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QUALITY OF WALKABILITY IN PEUNAYONG, BANDA ACEH

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ABSTRACT

Walkability has been introduced as one of the sustainable indicators of urban development. In creating a pedestrian-friendly area, good planning and design of pedestrian facilities are required. The concept of walkability makes an area a pedestrian-friendly environment and this concept can also be used as a measure of the quality of pedestrian paths in urban areas. Peunayong, as a heritage area and trade services in the form of a row of shophouses with Chinatown architecture, has a very strong attraction for walking activities, but on the contrary walking activities are very difficult to do because of various blending activities in the pedestrian path such as trading and parking activities. The difficulty of walking is exacerbated by the condition of the facilities of a pedestrian path that has not been supported, such as the lack of width and unconnected pedestrian path in Peunayong. The analysis methods used scoring analysis and were conducted in 5 segments of Peunayong road with variables of walkability are connected, convenient, comfort and safety, convivial and conspicuous. The results of this study found that 2 segments in Peunayaong have moderate quality while 3 segments have a low quality of walkability.

Keywords:
Walkability, Pedestrians, Walkable, Peunayong

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1. Introduction

Walking is a physical activity and mode of transportation owned by everyone (Ackerson, 2005), connecting humans from one place to another (Lantang, 2012) and is an environmentally friendly activity that costs nothing. Walking also can avoid traffic jams and reduce air pollution generated by vehicle transportation (Forsyth, 2015; Forsyth & Southworth, 2008).

Pedestrian paths and complementary road facilities support walking activities. The existence of pedestrian paths is the main driving force for people to walk from one place to another (Musriati, 2014), including people with disabilities. Pedestrians must walk on the pedestrian path and cross on the crossing that has been provided to protect them from traffic (Ahmad & Soeparyanto, 2013).

The Regional Spatial Plan of Banda Aceh City in 2009-2029 states that the Peunayong is a center for trade and services as well as a heritage area. As a trade and service center area, the activities that occur in the Peunayong are very diverse with high intensity. The density of activities in Peunayong causes a high number of vehicle transportations which causes congestion in the area and parking on site, which narrows the space for pedestrians and vehicles. The main problem in Peunayong is pedestrian facilities in the Peunayong area still do not facilitate pedestrians because of the mixing of various activities in one lane, such as circulation, parking, or trading. Pedestrian paths with good conditions and connectivity will be able to create special spaces for pedestrians and people with disabilities that are humane, safe, and comfortable to walk through (Handayani et al., 2018).

Walkability has been introduced as one of the sustainable indicators of urban development. In creating a pedestrian-friendly area, good planning and design of pedestrian facilities are required. The concept of walkability makes an area a pedestrian-friendly environment and this concept can also be used as a measure of the quality of pedestrian paths in urban areas.

With that, the question arises about the quality of walkability in the Peunyaong area. The purpose of this research is to measure the quality of walkability in Peunayong Banda Aceh.

2. Literature Review

Walkability is a state that explains the extent to which an environment can be friendly to pedestrians (Land Transport New Zealand, 2007). Walkability also can be interpreted as a measure of the quality of hospitality of an environment to pedestrians in an area (City of Fort Collins, 2011).

Many health studies say that walking can improve mental and physical health, reduce stress, and increase creativity. The definition of walkable, in addition to encouraging physical activity, is (Forsyth & Southworth, 2008): 1) close: walkable environments have proximity to the destination; 2) barrier-free: walkable environments can be traversed without obstacles, this includes the elderly, children, disabled, or those wearing heels; 3) safe: a walkable environment is a safe, safe environment against crime and traffic; 4) full of pedestrian infrastructure and destination: a walkable environment is an environment that features comprehensive pedestrian infrastructure such as sidewalks or separate lanes, crossovers, street furniture, and shade trees.

