Analyzing Human Scale Space on Street Characteristics in The Tembalang Education Area

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Abstract. The education area is considered as a new growth center, because the demand for mobility is quite high, related to the ease of the community to the destination. The term human-scale space becomes important to achieve ideal conditions and without external interference when moving. The research location is in the Tembalang education area of Semarang City and examines the three main variables of the human scale space, namely accessibility, distance, and coordination between locations. Data obtained through field observations. The research method used is descriptive quantitative and scoring analyze. The purpose of this study was to analyze the human scale space based on street characteristics in the Tembalang education area. The method used in after observing, the results of this study classify the characteristics of streets in the education area Tembalang both on campus and outside of campus.

Keywords: human scale, pattern of mobility, street

1. Introduction

The loss of human-scale space can affect the occurrence of criminal acts, which affect activities on a regular basis at a certain time [1]. According to Newman (1972), the spatial scale is a human model that forms individual physical expression. In this context, indicators of accessibility, distance, and the interrelationship between locations are important factors forming patterns of behavior in carrying out mobility. These three indicators are the main measures in an individual initiating movement in a location and at certain times or modes of transportation.

Accessibility as the ability of individuals to reach certain routes or locations through means of transportation in urban areas [2]. The function of the connecting facility is to facilitate the individual in reaching the activity point. The means of connecting are defined as the pedestrian, bridge, or supporting modes of transportation such as motorbikes, bicycles, or pedicabs that are different from the main modes of transportation at certain times and routes. The distance is defined as the actual measure of an object or measure when an individual moves in space [3]. Distance is also often associated with the ability of individuals to compare one object with another object [4]. Distances are related to the radius of an individual’s achievement of the location or can also be related to how far the distance of individual mobility is. Meanwhile, the interrelationship between locations is defined as the unity of the system between activities and/or humans that creates a behavior [5]. The research context speaks of spatial integration in conducting mobility. The incompatibility of the three indicators triggers a negative behavior. So that the community physically has no control over the surrounding environment [6].
The existence of several universities such as Diponegoro University in Semarang City is the main attraction for students who are outside the city of Semarang. This increases the activity around the education area. The increase in activity in this education area has a positive and negative impact, the negative is such as the emergence of crime along the way and creating negative perception of the university area. A college should occupy a safe, comfortable and quiet area to study, but the Tembalang education area has something different from other education areas in Semarang because it is located in a highland area. As a result, it can increase the potential for crime in the university environment. Therefore, this study presents a predictive model of crime-prone areas with streetscape variables such as street-facing building entrances, presence of parking lots and fenced wall heights.

The study aims to analyze human scales based on street characteristics in the Tembalang education area, Semarang. Research related to the characteristics of streets in the education area is quite often done, but there are still few studies that link human scale. Thus, with the existence of this research, the author hopes to be able to provide information on whether the Tembalang City education area is safe or not as a result of the ownership of individual space which later can have an impact on the movement pattern.

2. Literature Review

2.1 Human Scale

The concept of space (physical space as a place of human behavior and communicating naturally) and scale (understanding the area from the smallest to the largest unit) has become common in urban planning, namely how to understand geographical objects spatially [7]. LeFebvre also emphasizes that space spatially and scale will continue to change, along with how humans use that space. On the other hand, Yi-Fu-Tuan [8] provides an argument that space does not have a certain scale limit, as long as humans who carry out activities in it feel that they have a sense of place.

Human-scale space is a measure of a particular object that is measured based on human visuality and the point of view of the object [3]. The phenomenon of human scale space is often difficult to see, because the human system directly forms a constant measure of the objects around it. So that people often think that the size of an object has something in common with him, and a different picture of the object is lost. Also emphasizes that human scale is not measured by the desires of an architect or engineer in making scale of objects, but how humans are able to receive and communicate with these objects as a visual form in a different perspective [3].

Space adjusts the scale of human needs related to distance, accessibility, and coordination between origin and destination. According to [9], in comparative research conducted in London (United Kingdom), there is an association between humans and the scale of space used for activities. This is a representation of the success of the formation of space in accordance with human needs.

Created an analysis of human scale space needs with different behaviors [10]. This depends on the purpose of mobility, the socio-demographic characteristics, the natural and built environment, and the quality of public transportation. Also not separated from certain subjects such as children, disabilities, and women (gender aspects). In addition, coordination between human space is measured from the environment that can create walking space, lighting, security, density, and regular mixed land use [11]. In conclusion, design must be able to connect and estimate the connectivity between locations, to build a climate of conducive mobility.

