Accessibility in Kelapa Dua Depok

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Abstract. There are many previous studies on accessibility, but few studies consider accessibility comprehensively in areas where is difficult to access to the rail-based public transportation in suburban Indonesia. This paper focuses accessibility in three points; automobility, public transportation, walkability. The study reveal the inconvenience of public transportation reluctantly makes people choose other transportations such as private cars / motorcycles and informal transportation. Angkot which is used as a road-based public transportation, has relatively less merit, so that more people choose private cars / motorcycles and informal transportation. This leads to increase traffic volume, decrease road width due to illegal road occupation, and cause traffic congestion and accidents. In order to cut off these vicious circles, it is most important to develop public transportation measures. It is necessary to think how people motive to choose public transportation than other transportation.

Keywords: Accessibility; Automobility; Public transportation; Walkability; Kelapa Dua; Indonesia

1. Introduction – What is accessibility?

Terminological meaning of “accessibility” in dictionary is the quality of being able to be reached or entered. The meaning of “Access” and “Accessibility” is difference in terms of urban design. “Access” means whether the public has access to the space, on the other hand ‘accessibility’ is the capacity to enter and use a space. However, not all public space is opened for anybody freely access, but also some place should be controlled exclusively for security reason.

Other meaning of Accessibility in dictionary is the design of products, devices, services, or environments for people who experience disabilities. Disability is gaining influential advocates because the baby boom generation begins to experience difficulties with mobility and require the created the thinking of “streets for life” [1]. In this context, “accessibility” means streets that enable older people to reach, enter, use and walk around places they need or wish to visit, regardless of any physical, sensory or mental impairment.

In the field of urban design, traditional studies focused on transportation accessibility to reaching other urban services and areas of activities. In 1950s and 1960s, many city experienced population increase and urban sprawl. Suburban population commuting to work in the city created problem of access and congestion. The schemes to improve accessibility from suburban to city centers were need
to be installed. Ring roads, bypass and connections to nation-al motorway systems are developed in many countries at this age. Considering accessibility of public transportation is one of big subject. Public transport is a necessary to provide a sustainable transport system because more people can be carried by public transport than by any other transportation. Many previous papers tried to study not only accessibility of the public transport itself but also the accessibility from any place to the public transportation facility [1].

Nowadays, accessibility is also discussed in the field of electronic communication. Electronic communication has reduced the need for spatial concentration. Expansion of internet made us anybody and everywhere to communicate, and it doesn't matter where computers are located. Electronic communication is one of the powerful things that escalate decentralizing and dis-urbanizing [1].

There are many previous studies on accessibility, but few studies consider accessibility comprehensively in suburban Indonesia. This paper tried comprehensive study of accessibility in terms of private cars, public transportation and pedestrians in the road of Kelapa Dua Depok in Indonesia as the place of initiatives. To make these point clear, this paper divide three point to discuss accessibility, automobility, public transportation and walkability. This time the research not consider about electric communication to focus on transportation issue.

2. Problem-Why Accessibility is important?
In our daily life, it is certainly important that people can reach anywhere they want to go without any barrier or difficulty even they are rich or poor, and healthy or have disabilities, have private transportation or not. To reach the destination, people go through roads. If the road used by many people, might needed to be developed as suitable for.

2.1. Accessibility x Automobility
In the contemporary period, “automobility” is a term meaning car-based mobility. The strength of automobility can generally be defined as freedom and flexibility. Automobile have realized car drivers to travel at speed, at any time, in any direction. Many people’s working, social and home lives could not be undertaken without the flexibilities of the car and its 24-hour availability.

The problem is that mass automobility does not generate mass accessibility. Car-dependent developments reduce the ability of many people to reach places without facilities of automobile. Groups with low mobility also tend to have low accessibility [1]. It should be avoided that people reduce accessibility due to income disparity.

In many studies observe “automobility first” development wreaken cities by reducing opportunities for social interaction and languishing social awareness. Appleyard’s (1976) study in Ciudad Guayana, Venezuela, showed the sense of community on streets is stronger with less traffic [2].

