

The Influence of Mass Rapid Transit Existence on Pedestrian Convenience in Senayan District

Mega Dwi Kusumawati
Student of Bachelor Architecture
Tarumanagara University
Jakarta, Indonesia
mega.dkw@gmail.com

Bagus Putra Wicaksono
*Student of Bachelor
Architecture*
Tarumanagara University
Jakarta, Indonesia
bagusp026@gmail.com

Jovan
*Student of Bachelor
Architecture*
Tarumanagara University
Jakarta, Indonesia
jovfrans@gmail.com

Riando Agustian
*Student of Bachelor
Architecture*
Tarumanagara University
Jakarta, Indonesia
riandosman1@gmail.com

Rudy Trisno
Department of Architecture
Tarumanagara University Jakarta,
Indonesia

Djauhari Sumintardja
Department of Architecture
Tarumanagara University
Jakarta, Indonesia

Sidhi Wiguna The
Department of Architecture
Tarumanagara University
Jakarta, Indonesia

Corresponden author :rudyt@ft.untar.ac.id

Abstract— Jakarta needs Mass Rapid Transit (MRT) with regard to comfort. The research method made by the author in measuring the level of comfort of pedestrian in a city environment is the reduction of private vehicles to improve the quality of urban life, the Transit Oriented Development (TOD) concept that makes the city friendly for pedestrian, motorized vehicles and pedestrian must be at different road levels to increase pedestrian convenience, the need to pay attention aspect of safety, security, comfort, convenience, and aesthetic in developing pedestrian facilities and so on which ultimately shows the level of comfort of pedestrian in Senayan district. The result of this study conclude that based on the indicators made by the authors, the existence of MRT in Senayan district is sufficient to provide comfort for pedestrians, although there are still shortcomings that need to be considered to support pedestrian comfort, especially when it rains, therefore the finding of “canopy seating” expected to be taken into consideration for developing pedestrian facilities in the future.

Keywords: *MRT, convenience, pedestrian, MRT Senayan Station, MRT Istora Station*

I. INTRODUCTION

Traffic congestion is a problem that continues to occur in the capital city of Jakarta, the absence of mass transportation system that can be relied on timeliness makes it one of the reasons that there are still many Jakarta people who prefer to use their personal vehicles compared to public transportation. There are around 47.5 million people in Jabidetak, more than 18,6 million private vehicles in Jakarta, while public transport users have only reached 24 percent. BPS DKI Jakarta in 2015 noted that every day there are around 1,4 ,illion commuters from the area around the Capital City. The rapid and less controlled trend of expansion in the Jakarta-Bodetabek area significantly increases transportation costs, reduces the level of mobility, and decreases the quality of life [1].

This year is a new civilization of transportation in Jakarta along with the existence of Mass Rapid Transit or MRT Jakarta. The MRT development plan itself had actually been initiated since 1985, but the idea had disappeared along with the monetary crisis of 1997/1998. After being delayed for decades, finally the construction of the MRT Jakarta was carried out, starting in 2013 when President Joko Widodo (Jokowi) was still the Governor of DKI Jakarta.[2]. With the commencement of the MRT project, the development paradigm in Jakarta has also changed, which is more oriented towards pedestrians and mass public transportation, Jakarta MRT [1] affirms “ This change does not only stop at providing adequate mass transportation systems but also the concept of urban development that provides convenience and comfort for its residents, including regional arrangement, passenger flow, and intermodal integration”.

MRT Jakarta has been officially operating since April 1, 2019, where the phase I MRT project has strstched the MRT crossing line as far as 16 km from Bundaran HI to Lebak Bulus consisting of 13 station (six underground station and seven overpass stations) along with 1 depo. MRT facilities and infrastructure were made in such a way by the government in order to provide comfort and security to the community, for example by widening thr pedestrian lane at every entrance/exit access to the MRT station. As published in the Liputan6.com portal news, The convenience of sidewalks is a major support so that people want to use the MRT, especially amid competition for public transportation with application based transportation. Therefore, PT MRT Jakarta supports DKI Provincial Government’s program in rejuvenating sidewalks around the MRT station [3].

II. MATERIAL AND METHOD

A. Material



Figure 1. the TOD of Senayan and Istora MRT Station map.

