Picking Up People: Defining Walkable Ride-Hailing Transit Points Around MRT Stations in Jakarta

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Abstract— **The emergence of app-based ride-hailing platforms such as motorbike taxi (online ojek) services, has changed the commuters' behaviour and mobility pattern in Jakarta. The highly-anticipated Jakarta Mass Rapid Transit (Jakarta MRT), which was launched and operated in early 2019, has gained popularity among the commuters. The average number of MRT passengers that surpassed 82.000 person-day influences the increasing demand for transit exchange mode in certain stations. The integration of MRT, Trans Jakarta and Commuter Line does not impede the need for ride-hailing service, especially for destinations that are not yet covered by any means of proper public transportation. Urban space intervention has emerged in the form of informal transit points, which have been used by the ride-hailing drivers for collecting passengers and bidding orders. These points occupy very significant parts of the streets, thus recurrently generate problems to the traffic and pedestrian accessibility around the station gates. Responding to those issues, PT. MRT Jakarta has developed a plan to locate formal transit points for ride-hailing activities near every station. The research aims to assess the quality of pedestrian linkages between MRT stations and the ride-hailing transit points. The research was conducted by mapping both t existing and the proposed transit points around nine MRT Stations in Jakarta. All locations were assessed using a set of walkability index parameters, which was developed by the Asian Development Bank and Clean Air Initiative Asia. The result defines the walkability rating of each proposed transit point, which then would be followed by design recommendations based on the parameters used.**

Keywords: ride-hailing activities, commuters, pedestrian access, walkability

I. INTRODUCTION

The increasing number of population in Jabodetabek appears to be parallel with the growing number of commuters, especially those who use public transportations on a daily basis. A 2014 statistic shows that 13% of 28.000 people in Jabodetabek above the age of five are commuters. The highest percentage of 20% is originating from Depok. In the city of Jakarta, the highest percentage of commuters is in the Central Jakarta of 15%. These statistics, however, shows that only 14 – 16% of the commuters rely on the public transportations, such as the Commuter Line (also known as the KRL) [1], privately-owned intercity buses, and Trans-Jakarta buses to get in and around the city of Jakarta, whereas others ride on private motorcycles. In the early of 2019, the Mass Rapid Transit Jakarta was launched as a new means of public transportation for the Jabodetabek commuters.

The MRT Jakarta began to operate formally in March 2019. This new mode of transportation opens a way for many commuters in Jabodetabek for a fast journey toward the inner city of Jakarta. The first line of the MRT Jakarta serves a northbound route from Lebak Bulus, South of Jakarta to Bundaran Hotel Indonesia (Bundaran HI), Central of Jakarta, which covers one of the busiest business corridors in Jakarta. Along the way, the MRT Jakarta stops at thirteen stations and some of the stations are used as connecting points to change from a means of transportation from and to the MRT.
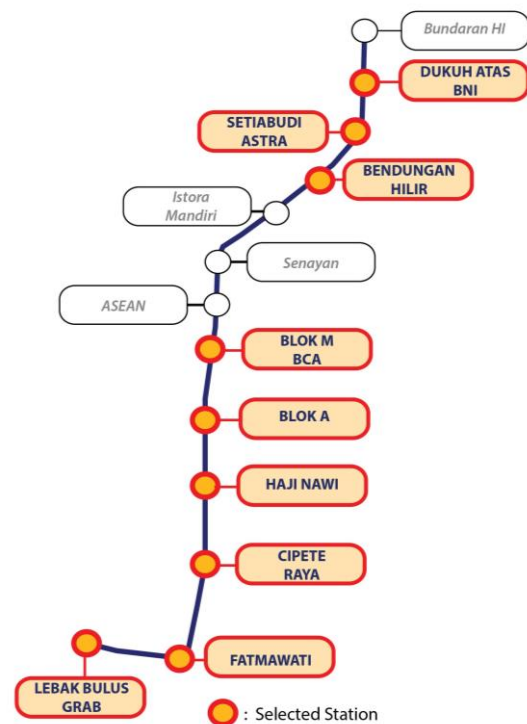

Fig. 1.   MRT Jakarta route diagram

In terms of the passenger number, one MRT trip takes up to six carriages, which can potentially carry an estimated number of 1,900 passengers [2]. As early as April 2019, the total number of passengers riding the MRT has reached an average of 82,000 passengers per day [3]. This statistic indicates a demand for public transportation for travel around the City of Jakarta toward the inner parts of Jakarta for commuters around the Jabodetabek area to go about the City for various purposes. Unfortunately, the MRT line travels only along the main business corridors, hence there

is even a greater need for a means of feeder transportation to get the commuters from their arrival points to their destinations.