Other problem of automobility is the environmental and health issue. Automobile discharge carbon dioxide and that pollutes air. Car-dependent society caused traffic congestion, traffic fatalities, increased prevalence of obesity.

2.2 Accessibility x public transportation
Public transport is a necessity for providing a sustainable transport system to people. It is friendlier for environment than automobility because number of people whose destination is same can be carried by public transport at the same time. Public transportation is considered to be open to a wider user. Public transport has a role to improve sustainability and the quality of urban life in economically and environmentally. Performance of cities can be enhanced by connecting resources to destinations effectively and facilitating mass mobility. Public transport networks are an important part of urban structure for the elements of urban interactions and circulations to be developed.

The problem of public transportation is various "gaps" occur, for example, when we use public transportation, walk to the bus stop, wait at the bus stop, walk through the bus station to the train station, wait on the station platform, etc. [1]. Each gap is a source of uncertainty, inconvenience and perhaps danger.
Some Studies has pointed out the importance of accessibility to the public transportation from departure place because the presence of public transportation system generate a new route to reach the transportation system land new and use a such as large parking lots even public transportation itself smart and efficient.

2.3 Accessibility x Walkability

Even concept of walkability city was generated for disability persons, main target user of development is not only for them but everybody use the place. Designs made for disability people easily access to the place is also useful for other groups who need such facilities for example elder person, parent who accompanied small children, pregnant, and people who injured their body, etc. That’s the reason that walkable design was accepted by society because the design created for disability person is friendly for everybody.

The walkable city is not only good for the environment but also healthy. Obesity and lack of exercise are a problem in Indonesia, and improvement can be expected by the concept of walkable city.

Walkable city is friendly to anyone. The car society produces a disparity with who has and who does not have. When considering urban design, It is considered that we should not create a disparity between those who have cars and those who do not have, and I we should not make a society that only people who has money can earn. Walkability is the importance in invigorating and making lively the place. Jacobs found that the quality of the "pedestrian realm" plays a big part in the livability and liveliness of the streets [2]. It is necessary to support even poor people to live the same life as ordinary people. Enrichment of public facilities and realization of a walkable city can enrich the lives for all people.

However, it goes without saying that the walkable design is friendly for environment, it cost to maintain in good conditions. Sometimes it is difficult to install to existing road due to insufficient of road width.

2.4 No Center Core and Car Dependency

Depok city, the target place of this paper, is in West Java province, located approximately 20-30 km from central Jakarta. Depok is kind of commuter town with a population of 1,738,570 and population density of 8746 persons per km² (2018). In the Depok, there is no city center, in the meantime; all over the main street is the commercial area of the city. According to Depok’s master plan, the main streets excluding the expressway are designated almost as “Kawasan Perdagangan dan Jasa (Regions of Trade and Services),” accepts commercial facilities which created spontaneously on the road as it is.

The commercial facilities in the road include formal - informal, have been satisfied everyday demand of an ever-increasing urban population, but on the other hand they are creating chronic congestion, traffic problems, car-dependent society.

What happens if all over the main driveway becomes a commercial area? Traffic is increased by people traveling to commercial areas using cars and traffic congestion occur by both the people going to that commercial site and those just wanting to pass the road. And large area is used just for parking lot to stop by the site. Even if you use public transportation such as angkot running in the driveway, you must cross the road at least once before going back to your destination. If people cross a driveway with high traffic volume, needless to say it is very dangerous and many accidents occur. As drivers, they also don’t want people cross the street because it’s dangerous, cannot speed up, have to step on the brake every time a person crosses. Even Crossing pedestrian bridges, may be no problem for healthy people, but elderly people, people with disabilities, families with children, pregnant women may feel physical and mental burdens to cross the street.

These factors are attributable to the expansion of populated areas in urban, and as a result Depok has attempted to absorb the increasing urban population as a bed town.