There are 5 things to look out for to create a walkable environment that used in this research:

- Connected
  Connected roads provide multiple route options for a variety of activities, resources, services, premises and encourage physical activity (Jackson, 2009). Connectivity comprehensively refers to the straight path as well as the shorter distance to reach the desired goal (Saelens & Handy, 2008).
- Convenient
  The area is easy to understand, bringing a sense of proximity to visual cues and physical direction for pedestrian needs. Wayfinding can be known by pedestrians as well as vehicle users by presenting landmarks, maps, and signs. The right wayfinding system can easily support users to find the environment positively and help visitors to choose the right path (Giles-Corti, Kelty, Zubrick, & Villanueva, 2009).
- Comfort
  A comfortable place is an environment where the shape and capacity of roads and public spaces are by the pattern of human behavior to bring a sense of comfort and security (A.B. Jacobs, 1993).
- Safety
  Pedestrian safety can be considered the most advanced and implicit feature of walkability (Soutworth, 2005). Walking activities are more likely in safer places.
- Convivial
  Pedestrian area should be friendly to pedestrians as well as people with disabilities.
- Conspicuous
  Pedestrian area should be visible at night as well as street space zoning.

Based on Benjamin Grant, in *Getting to Great Places* (2013), mentions 6 components of design for walkability, namely:

- Make accession in an area shorter by making blocks smaller or providing access within blocks through alleys, and lanes.
- Land function is directed to support activities, vitality, security, and identity of roads and spaces.
- Place parking in a place that does not interfere with the pedestrian space. Parking should be provided on a multilevel structure because once the parking is done, each driver becomes a pedestrian so that it can enliven public spaces.
- Create humanist spaces with proportion and scale settings that adjust the human scale, which can be done with elements of façade, lighting, signage, and other supporting facilities.
- Pedestrian space is wide and includes elements of trees, lamps, street furniture, and public art. Pedestrian space must also be well connected and form continuity connected with safe deployment.
- Road space can accommodate a variety of modes of transportation and serve as a public facility, commercial space, and green space.

According to Duany Andres (2000), buildings arranged in the area have an effect on roads and context on the series of walkability. The specific elements of an urban morphology that contribute to defining the vitality of urban space are:

- Building orientation and setback:
  In a place that is not prioritized to walk, the building is usually less related to the road, either with a wide setback or orientation to the parking lot than the street space. Conversely, the urban contexts with buildings that are oriented and often adjacent to street spaces, therefore walking becomes a high priority.
- Block length:
  The development of urban character patterns usually has short blocks with systems that are well connected between pedestrians, roads, and alleys. In contrast to urban areas dominated by vehicles, they usually have large blocks, less complete road connectivity, and usually no alleys. This pattern makes walking longer and therefore people will walk less.
- Building height and street enclosure:
  Building is an important part of the urban context that shapes the definition and enclosure of street space, while it is also an important urban design element for making the inner-city space experience a comfortable place for pedestrians. The threshold when pedestrians stop feeling the enclosure is the 1:4 ratio of building height to street width—typical of low-density cities. In denser urban contexts, a high-to-width ratio between 1:3 and 1:2 creates a suitable enclosure. Walkable environments have a ratio of 1,5 to 2.
- Building scale and variety:
  Help define the context and character of a street and encourage people to walk by providing visual interest to street spaces. The scale and variety of buildings should help define the scale of a walkable environment.

ITDP's walkability hierarchy (2018) is described in the pyramid to provide the basis for the development of walkability assessments at the city level (Figure 1):

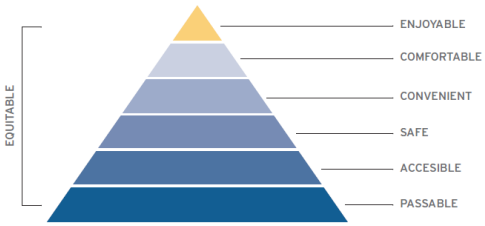

Figure 1. Walkability hierarchy
Source: ITDP (2018)

- Passable:
  An urban environment that physically allows for walking from one place to another.
- Accessible:
  The urban environment in which the destination is within a walkable distance, it can also be accessed by wheelchair users and others who have special needs.
- Safe:
  An urban environment that can protect pedestrians from traffic crime, both along and across the street.
- Convenient:
  An urban environment prioritizes pedestrians by minimizing the time it takes to walk to a destination, particularly about other modes of transportation such as motor vehicles.
- Comfortable:
  An urban environment that minimizes physical discomfort when walking, such as crowding, fatigue, rain, heat, dark, and provides design elements that minimize discomfort.
- Enjoyable:
  An urban environment that adds an element of joy for pedestrians through the existence of entertainment, art, and supporting facilities.