The allocation of yhe MRT station is in the center of the crowd in order to reduce the level of jam, one of area jam is in the Senayan district. As we know, Senayan is the center of business and commerce. Arena sport (Glora) Bung

Karno or GBK which is the largest sport complex in Indonesia also make this area more crowded. The high level of mobility in Senayan certainly makes this area often congested, therefore in this area there are two MRT station points, Senayan MRT Station that location in the center of the business and trade center and Istora MRT Station that close tp the center sports and business.



Figure 2. Zoning map of MRT station around Senayan district.

In figure 2, it shows that around the MRT station is almost surrounded by office, trade, and service zone. This things makes the area around the station being busy and has a high level of mobility, the presence of the MRT is expected to minimize the level of congestion that occurs

due to the dense use of private vehicles of residents but does not limit the level of mobility residents of the area.

Senayan MRT Station and Istora MRT Station are under Jendral Sudirman Street. For entrance/exit access, Senayan MRT Station has four doors, namely the entrance to Jl. Hang Lekir 1, Bundaran Senayan; Jl. Jendral Sudirman, Ministry of Education and Culture; Jl. Jendral Sudirman Summit; Jl. Senopati, KemenPAN. Same as Senayan MRT Station, Istrora MRT Station also has four doors entrance/exit acces, GBK Stadion; Gate 5 Gelora, Senayan city forest; Jl. Jendral Sudirman, Polda Metro Jaya; Jl. Jendral Sudirman, Bursa Efek Indonesia.

Based on the above, in this journal authors will discuss the influence of MRT existence on pedestrian convenience in Senayan district.

B. Method

The method section or often called as the research method used as a reading tool in case studies.

Environment characteristics can be identified as space experiences. To be able to distinguish a location can use physical or social reasons which are also called memorable locations in the from of:

- Availability of facilities (shops, vending machines, etc.)
- Clarity of physical components (directions, signage, etc.)
- Visual variations and complexity

Social meaning (emergence of activities, social interactions, etc.)[4].

There is a close relationship between urban form and sustainable development, but this cannot be changed directly and simply. It can be said that sustainable cities must be in the form and scale of efficient walking, cycling and public transportation and encourage social interaction [5].

In the development of a sustainable life it is necessary to reduce dependence on private cars. Roads ini residential environment, shopping centers, and commercial districts must be a decent place compared to just a decorator of a highway. Peoples also have to choose to improve the quality of urban life compared to dependence on motorized vehicles that spread [5].

For cities that work socially environmentally and commercially in an era of motorized vehicle use, all must be rearranged with vehicles and pedestrian must at different level of the road or control of draconian traffic restraint must be applied [5].

Peter Calthrope said that Transit Oriented Development aims to reshape the vast suburban city into a pedestrian-frinedly place and is accommodated by the interconnected modes of public transportation that requires a lot of energu and large land. Functional density in this case means being able to meet the living needs of urban communities both in terms of moving places and daily needs [5].

Rebinovitch said that if transpotation is seen as a tool to enable mobility, which ultimately enables “ City for All” then an effective transportation system should be seen as a fundamental goal of social planning, for example for

social groups not sufficiently elected such as poor people, women, elderly people, disabled people, and children [6].

According to Uterman comfort is affected by distance. Factors that affect mileage are:

- Time related to pedestrians time to travel.
- The comfort of people walking is influenced by the weather and type of activity.

Weisman said, comfort is an environmental condition that gives sense to the five senses and anthropometry along with facilities that are in accordance with their activities. Anthropometry is the proportion and dimensions of the human body and other physiological characteristics and is capable of dealing with various different human activities.

The level of comfort of pedestrians in carrying out walking activities can be achieved if the pedestrian lane is smooth and free of obstacles to use without interference from other activities that use many of these lines, besides the pedestrian lane must be wide in order to accommodate pedestrian traffic from two directions. To support pedestrian facilities convenience, supporting facilities such as adequate resting places, adequate public telephone, and trash cans and waiting areas for public transportation can be provided. [7]

There are several things that can be used as indicators of the achievement of the concept of developing pedestrian facilities, as follows

- Safety, manifested by the placement of pedestrian lane, structure, texture, pavement patterns, and sidewalks dimensions (free space, effective width, slope).
- Security, protected from problem that occur, with adequate lighting repair or structures without ruin landscaping that are not allowed
- Comfort, easily passes from various places with the protection from bad weather, temporary resting places, avoiding obstacles by complicated to be used by anyone including safety.
- Convenience, indicated by distance, width of the sidewalk, attractive landscape, and proximity to the facilities needed.
- Aesthetics, discussing with sidewalks and the surrounding environment.