However, in Indonesia, low to middle-class housing is still common, and high-rise buildings are commonly used by some high-income groups and foreign nationals. As a result, residential areas
spread narrowly and narrowly, forest areas and vacant lots have almost disappeared. As a result, almost the entire area of the Depok became a residential area. In order to meet the demands of these people a lot of commercial facilities were needed.

3. Method- How to evaluate Accessibility?

What is good condition of accessibility and what kind of form is best? There are many thoughts of accessibility, but it differs by which viewpoint people stand. The major thinking of good accessibility in modern time is “reach anywhere by walk,” influenced the concept of walkability. People is able to access their needs in daily life by walk, - not only needs of things, but also their needs of activities such as work, living life, communicate with people, etc. That concept is not just certainly good for health and environment, but maintains good relationships of communities. Jacobs recommended the good structure of the city is formed small blocks with good perspectives in multifunctional use [3].

The key to increase the user rate of public transportation is to improve its relative convenience than private cars evaluated by traveling resistance such as travel time, fee, transfer waiting time etc. To evaluate Public transportation, the representative method is the public transport accessibility level (PTAL) which was developed for the United Kingdom transport planning to assess the access level geologically [4]. Related to the concept of compact city, Kaido introduced a case to explain the marginal distance of comfortable walking is 400m to 800m in daily life zone [5]. Meanwhile, he reports that the distance that 80% of people accept traveling is 60m to the bus stop, and 140m to the tram stop. In case of 250 m, 50% people accept for tram stops and 10% people accept for bus stops: If people looking for apartment near the station, about 10 minutes on foot to reach destination will be a range of the possibility for walking [5].

Important points to consider the accessibility of automobility are that you can arrive at the destination properly by automobile, the road is smooth (not congested), the way to goal is easy to understand, and there is parking space, and so on. Previous Research on congestion and vacant lots had been analyzed using GIS and GPS data [6]. This time we conducted field study and check obstacle of accessibility of automobility.

To evaluate pedestrian accessibility, there are some indices named Walkability Index and Walkability 3Ds, both two was based on analysis by geographic information system [4]. NEWS (Neighborhood Environment Walkability Survey) and The Walkability Assessment Tool are questionnaire survey to analyses walkability. The difference of walkability and pedestrian accessibility are not defined clearly, but the walkability commonly used for the streets which make people motivate to walk, the pedestrian accessibility is used in the concept of normalization, to create the street where easily used by all people include people have disabilities. In this paper analyze accessibility referring to The Walkability Assessment Tool to check whether the road is well arranged for pedestrians, easily to walk even have any handicap, and whether the street makes people motivate to walk.

Accessibility is not completed by a single means, it is used multiple means in common, for example: go to walk from home to the bus stop; then ride a bus to the station; ride a motor- cycle from station to walking place; etc. This paper tried to conduct comprehensive study of accessibility in terms of public transportation, private cars, and pedestrians, in the road.

In this paper, to analyze Accessibility in suburban area in Indonesia, we select Kelapa Dua Depok as study area. Kelapa Dua is one of typical Indonesian road generated by the transition of urban sprawl. Main street of Kelapa Dua has a role as the arterial road of the city, simultaneously it is a commercial street in master plan, which has filled with a various kind of buildings on both sides in Depok city, there is no city center, instead of it, the main road is formed as citizen’s commercial place which provide us everything we need in our daily life including formal - informal one. The reason the study was conducted in Kelapa Dua is there have been no urban design studies targeting Kelapa Dua so far and this study is meaningful to understand situation of urban sprawl in same cases. Kelapa Dua is far from trail-based transit, not exist the center of the commercial area. People need to use at least one transportation to reach.