The purpose of walkability is to create a pedestrian-friendly environment with road access to destinations that are well connected, comfortable, safe to pass, and no longer dependent on motor vehicles to achieve the destination. The Western Australian Planning Commission (2007) also stressed the need to create a pedestrian-friendly environment, with the following objectives:

- Reduce the dependence on the use of private vehicles and encourage the use of public vehicles by forming compatible city structures.
- Create access that is well connected with various facilities and can be used by all circles, be it pedestrians, cyclists, seniors, and people with disabilities.
- Ensuring the safety of pedestrians by designing the orientation of the building facing the street to increase supervision and activity.

3. Research Method

This research area is located in Aceh Province, precisely in Kuta Alam District, Banda Aceh City. The object and location of the research are road corridors that formed Peunayong, namely Jenderal Ahmad Yani Street, Kartini Street, W. R. Supratman Street, Khairil Anwar Street, Sri Ratu Safiatuddin Street, and the road will be referred to as the segment (Table 1).

Table 1. Street segment

Segment	Street name
Segment 1	Jenderal Ahmad Yani Street
Segment 2	Kartini Street
Segment 3	W. R. Supratman Street
Segment 4	Khairil Anwar Street
Segment 5	Sri Ratu Safiatuddin Street

This research uses the qualitative deductive method by identifying parameter points, variables, and indicators in the research area that correspond to the conditions in the field, then processing the resulting data and analyzing it based on walkability theories.

The approach to this research was done by the theory of walkability as a reference. The focus of this research is to measure walkability in the Peunayong area. The analysis methods used scoring analysis and were conducted in 5 segments of Peunayong streets.

Variables are determined based on derivative parameters on walkability that are adjusted to the context of the research location. The walkability scoring guide is a guideline for walkability assessment in the Peunayong area. This guide is formulated based on variables, parameters, and theories related to looking at the context of data in the Peunayong area (Table 2).

Table 2. Variables and walkability quality scoring guide

Variable	Parameters	Very Low (0)	Low (1)	Moderate (2)	High (3)
Connected	Pedestrian lane connectivity	Pedestrian lanes not available	Pedestrian lanes are not connected on either side of the street	Pedestrian lanes are connected on one side of the street	Pedestrian lanes are connected on both sides of the street
	Conflict in pedestrian lanes	Pedestrian lanes not available	Pedestrian lanes have conflicts with parking or trading activities on both sides of the street	Pedestrian lanes have conflicts with parking or trading activities on one side of the street	Pedestrian lanes have no conflicts with parking and trading activities on both sides of the street
	Availability of crossings	Crossings are not available	There are crossings, no signs, and indecisive limits	There are crossings, no signs, and firm limits	There are crossings, there are signs, and strict limits
Convenient	Availability of signs–traffic signs, signage, and information boards	Traffic signs, signage, and information boards are not available	There are traffic signs, signage, and information boards in some pedestrian lanes	There are traffic signs, signage, and information boards on one side of the pedestrian lane	There are traffic signs, signage, and information boards on both sides of the pedestrian lane