In public places, corridors that feel wider than entrance access provide a gradual transition experience, not suddenly. It usually takes the form of a limited and directed aisle that connects two or more spaces. While the scale is generally small, relatively short distance, clear entrance and exits, and a lack of internal features that might attract special attention, all work to emphasize the sensation of passing rather than a sensation which is more general than continuity [4].

From the theory study above, the authors get an indicators that will be used as a reading tool or also called a research method. The authors in analyzing case studies uses the following indicators:

- To be able to create environmental characteristics that can facilitate pedestrians, the place must meet the memorable location aspect.

- Reduction of private vehicle use to improve the quality of urban life.

- Sustainable cities are pedestrian-friendly cities.

•The concept of TOD makes the city a pedestrian-friendly place with direct connectivity to public transportation modes.

•Motorized vehicles and pedestrian must be at different road levels to increase pedestrian comfort.

•An effective transportation system must facilitate the mobility of disabled people, women, children, and the poor.

- Indicator of pedestrian comfort level :

1. The walking distance is not so far away.
2. Comfort that is not affected by the weather.
3. Facilities in accordance with human anthropometry according to their activities.
4. Pedestrian lanes that are wide, smooth, and free of obstacles to use without interference from other activities.
5. There are supporting facilities such as adequate resting place, trash bins, and waiting places for public transportation.

•On developing pedestrian facilities need to pay attention to:

1. Safety
2. Security
3. Comfort
4. Convenience
5. Aesthetics

III. RESULTS AND DISCUSSION

A. Discussion

It is undeniable that the existence of MRT is the beginning of a new civilization in the world of transportation in Indonesia. In line with the work on the phase I MRT project, the government has changed the orientation of development, which previously was more to vehicle users, but now more oriented to pedestrians.

This can be seen on the sidewalk along Jendral Sudirman – MH Thamrin Street.



Figure 3. Illustration of pedestrian arrangement plan on Jendral Sudirman-MH Thamrin Street

In figure 3, we can see the plan of pedestrian lane arrangement on Jendral Sudirman – MH Thamrin Street. Pedestrian lines that used to have an average width of 3-5 meters have now been expanded to 10-12 meters. This is done to increase the level of satisfaction of pedestrian lane users. Beside that the pedestrian lane in this area is also

integrated directly with the entrance/exit access of the MRT station.

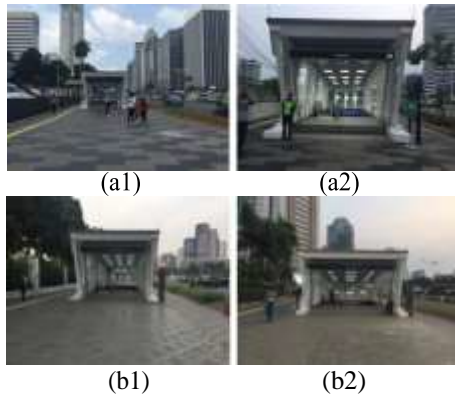


Figure 4. Situation of entrance/exit acces on Senayan MRT Station (a1,a2) and Istora MRT Station (b1,b2)

In figure 4, there is a pedestrian lane that is integrated directly with the entrance/exit access of Senayan and Istora MRT Station. The wide pedestrian path makes pedestrian convenience, not only that, almost at each station entrance, we can find security guards who are ready to stand guard and show direction. With the widening of the pedestrian path, it shows that the government has made pedestrians to the orientation of city development so that the creation of this pedestrian-friendly environment will gradually make Jakarta people leave their private vehicles because pedestrian paths are now comfortable and directly integrated by public transportation



Figure 5. (a) Situation of the pedestrian lane around the Istora MRT Station , (b) Situation of the pedestrian lane around Senayan MRT Station

In figure 5, there is a pedestrian lane around the MRT station, both Senayan and Istora, connecting pedestrians from the MRT station to other modes of transportation (city bus or Transjakarta). This shows that the existence of the Jakarta MRT has an effect on the transportation system in Jakarta which is made it easy, organized, and untegrated between modes of transportation with other modes of transportation.