2.2 Accessibility

Accessibility in urban planning is defined as the ability of a city or region to facilitate the central needs of human activities which are influenced by various factors and the existence of certain regional functions [12]. The difficulty that is often faced by individuals is defeat in competition to achieve limited accessibility [13]. Even though accessibility is an important factor in shaping personal space in carrying out mobility. Accessibility can also provide security and comfort in supporting elements of urban vitality. Good accessibility is usually associated with ease of affordability to the destination location, availability of transportation modes to get to the location, convenience of physical objects that are used as a location link, and can easily create mobility activities related to improving environmental quality.
The challenge often faced in accessibility planning is how to provide a balance between the use of transportation and human labor in reaching the destination [14]. For example, in the context of the education area, it is a balance between the availability of pedestrian lines and modes to reach educational areas such as campuses. The function of this is to support the proper occupancy of a city, attracting public space at the same time relating to service activities and fulfilled individual needs. When urban space used by individuals is smaller or narrower, it will have a negative impact such as congestion (self-congestion) and disturbed security [15]. Individuals are more likely to be easy to do accessibility when having interests related to public needs.

2.3 **Land Use**

Land use is related to activities. Coordination between locations is often associated with a form of activity, characteristics of an area or location that attract functions, uses, and other activities [16]. Integration and coordination of activity patterns is important, such as the argument from [17] which states that the coordination of a location concludes the human ease of reaching other locations. Critical issues related to location coordination are usually associated with:

1. Effect of congestion caused by the accumulation of activities in one location
2. Narrow space on the human scale for walking, dangerous pedestrian paths
3. Visualization of the placement of one activity with activities others [18]

Inter-location coordination is also often associated with the ability of a space to interact, in addition to the presence of complementary infrastructure or certain transportation routes [19]. In understanding the coordination between locations and people who carry out activities in it, it is often associated with location theory and connectivity (place and linkage theory). Place Theory talks about how physical space is related to its social and cultural characteristics. The distinctive features of these locations then form an inter-space network that is able to adapt to the framework or structure of natural space functions (linkage theory) [20].

Various factors for defining coordination between locations include distance, space competition opportunities, clustering, and agglomeration between spaces. While in the theory of transportation, integrated location zones can be analyzed regarding traffic circulation that is a separator or separator between locations [19]. Along with the possibility that might arise from the coordination of locations with transportation routes such as congestion or an increasing crime ratio.

3. **Method and Research Sites**

This research uses quantitative methods with emphasis on observation techniques in data collection. The research locations are in the education areas of the Diponegoro University (UNDIP) and Polines colleges, starting from Banyuputih Raya street, Lingkar Utara UNDIP street, and Prof. Soedarto street. The analysis technique used is descriptive statistics and scoring analysis. The variables in the study are divided into two, namely:

a. **Accessibility variable**
   - Accessibility variables consist of pedestrian availability, zebra crossing, availability of lighting, bus stops and availability of boundaries between pedestrians and highways (street shoulder).

b. **Land Use Variables**
   - The coordination variable between locations is more focused on land use in the Tembalang education area.

The development in Tembalang post relocation of the Diponegoro University in 1995 demonstrates gentrification that is identified causes change of social, economic and physical. Gentrification is considered to greatly affect the Tembalang's rapid growth who be able to improve urban services such as facilities and infrastructure [21]. Therefore, community mobility will increase in line with the improvement of facilities and infrastructure. The location of the research used in this study is the Tembalang educational area, where there are several universities, one of which is Diponegoro University and Semarang State Polytechnic.

The research location is directly adjacent to the residential area namely Blimbing Gorge, and Baskoro. There are three streets that are directly adjacent to the research location, namely Prof. Soedarto street, Banyuputih Raya street and Lingkar Utara UNDIP street. At the research location there are public facilities such as health facilities namely Diponegoro National Hospital (RSND), UNDIP gas station, BNI Bank and several shops. Justification of the selection of research locations is
a street that is directly adjacent to the campus, where one of the streets is the main access to the campus. The following is a map that describes the location of the study (see Figure 1):

![Map of the study area](image)

**Figure 1.** Research sites (Analysis Results, 2019)

4. **Result**

The results of the study and the relationship between variables are samples of observational activities that have been carried out, where the results of this study are not fully correct. In addition to several variables used in this study, there are still other factors that influence human scale on street characteristics in the Tembalang education area that can be studied. However, back to the research objective, that is knowing human scales based on street characteristics in the Tembalang education area, where streets are access to the campus are the main factors to achieve security during mobility in the Tembalang educational area. Therefor with this research it is expected to be able to provide information, whether the Tembalang education area has been able to apply the human scale concept in mobility to the campus. The following is the assessment table of each street corridor in the research location (see Table 1):

| Corridor / Street Name | Variable | Value | Total | Land Use | Value | Total |
|------------------------|----------|-------|-------|----------|-------|-------|
|                        | Accessibility |       |       |          |       |       |
|                        | Availability pedestrian | 1 | Settlement | 1 |
|                        | Availability crosswalks (Zebra crossing, pedestrian overpass) | 0 | Non-Settlements (commercial, offices, schools, health) | 1 |
| Prof Soedarto Street   | Availability of lighting | 1 | 4 | 2 | 6 |
|                        | Availability of signage | 1 | 1 |
|                        | Availability of street shoulder (shade tree, empty space) | 1 |
|                        | Availability pedestrian | 0 | Settlement | 0 |
| Banyuputih Raya Street | Availability crosswalks (Zebra crossing, pedestrian overpass) | 0 | Non-Settlements (commercial, offices, schools, health) | 1 |
|                        |                      | 2 | 3 | 1 |