This paper is based on field study and interview for residents, students who study at university in Kelapa Dua, RT leader, Kelurahan and Depok government.
4. Background

Kelapa Dua is located in kelurahan Tugu, Depok, Jawa barat in Indonesia. Kelapa Dua is a common name of this area since a long time ago. The main field of the initiative is the main road of kelurahan Tugu named Jl.M.Jasinon and that peripheral area which is called Kelapa Dua in this paper, a connector of Jl. Margonda Raya and Jl. Jakarta - Bogor. The population of kelurahan Tugu estimated 107,000, and a population density of 212 persons per km². The total area is 504 square kilometers, but actually there are crowded with students and their dormitories who's not counted in the population of Kelurahan Tugu.

According to interview for head of RT 6 kekuranan Tugu in March 2018, this area was just a small village with abundant nature in the 1970. Kelapa Dua was just narrow country pedestrian’s street at that time. It was undergoing a drastic change after the construction flyover of Jl. Margonda in 1990s. Jl.M.Jasinon was developed widely as an automobile road to connecting it; almost simultaneously, campus of Gunadaruma University was established near the intersection. Since then both side of the road are has been filled with multi-functional buildings generated spontaneously which supply a demand of students such as restaurant, computer service and lodge, and students dormitories.

5. Result - How is the Accessibility conditions?

5.1. Accessibility x automobility

Kelapa Dua has been facing the serious chronic traffic congestion problem. It usually takes about 10 - 15 minutes to go through Kelapa Dua, just 3 km from the end of flyover to intersection Jl. Raya Bogor. The road is used as byway to avoid congestion of Jl Margaonda. Both side of road are occupied as stops of Angkot (road based transportation like a mini-bus) (a.1). Ojek (informal motorcycle tax), and Kaki lima (hawkers) park at the road shoulder or pedestrian road and it makes narrow the availability of road(a.2). Also Automobiles are interrupted smooth driving by pedestrians crossing the road in anytime and anywhere (a.3). Street lights and traffic signs are prepared, but sometime they cannot be seen due to the growing trees (a.4). Even though there are traffic lights at the intersection, the lights are not turned on so that drivers are check safety themselves by looking at the road conditions. In addition, traffic lights hide behind the leafy shade of trees and cannot be seen well (a.5). Although the roads itself are commercial area in zoning, Kelapa Dua does not have parking lots. The Road is only a passing road for those who use for the purpose of commuting or school attendance. Even large restaurants and convenience stores have small parking lots, there are occupied as parking lot of students enrolled in the university located in Kelapa Dua (a.6).
5.2. Accessibility x Public transportation

The nearest train station of Kelapa Dua is Stasiun Universitas Indonesia, the distance is 2.2 km, it takes 30 minutes on foot. In addition the distance, it makes more difficult to commute by walking because it’s necessary to cross over a large road with difference of height. Angkot, road-based public transportation, supplies demand of transport to a place that cannot reach by train.

To increase public transportation user, transportation should be relatively superior to cars. This time this paper tried to compare the accessibility from the nearest station to the intersection of Kelapa Dua by angkot and private car (table 2).

Table 2: Comparison between angkot and automobile

| Transportation | Angkot | Automobile |
|----------------|--------|------------|
| Duration       | 25 - 30 min (8:00am)  
                | 30 - 40 min (4:00am)  
                | include 4-6 min walk | 6 - 12 min (8:00am)  
                | 4 - 8 min (4:00pm) |
| Cost           | Cost: IDR 6,500 x 1 ride | Gasoline, parking lot, maintenance fee |
| Mobility       | • across the road without signal to go to a bus stop.  
                | • cross the overpass from the bus stop to the station  
                | • have to wait departure until the angkot is filled with passenger  
                | • Many “gap time” during traveling | • go through direct road  
                | • able to departure anytime driver wants. |
| Comfort        | • no air conditioner  
                | • steamy hot  
                | • old facility  
                | • less safety | • Airconditioner safety |

※:a.6: Fast food store near the university: the parking of store and the side of the road are used for parking students. (by Interview)
Although private car cost more expensive than angkot, it is superior in terms of comfort, mobility, travel time, and labor. Even you do not use a private car yourself, can choose Ojek, informal motorcycle taxis, active as a means of transportation in inconvenient areas.