Variable	Parameters	Very Low (0)	Low (1)	Moderate (2)	High (3)
	Transit distance (bus stop) to a walkable destination	Transit distance to destination >1 km	Transit distance to destination 400–500 m	Transit distance to destination 200–300 m	Transit distance to destination <150 m
Comfort and safety	Availability of shade trees on pedestrian paths	Shade trees are not available	Shade trees on some street	There is a shade tree on one side of the street	There are shade trees on both sides of the street
	Availability of street furniture (seating, trash cans, handwashing, and bollards)	Street furniture (seating, bins, handwashing, and bollards) are not available	There are several street furniture (seating, trash cans) on both sides of the street	There is street furniture (seating, bins, handwashing, and bollards) on one side of the street	There are street furniture (seating, bins, handwashing, and bollards) on both sides of the street
	Width of pedestrian lanes	Pedestrian lanes not available	It has a width of <1 m	It has a width of <1,2 m	It has a width of >1,5 m
	Material condition of pedestrian lanes	Pedestrian lanes not available	Material conditions are bad, damaged, and perforated in some pedestrian lane	Material condition is good, not damaged, not perforated on one side of the pedestrian lane	The condition of the material is good, undamaged, not perforated on both sides of the pedestrian lane
	Mix used as transparent element (eyes on the street)	Mix used not available	There is a mix-used building on some street	There is a mix-used building on one side of the street	There is a mix-used building on both sides of the street
	Street vendor Availability	Street vendors are not available	There are street vendors on some streets and inhibit walking activities	There is a vendor street on one side of the street and does not hamper walking activities	There are street vendors on both sides of the street and do not hinder walking activities
Convivial	Spatial enclosure and Humanscale	Loss of enclosure/space loss of closure and influence of space is not felt	Minimum enclosures begin to lose closure and the influence of space begins to be felt	Full enclosure and feel balanced	Threshold of enclosure/last boundary of space and space closure feels rather large
	Vehicle speed control	Speed control is not available	There is a narrow street and sign speed limit of the vehicle	There are speed bumps, vehicle speed limit signs, and narrow street	There are raised crossings, speed bumps, vehicle speed limit signs, and narrow roads
	Availability of ramps on pedestrian paths	Ramp not available	There is a ramp on part of the street	There is a ramp on one side of the street	There are ramps on both sides of the street
	Availability of guiding blocks on pedestrian paths	Guiding block not available	There are guiding blocks on some street	There is a guiding block on one side of the street	There are guiding blocks on both sides of the street
Conspicuous	Division modes of transportation	There are no division modes of transportation	There is a division of modes of transportation private vehicle and parking	There is a division of modes of transportation such as pedestrians, private vehicles, and parking	There is a division of modes of transportation such as transit (bus), bicycles, pedestrians, private vehicles, and parking
	Parking on street	There is parking on-street on both sides of the lane with 45 degrees	There is parking on-street on one side of the street with 45 degrees	There is parking on-street on one side of the road with 0 degree	There is parking on some streets with 0 degree
	Parking off the street (vacant lots, parking, basement buildings, and parking buildings)	There is no off-street parking along the lanes	Off-street parking is done in the building's existing setbacks	There is off-street parking in the form of vacant land used for parking and a parking building	There is off-street parking in the form of vacant land used for parking, basement buildings, and parking buildings
	Streetlight	Street lights are not available	Street lights are available on some streets	Street lights are available on one side of the street	Street lights are available on both sides of the street

4. Results and Discussions

The segment analysis is conducted based on variables and standards in the form of scoring assessment of walkability qualities with variables: connected, convenient, comfort and safety, convivial and conspicuous. Here are the indicators on how to assess the quality of walkability in the Peunayong area (Table 3):

Table 3. Walkability quality assessment indicator

Score	Assessment indicator	Description
0	Parameters not available in the segment/very low parameter quality	Walkability is very low
1	Parameters available but only partially in the road segment/low parameter quality/incomplete parameters	Low walkability
2	Parameters are available and only exist on one side of the segment/moderate parameter quality/partial complete parameters	Moderate walkability
3	Parameters are available and are on both sides of the road segment/high parameter quality/complete parameters	High walkability

The assessment indicator is divided by 4, if the parameter is not available in the segment or the quality of the parameter is very low, then the value is 0, which means very low walkability. When parameters are available but only available on some segments or low parameter quality or incomplete parameters, the value is 1 which means low walkability. However, if the parameter is available and only exists on one side of the segment or the quality of the parameter is moderate or partially complete, then the value is 2 which means moderate walkability. Lastly, if parameters are available and are on either side of the segment or high parameter quality or complete parameter, then the value of 3 means high walkability. The results of Peunayong's walkability quality assessment are shown in Figure 2.