**Table 1.** Street corridor assessment results based on human scale variables
The researcher has observed in the Tembalang educational area, what is seen is the street network which in some areas has its own characteristics. The description of the characteristic has two meanings, that there are positive and negative values on each street which later affect the application of human scale space. For example, there are streets that have complete infrastructure in conducting mobility, but there are also streets that have deficiencies in facilitating community needs to carry out their activities, for example there are no pedestrians.
Accessibility is a variable that is used as the main factor in the application of human scale space in the Tembalang educational area. The success of a travel activity can be measured through security and comfort along the origin to the destination. Based on the results of surveys that have been conducted with regard to street characteristics to reach campus are also vary. In traveling to the campus, it is necessary to pay attention to the interrelationships and interactions of the surrounding space along the street between the location of the house or boarding house to the campus.

On the location of the study there are three streets, namely Prof. Soedarto street, Banyuputih Raya street, and Lingkar Utara UNDIP street. Of the three streets, Prof Soedarto street has the most integrated mobility system. Accessibility variables seen along the street, which are along Prof. Soedarto’s street, are pedestrian with a width of 2 meters. In addition, there is a BRT shelter, one of which is the BRT RS Diponegoro bus stop that has proximity to the RSND, the Faculty of Economics and Business campus, and the Medical Faculty campus. So that it makes it easier for students or communities in the campus area to access trips with BRT and on foot.

Second, land use on Prof. Soedarto street tends to vary because there are commercial activities (food stalls, copy centres), health (RSND), education (UNDIP, Polines), and settlements (see figure 2). Based on the land use, it can be ascertained that routine movements will occur. So that every society in the neighborhood around Prof. Soedarto street will definitely make a move every day, especially students who every day move towards the campus.

Third, not only the BRT and pedestrian bus stops are the people's choice in conducting mobility. It is also technological advancements with online transportation such as Go-Jek and Grab that facilitate the connectivity of user mobility after or before heading to the BRT stop location. These choices allow users to use public transportation modes in their entirety, or help reduce walking distance.

The availability of routes that are specifically for pedestrians also varies. For example, pedestrian lines are attempted to have the same height level along the route, and are not interrupted unless there is another street that breaks the main route. Along the pedestrian lane in the Tembalang education area, it has not been fully equipped with a street divider, either in the form of boulevard or plants (1.2 m wide). Where the purpose of the barrier is to reduce direct physical contact between pedestrians and motorized vehicle users. Pedestrian lane which has been equipped with a barrier with a highway in the form of boulevard and plants, one of which is on Prof. Soedarto street in the area on campus, such as the street to the rectorate.

Accessibility to the campus in the morning and evening, for example at 7:00 pm is quite good if it is associated with a dense surrounding activity. Lighting is available every 100 m on pedestrian lines or in Boulevard, the quality of lighting is also quite good, but a lot of insecurity is felt in locations that are quiet activities or land that has not been used in the Tembalang education area. For example, along Banyuputih Raya street up to the Lingkar Utara UNDIP street where there is no activity that creates a sense of insecurity or vulnerability to crime not only felt at night, but also during the afternoon hours when the street is quiet. However, often light dimming occurs in the area towards the campus, so access to the campus is quite dark and vulnerable to crime. When there is light dimming, lighting only comes from vehicles passing through. In addition, there is no CCTV service along the street to the campus.

Of the three streets in the Tembalang education area, researchers considered Prof Soedarto street to be the most effective in creating coordination between spaces compared to other streets. The reason is that although Prof Soedarto street is located along the Undip campus area, the location actually has proximity to the surrounding public space. Along the Prof Soedarto street, BRT Trans Semarang has been served, so there is a bus stop. Even though BRT Trans Semarang has been served, students still use modes of transportation such as motorbikes, cars, online transportation on their way to campus.

Compare with the conditions of the other two streets, Banyuputih Raya street and Lingkar Utara UNDIP street tend to be quieter. The location is also quite far from the center of the crowd, for example, dominated by landfills and protected forests. The existence of the street aims to unravel the traffic flow on Prof. Soedarto street, but the street is considered to lack strong coordination between spaces. As a result, students and communities are reluctant to go to the street and prefer to use practical modes of transportation (online vehicles for example) or private vehicles.

5. Conclusion
Based on the research that has been done by observing the UNDIP campus area, there are three streets that have different characteristics, namely Prof. Soedarto street, Banyuputih Raya street, and Lingkar
Utara UNDIP street. The street that has applied the human scale concept is Prof. Soedarto street, where the street has the highest value compared to the other two streets. Whereas the streets that have not fully implemented human scale are Banyuputih Raya street and Lingkar Utara UNDIP street. Both streets need to be increased accessibility, for example added pedestrian equipped with street shoulder. Then for Prof. Soedarto's street it also needs to be improved such as the availability of zebra crossing, with the aim of providing maximum service to street users, especially pedestrians.

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