(a) (b) Figure 6.(a)

Situation of the pedestrian lane around the Istora MRT Station , (b) Situation of the pedestrian lane around the Senayan MRT station.

In figure 6(a) you can see the difference level between the road and pedestrian lane around the Istora MRT Station, while in figure 6(b) it can be seen that between the road and pedestrian lane around the Senayan MRT Station has the same level. Based on research indicators which state that motor vehicles and pedestrians must at different levels so that vehicles cannot enter pedestrian lines so pedestrians can move freely and feel safer and more comfortable, it can be said that the convenience level of pedestrian lane around Istora MRT Station more higher than pedestrian lane around Senayan MRT Station, this is because there is still have possibility of motorcycles entering the pedestrian lane because of the same level of road and pedestrian lane.

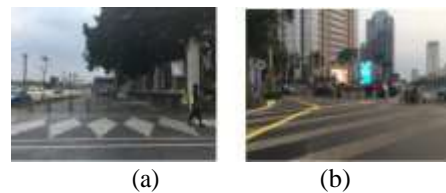


Figure 7. (a) Situation of the pedestrian lane around the Senayan MRT Station , (b) Situation of the pedestrian lane around the Istora MRT Station

Not only does it provide a different level of road, to increase the convenience of pedestrians, it can be done by giving a crossbar at each border between the road and pedestrian lane as seen in figure 7, in the picture we can see both pedestrian lines around Senayan MRT Station as well as Istora MRT station there is a crossbar that separates the road and the pedestrians line.



(a) (b) Figure 8. (a)

Situation of the pedestrian lane around Senayan MRT Station, (b) Situation of the pedestrian lane around Istora MRT Station.

An effective transportation system must facilitate the mobility of disabled people, women, children, and poor. In provision with the facilities found at the MRT station so that people with disabilities can easily make shifts to the pedestrian lane there are tactile (lane for the blind) and priority elevator that can be directly connected with the part in the MRT station. With the priority elevator making it easier for disabled people to travel using MRT, it encourage the government to do the same thing by improving facilities for other transportation facilities such as Transjakarta. Now we can see the government is adding priority elevator facilities that can connect pedestrian lines with Transjakarta shelters. Not only that in figure 9(b) there seems a sign that gives priority to women in use MRT during rush hour, where the priority of vehicles for women is already applied to other transportation such as Transjakarta and KRL Commuter

Line. This kind of thing can certainly enable Jakarta as "City for All".

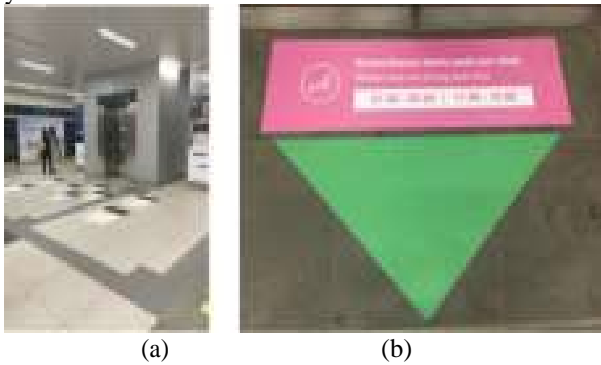


Figure 9. (a) fasilitas penunjang kaum difabel dalam stasiun MRT, (b) sign prioritas perempuan

Based on writer viewd from pedestrian comfort level indicators, both situation around MRT station and the surrounding area of the Istora MRT station have short walk distance (approximately 1,5 km), wide, smooth, and free pedestrian lanes to walk without disturbance from other activities, facilities are also made in accordance with the human anthropometry according to their activities. There are also supporting facilities such as street lights, rest areas, trash bins, and places to put bicycles that can provide convenience for pedestrian lane users (look at figure 10).

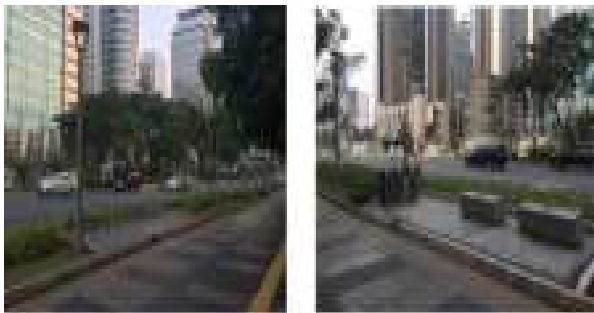


Figure 10. Supporting facilities at pedestrian lane

The placement of street lights along the pedestrian lane is good and can provide good information to pedestrians at night, but for trash cans or places to rest are still lacking, this is due to the provision of trash cans only in front of the entrance/exit access of MRT station, bus stop, and rest area only and the majority of resting places are only adjacent to the bus stop. In addition, the supply of bicycle parking lots is still not quite evenly distributed around the station.

