walkability Index (GWI).
Both of Pongprasert et al. (2016)\cite{24} and Malaitham et al. (2015)\cite{25} use distance variable to measure the success of walkable environment. The farther distance from transit stations, the lower the share of walking, but the higher the shares of other modes presented.

Tanaboriboon et al. (1991)\cite{26} and Tipakornkiat et al. (2012)\cite{27} concern on walking speed. Tanaboriboon (1991) measures the walking speed in three different lines, that are sidewalks, stairways, and signaling crossing. At the end of the research, he and his team found out that Asian pedestrians walk slower compared with their western counterparts, so local design standards are needed for pedestrian facilities in Asian countries. In the meantime, Tipakornkiat (2012) measure walking speed in the specific length of the journey to know the average density of pedestrian. As a result, the range of 5-8 meter produces the highest correlation coefficient. In the case of high-density conditions, the walking speed of the equally-split flow (50:50) was found to be higher than other proportional one analyzed.

Malaitham (2015) and Townsend & Zacharias (2009)\cite{28} confirm that it is necessary to consider the road network and pattern. Malaitham (2015) stated that road classification and its structure have been thought to influence on the pedestrian-friendly environment; likewise, arterials were a significant barrier to pedestrian amenity and safety because of the functional features of arterials such as high speeds with high traffic volume (Hutchinson, 2011, in Malaitham, 2015). On the other hand, Townsend & Zacharias (2009) write that a broader road network could influence the length of walking trips by either increasing the number of possible routes and activities or by creating possibilities for more direct walking routes. If there were many activities, it is possible that people would walk further because there were more possibilities for linked trips, or the experience was more enjoyable. In this way, the built area could provide inducements for shorter trips by clustering activities together, or longer ones by creating nodes that attract many people walking to shop or undertake other activities within the area.

Malaitham (2015), Tipakornkiat (2012), and Townsend (2009) approve that density influence the walkable environment. However, there are a different focus on density between them. Malaitham concerns on analyzing intersection density. Ewing (2010) and Saelens (2003) in Malaitham (2015) said that in the basis of connectivity, the denser intersection provides the opportunities for people to walk more destinations with different route choices as well as shorter distance. Instead, Townsend (2009) choose road density and road connectivity as variables, by assuming that they would serve as proxies for the sidewalk network. The areas with a higher road network density and road connectivity would offer more option for pedestrians and present a more permeable connection that increases the number of choices and reduces pedestrian route length. In contrast, Tipakornkiat (2012) research about the density of pedestrian at certain distance in its relationship with walking speed. He found out that pedestrian select their walking speed based on the crowd density in front of them. The group of people ahead in the influencing area is the determination of walking speed rather than a few people immediately in front of the pedestrian further away.

From the comparison above, it can be summarized that among the six journals from Indonesia, each journal presents study cases in different cities in Indonesia. Although the authors of the journals use different variables to evaluate their study cases, generally, assessed streets are located on the city centers. The authors from Indonesia evaluate it by observing the existing condition and investigate points related to the utilization of the pedestrians; which associates to user’s level of satisfaction and habit. Five of six journals use walkability tools from literature, and only one journal develop its parameter. In Malaysia case, all assessment of pedestrian located in the city of Kuala Lumpur. The study cases are various include walkability within Transit Development (TOD), the livability of the city, and comfort of the pedestrian. Three of five journals develop their parameters from their independent study, while the rest use walkability tools from literature. For the meantime, five journals from Thailand discuss walkability in Bangkok, and another explain the study case in another province. The journals investigate TOD area and streets in the city center. One of the journals uses parameters from literature while the other five journals practice their variables. In the end, variables utilized by more than one author from the three countries, are 1) variables from Global Walkability Index, 2) environment physical conditions such as dimension, material, size, and aesthetic, 3) distance which related to land use, 4) speed, 5) road network, pattern, and connectivity, and 6) density.
3.3. Questionnaire Result

To know about the way of people travel, and what citizen think related to walking in the city, 140 questionnaires were spread out in May 2017 in the area of Baiturrahman Grand Mosque in Banda Aceh. The targets are random people who walk or stand on the pedestrian lane, and the time of the questionnaire’s interview is from 09:00 to 16:00.

Diagram 3. People’s choice of transport in visiting Baiturrahman Grand Mosque area.
Data source: Questionnaire May 2017

Diagram 3 shows the people’s choice of transport in visiting Baiturrahman Grand Mosque area. It shows that almost half of the respondent comes by motorcycle. 19% of the respondent drives car and 14% by public transport. Interestingly, it is also 14% of people arrive with another way and less than 10% of people walk to the area.

Diagram 4. People’s choice of transport to move within Baiturrahman Grand Mosque area.
Data source: Questionnaire May 2017

Around 39% of respondent use motorcycle and 34% use another kind of transportation to move within the area. Compared to diagram 3, diagram 4 indicates that some people who come by driving a car and riding a motorcycle change their transport mode to either walk or other.
For the reason of not to walk, up to 41% respondent complains about accessibility related to distance. They said that they do not intend to walk because the distance between places they want to visit in the area is for them too far. On the other hand, 23% respondent say that they are lazy, and it is exhausting to walk, while 23% complain about the weather that is too hot to walk under the sunshine. There are 8% of respondents criticized about pollution and only 5% protests about the condition of the pedestrian lane.

Furthermore, 71% of respondents intend to walk if the pedestrian lane is in good condition, and comfortable to walk on and only 6% of respondents do not want to walk.

From the result of the questionnaire above, it can be summarized that the trend of using motor-vehicle is high and the interest to walk is low. Interestingly, people’s intention to walk is high if the condition of pedestrian lane good is.

4. Conclusions
In the context of Banda Aceh, walkability defined as level of interaction between pedestrian as the users and physical environment as the space. level of interaction in walkability consist of three matters. Firstly,
the existence of pedestrian in the research site is a crucial point because an interaction occurs after existence. The existence here is the existence of pedestrian and the existence of the space where the walking activity takes place. Secondly, the ability of environment to accommodate the walking activity. It relates to physical condition of the pedestrian lane by considering certain variables, where the issues of quality and perception is part of the topic discussed here. Thirdly, after the pedestrian and the walking space exist and it is capable to provide space for walking activity, walkability can be measured with various methods as needed.

The result of the questionnaire indicates that there is problem with physical environment related to pedestrian lane because it proves that 7 of 10 people will walk if the walkable environment provided. The walkable environment will contribute in handling pollution caused by the rapid growth of the number of motor-vehicle.

Government should aware that the benefits they got by providing the amenities for people to own motor-vehicle possibly become time-bomb that can endanger continuity of life in the city. A resolution is needed to answer the people’s needs for commuting without ignoring social, economic, and environmental aspects.

The next part of the research is the analysis of Kaiserslautern city as a role model for good walkability or what we know as pedestrian-friendly city. Kaiserslautern is chosen because in the last decade, statistic number shows more than 50% people choose to commute on foot and this achievement is inseparable from the success of transportation management. In this part, the analysis will be about the mobility situation in Kaiserslautern, the development stages of the pedestrian zone as well as public transportation, and the city transportation plan that control the system.

Acknowledgment
The author gratefully acknowledges that the ongoing research is supported by cooperation program between Aceh Scholarship for Excellence (ASFE) and German Academic Exchange Service (DAAD), and Department of International Planning System, Faculty of Spatial and Environmental Planning, Technical University of Kaiserslautern, Germany.

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