The results of walkability assessment per parameter for each segment are shown in Figure 2. There are several parameters with very low quality, namely the availability of crossings, vehicle speed control, availability of ramps and guiding blocks, and parking on and off the street. For low quality, there is the availability of shade trees, availability of street furniture, the width of pedestrian lanes, and the availability of street lights. For moderate-quality, there is pedestrian lane connectivity, conflict in the pedestrian lane, ease of transit distance, the material condition of pedestrian lanes, street vendors, street enclosure hospitality, and transportation mode. High-quality parameters there are 2, namely ease of access to information and mix used functions. Overall the walkability quality of the Peunayong area is dominated by very low and moderate values. While the results of walkability assessment based on segments are as follows (Table 4 and Figure 3).

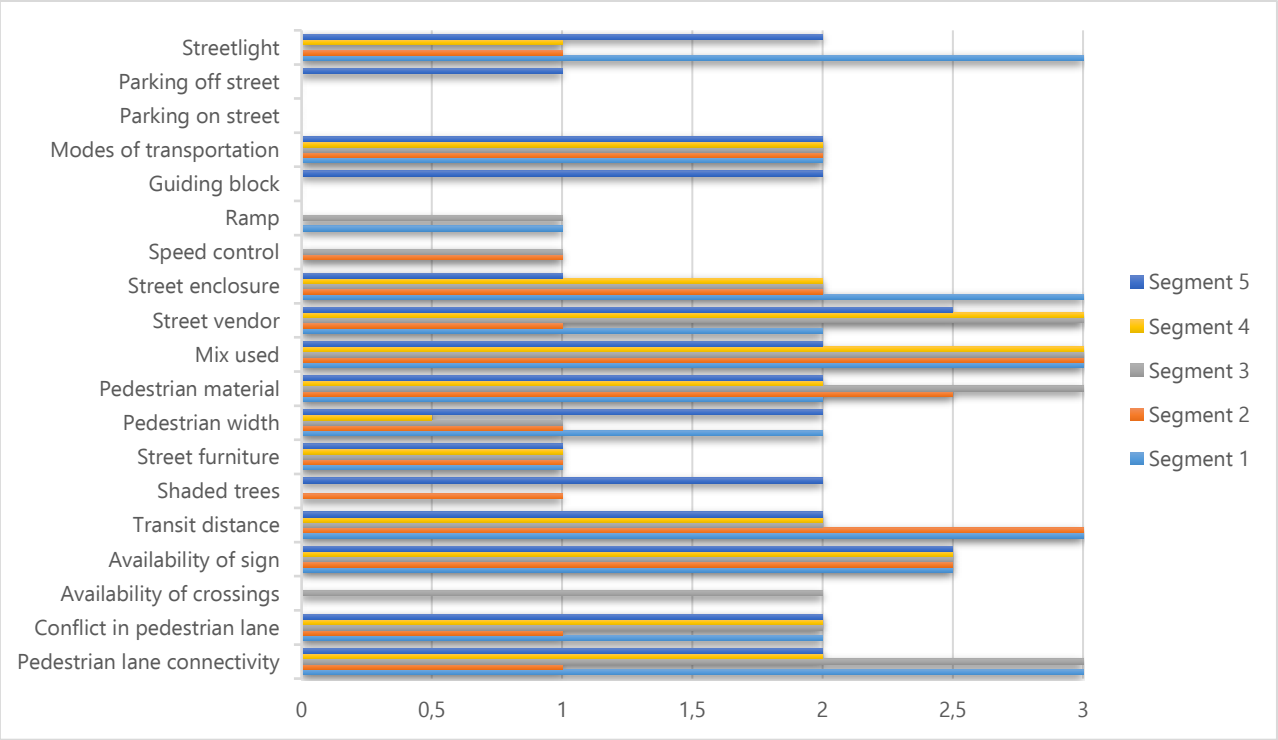

Figure 2. Recapitulation of scoring walkability results

Figure 3. Mapping the results of walkability scoring

Table 4. Walkability quality assessment indicator

Segment	Total Score	Description
Segment 1	1,64	Moderate walkability
Segment 2	1,28	Low walkability
Segment 3	1,57	Moderate walkability
Segment 4	1,27	Low walkability
Segment 5	1,49	Low walkability

Based on scoring results regarding the quality of walkability in the Peunayong area, 3 segments get low scores, namely segments 2, 4, and 5, while 2 segments get moderate scores, namely 1 and 3. The lowest walkability quality in segment 4 with a score of 1,27, then segment 2 with a score of 1,28. The third-lowest score in segment 5 was 1,49, then segment 3 with a score of 1,57. The highest score is in segment 1, which is 1,64. There is no segment in the Peunayong area that is high quality of walkability.