On the comfort are not affected by weather indicators, both pedestrian lane in the neighborhood around Senayan MRT Station and Istora MRT Station do not meet the comfort level, this is because pedestrians will still have problem when it rains due to the absence of roofing on the pedestrian lane.



Figure 11. The situation of entrance/exit entrance Senayan MRT Station in night

In developing pedestrian facilities both Senayan MRT Station and Istora MRT Station are considered to have sufficient attention to safety aspect because it has provided pedestrian lanes that are free of vehicles and wide; security aspect by designing adequate lighting, where the light from the entrance/exit station can also be used as a street light at night (as seen in figure 11); aspect of convenience indicated by widening the sidewalk and the proximity of the station with supporting facilities and the center of the crowd; aesthetic aspect that can be seen from the green lanes planted with trees and pedestrian pathways that have a pattern of archipelago culture belts (can be seen in figure 12).



(a) (b) Figure 12. (a)

Pedestrian lane pattern on pedestrian lane around Istora MRT Station, (b) Pedestrian lane pattern on pedestrian lane around Senayan MRT Station.

However, due to the absence of roofing on pedestrian lines both around Senayan MRT Station and around Istora MRT Station, pedestrian convenience is disrupted when it rains.

B. Result

Table 1. Analysis Interval

Indicator	MRT Senayan STN	MRT Istora STN	Note
Memorable location			Both of stasiun environment is ideal for memorable location aspect which can provide convenience and increase pedestrian comfort.
a.Availability of facilities	√	√	
b.Clarity of phsical component	√	√	
c.Visual landscape variation	√	√	
d.Social meaning	√	√	
Pedestrian friendly environment	√	√	It can be seen from the widening of the pedestrian line by the goverment
TOD concept	√	√	Achievment between modes of transportation with each other is increasingly integrate
Difference in road level	x	√	Not all pedestrian side have different level of road (uneven development of facilities)
Effective transportation system	√	√	Seen in facilities provided.
Level of pedestrian comfort aspect			Both station environment has provided enough pedestrian comfort, but not when it rains.
a.Mileage	√	√	
b.Comfort that isn't affected by the weather	x	x	
c.Appropriate facilities for antropometry	√	√	
d.Wide pedestrian lane	√	√	
e.Supporting facilities	√	√	
Development of pedestrian facilities			Both station environments have thought enough about aspects of the development of pedestrian facilities, but the comfort aspect needs to be improved.
a. Safety	√	√	
b. Security	√	√	
c. Comfort	x	x	
d. Convenience	√	√	
e. Aesthetic	√	√	

IV. CONCLUSION

Base on memorable location factor, pedestrian- friendly environment, TOD concept, differences in road level, effective transportation system, pedestrian comfort level and development of pedestrian facilities, it can be concluded that the presence of MRT in the Senayan district can provide comfort for pedestrians, this can be seen in table 1, the range of analysis above, where almost all indicators at Senayan MRT station and Istora MRT Station are fulfilled (Ö), although there are still some shortcomings that need to be considered to support pedestrian convenience such as providing a threshold on the track or part of the pedestrian side to providr comfort of pedestrians when it rains, adding trash points to support the environment so that it is always clean and generalizing facilities around the MRT station environment.

The Finding, because of there is no upper threshold along the pedestrian lane around Senayan MRT Station and Istora MRT Station it can disturb pedestrian convenience when it rains, and there are still rarely or few places to rest then the canopy seating can be added to pedestrian side. The presence of the canopy that blends with the seating can add aesthetic value of the area and become a communal space of the city community.

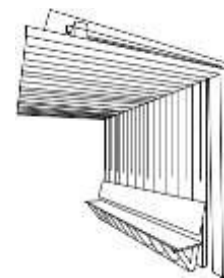


Figure 13. Canopy seating

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