Considering that the fare of angkot is Rp 6500, it is not much different from using Ojek or paying parking lot for a private car.

Inconveniently, angkot doesn’t stop at the station directly. Passenger have to ride of the nearest place in Jl. Margonda and then walk to the station. If you depart from Kelapa Dua to the station, you will get off the angkot the right side of Jl. Margonda, the 6-line cloudy big road.so you have dare to pass such dangerous road to reach train station.

Regarding about acceptable distance of walking to bus stop, it is general to wait for a bus at the bus stop, but in the case of Angkot, the Angkot passengers can ride on / take off anyone they want. It might be said one cause traffic congestion, but it is convenient to stop everywhere. From this point, method of walking distance in overseas study is not apply case in Indonesia. For these reasons, those who commute to Kelapa Dua basically use a private car / motorcycle or Ojek.

Another issue of Angkot is congestion problem. Angkot which is parked at the both side of road reduce the width of road and makes congestion. Angkot is parked not only one but also 2 or 3 Angkots in line in every bus stops. Passengers who ride angkot also fluently pass the street everywhere and make mobiles stop.

5.3 Accessibility x Walkability
Based on Walkability Assessment Tool, the evaluation of Kelapa Dua's pedestrian road is hard to say easily walkable. There are sidewalks located on both side of the road, but not feel safe because pavement has cracked (b.1). The sidewalk not continuous and have gaps with automobile road and entrance of shops (b.2). The curbs in different height not allow pedestrians easy to walk (b.3). Street trees and electric light interfere to the center of the sidewalk (b.4), and in order to avoid them, pedestrians have to walk automobile road. It would be difficult for the users of wheelchairs and strollers, visually handicapped people to walk in Kelapa Dua. In addition, pedestrians must avoid obstructions since sidewalks are used as Ojek’s waiting places and rest areas, commercial locations of Kaki lima, Informal Park lots for private Car and motorcycle (b.5).

Another issue of pedestrian road in Kelapa Dua is the lack of signalizations to cross the street. Pedestrian cross the street (b.6) where they want even through the automobile traffic is basically speedy and crowded. Many fatal and injury accident was occurred in Kelapa Dua when people is crossing the street.

On the other hand, Kelapa Dua is composed in a familiar walkable structure with small blocks. The variety of formal-informal shops on both sides would be a potential to attractive people wants to walk.

| Table 3: Condition of walkability in Kelapa Dua |
|---|---|---|
| b.1 | b.2 | b.3 |
5.4 Negative chain of accessibility

Based on the above results, the shortage of rail-based public transportations and the inconvenience of
the road-based public transportation in the inconvenient access area are the keys of negative chains and
promoted car-base society. The paradox of this area is the road of Kelapa dua is not only city’s
important main road, but also have a characteristics as commercial area. In terms of mobility, driver
wants to reach destination quickly, smoothly, and safety. The pedestrians and informal sales are
obstacles for drivers. On the other hand, for pedestrians, the automobiles are obstacles to walk.

The road condition is not in easy for walking for anybody though sidewalks are prepared.
Therefore, in Kelapa Dua, it is necessary to improve the public transportation system and make it easy
to walk.

According to Interview for residents, informal Ojeks and Kaki lima occupy sidewalks and makes
pedestrian’s traffic inconvenient, actually the Ojeks and Kaki lima were old residents who lived in
Kelapa Dua for long time. After construction of the University of Gnadarma, they came up to the
sidewalk for seeking a chance of economic gain from students. It should be considered that people in
informal sector is also the one of subject of this area.

6. Discussion

This paper tried to consider comprehensively the accessibility of Kelapa Dua in three points, automobility, public transport, walkability. However, each element has room for considerable measure and should be studied deeper and detailed; we should analyze the relation between its connection roads and role in the city in terms of Automobility; to evaluate walkability, we could hold a workshop and ask citizens to evaluate together.