After getting the quality of walkability in general then the quality is adjusted to the role of ITDP, there are 6 ranking categories, namely passable, accessible, safe, convenient, comfortable, and enjoyable. Here are the results of the ranking (Table 5):

Table 5. Walkability quality categories based on ITDP

Ranking	Indicator	Peunayong
Passable	It is possible to walk from one place to another	Peunayong makes it possible to walk from one place to another
Accessible	The destination inside is within a walkable distance	Destinations in Peunayong are within walking distance
	It can be accessed by wheelchair users and others who have special needs	Peunayong is not accessible to wheelchair users and people with special needs
Safe	Can protect pedestrians from traffic crime, both along and across the road	Peunayong has not been able to protect pedestrians from traffic crime
Comfortable	Prioritize pedestrians by minimizing the time it takes to walk to a destination, particularly about other modes of transportation such as motor vehicles	Peunayong is still oriented to motor vehicles to achieve the destination
Enjoyable	Add an element of joy for pedestrians through the presence of entertainment, art, and support facilities	Peunayong does not yet have an element of joy for pedestrians

Based on the table above, the Peunayong area only meets the criteria or indicators of passable, meaning that the Peunayong pedestrian path is included in the lowest or minimum ranking based on ITDP, which is passable.

5. Conclusion

Based on the results of research that has been done, Segment 1 Jenderal Ahmad Yani Street has moderate walkability quality that lacks quality, especially in the convivial part. Segment 1 is not friendly for pedestrians, especially for pedestrians who have special needs. In Segment 2, Kartini Street has a low category of walkability quality, especially in the connected part that causes pedestrian lanes in segment 2 can not connect properly, then convivial, which means segment 2 is not yet friendly to pedestrians, especially for the disabled ones, and conspicuous related to parking spaces and street lights for lighting at night. Segment 3, W. R. Supratman Street has moderate walkability quality that lacks quality, especially in the conspicuous section related to parking spaces and street lights for lighting at night and convivial, so segment 3 is not friendly for pedestrians, especially for disabled people. Segment 4, Khairil Anwar Street has low walkability quality. The low quality of walkability in segment 4 is equal to the low quality in segment 2, namely convivial, which means that segment 4 has not been friendly to pedestrians, especially for the disabled ones, and conspicuous related to parking spaces and street lights for lighting at night. Segment 5, Sri Ratu Safiatuddin Street has a walkability quality that falls into the low category. The low quality in this segment is due to the low-quality value on 3 variables, namely connected which means that segment 5 of pedestrian lanes in segment 5 is not connected, convivial (friendliness) which means segment 5 is not friendly to pedestrians, especially disabled people.

Although the quality of walkability is low and moderate, all segments in the Peunayong area have high walkability potential. The increase in potential can be done with improvements in several parameters such as adding and improving pedestrian lanes, sharing modes of transportation, adding access to information, shade trees, and street furniture, and providing access for disabilities. However, some parameters do not have the potential for improvements, such as street enclosure and parking off-street. These parameters do not have the potential to be improved because they relate to land carrying capacity and existing conditions that are difficult to change, such as building height and building setbacks.

Quality of walkability research has limitations that only look at the physical aspects of street space in the Peunayong area. It is less complete if walkability research does not discuss the deeper aspects of enclosures, namely the facade of the building that forms the aesthetics of the

area, especially Peunayong as a heritage area that has a Chinatown architectural façade. Therefore this quality of walkability research has not been completed and can be continued to examine the aesthetics of the building façade of the area to get comprehensive walkability results.

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