This paper refers overseas research and indicators, it would be better to create new comprehensive Indonesian indicators originally. It is desirable to make questionnaire items, investigate to people in the area that is the user, perform geographical GPS, GIS data analysis, etc.

However, since this research evaluates accessibility based on field Study, we could explain the actual situation of actual Kelapa Dua from the view point of people who concern in this area such as residents, students, people who use this road for commute etc. The case in Kelapa Dua is common in Indonesia, still many place in inconvenience rail-road transportation area facing same kind of situation. I believe I made a few contributions toward the subject.

7. Conclusion

This study found that accessibility of Kelapa Dua cannot be said in a desirable condition. Factors that
deteriorate accessibility cannot singularly exist, but it caused with multiple factors in a negative chain.

Since rail-based public transportation is still inadequate in the area, people have to choose other
means of transportation. Angkot, which is used as a road-based public transportation, has relatively
less merit, so that more people choose private car / motorcycle and informal transportations. This leads
to increase traffic volume and decrease road width due to illegal occupation of roads, and cause traffic
congestion and accidents.
In order to cut off these vicious circles, it is most important to develop public transportation measures. It is necessary to think how people motive to choose public transportation than other transportation. It should be taken into consideration the freight, comfort, and total connectivity to the destination in order to gain a relative advantage over other transport, not only just “a public transportation means exist.” For this purpose, it is recommended to create Indonesian standardized indices in and analyze by using data.

It is also effective to introduce punishment for illegal parking on roads, sidewalks, commercial areas and private areas. It should be considered to establish new commercial areas for Kaki lima and Ojeks so as not to interfere walking.

8. References

[1] Mathew Carmona, Stiven Tiesdell, Tim Health, Tanner Oce 2010 Public Places Urban Spaces The Dimensions of Urban Design Second Edition, Architectural Press.

[2] Reena Tiwari 2018 Connecting Places, Connecting People –A Paradigm for Urban Living in the Twenty-First Century, Routledge.

[3] Michael W. Mehaffy 2017 Cities Alive -Jane Jacobs, Christopher Alexander, and the Roots of the NewUrban Renaissance-. Sustasis Press.

[4] Haruka Kato, Kiyoko Kanki 2017 Development and Verification of Indicator about Regional Evaluation based on walkability in Residential Area –Toward Smart Shrinking Ibaraki City in North Osaka Metropolitan Region-, Journal of the City Planning Institute Japan, City Planning Institute Japan, 52 3.

[5] Keisuke Mitsuhashi 2012 A Relation Between Location of Public Transport Stops and Walking Area Population, Journal of the City Planning Institute Japan, City Planning Institute Japan, 37.

[6] Takayuki Hirasawa, Masahide Sasaki, Hirokazu Ichikawa, Kousuke Yamada, Sadayoshi Nishii, Yousuke Tanaka, Motomune Kataoka 2013 A demonstrative analysis on parking association using ICT for sustainable revitalization of city central zone, Seisan-Kenkyu 65 2 pp163- 168, Bimonthly journal of Institute of Industrial Science, University of Tokyo.

Acknowledgements

This research would not have materialized without the support from Hinifa Fijriah who always gave me strong motivation and enthusiasm of study and support me this study regarding Kelapa Dua, Evawani Ellisa Sensei who lead me the project and always give me kind advices, Pak Gunawan Tjahjono who give me a lot of chance of notice with plenty of knowledge and acute mind. Rendy Pratama and Shiyo who always give me unfailing power, courage, and smile, Takayama-no-baachan and my big families who encourage me to participate ICSCI conference.

This article is presented at the International Conference on Smart City Innovation 2018 that supported by the United States Agency for International Development (USAID) through the Sustainable Higher Education Research Alliance (SHERA) Program for Universitas Indonesia’s Scientific Modeling, Application, Research and Training for City-centered Innovation and Technology (SMART CITY) Project, Grant #AID-497-A-1600004, Sub Grant #IIE-00000078-UI-1.