Upon arrivals, the MRT passengers are offered a selection of feeder transportation modes, including bus, car-taxi, and motorcycle-taxi to get to their final destinations. However, it is widely known that DKI Jakarta faces many transportation issues, such as traffic congestion. This often makes automobiles the least preferable choice. With that in mind and for the purpose of cutting travel duration, many turns to the use of motorcycles. The emergence of online ride-hailing services provides a convenient choice of continuing travel mode once the commuters get off the MRT train. The rapid adoption of ride-hailing services presents significant challenges for transportation researchers, policymakers, and planners, as there are limited information and data about how these services affect transportation decisions and travel patterns. [4]

The MRT Jakarta operates with thirteen stations located along one of the busiest business corridors of Jakarta, which is also the primary transportation corridor. These stations have strategically become new potentials for the growing segments of commuters that turn to online ride-hailers. Moreover, there has been increasing use of certain spaces nearby several stations, particularly by the ride-hailers as a pick-up/drop-off place as well as a waiting place, which leads to the problems of blocking and overcrowding. In order to help alleviate such a phenomenon, PT. MRT Jakarta has proposed several locations around the MRT stations to be used for online ride-hailer activities. This measure has been taken also to allow for more efficient traffic flow around the stations. [5] Consecutively, all ride-hailing companies must abide by this directive and at the same time build shelters for their respective ride-hailers. They are also to regulate the hailers from obstructing the traffic flow surrounding the MRT stations in any ways. [6]

Consequently, this concept all passengers to walk back and forth in-between the ride-hailing points and the MRT stations. Such travelling patterns need to be maintained and therefore there is a need for providing a means of suitable pedestrian walking access, which is measured with a walkability index. Walkability is an interactive relation between pedestrians and the supporting facilities along their walking pathways. The walkability index is a qualitative measurement to denote the feasibility of a pedestrian walking condition. Initially, this concept was developed by Krambeck (2006) in the form of Global Walkability Index (GWI) [7].

The facilitation of pedestrian access must consider the potential duration and distance, in which a pedestrian catchment area of 400 meters in distance should be reached in only 5 minutes-time [8]. This 400-meter distance is assumed as the length of travel in which a pedestrian would be willing to walk conveniently from one place to another.

II. METHODOLOGY

This research uses the Global Walkability Index parameters as developed by James Leather according to the research of the Asian Development Bank [9] and by Sudhir Gotha of the Clean Air Initiatives Asia [10]. Its assessment methods measure the walkability index from the MRT stations toward the ride-hailer transit points. The parameters are as mentioned in the table below.

TABLE I. WALKABILITY INDEX PARAMETER

Parameter	Description	Weight
Walking Path Modal Conflict	The extent of conflict between pedestrians and other modes.	15
Availability of Walking Paths	The need for, availability, and condition of walking paths.	25
Availability of Crossings	The availability and distances between crossings to describe whether pedestrians tend to jaywalk when there are no crossings or when the distances between crossings are too long.	10
Grade Crossing Safety	The exposure of pedestrians to other modes while crossing, the time spent waiting and crossing the street, and the sufficiency of time given to pedestrians to cross signalized intersections.	10
Motorist Behavior	The behavior of motorists toward pedestrians, which may well indicate the kind of pedestrian environment there is in that area.	5
Amenities	The availability of pedestrian amenities such as benches, street lights, public toilets, and trees.	10
Disability Infrastructure	The availability, positioning, and maintenance of infrastructure for the disabled.	10
Obstructions	The presence of permanent and temporary obstructions on the pedestrian pathways which affect the effective width of the pedestrian pathway.	10
Security from Crime	The general feeling of security from crime in the street.	5

Source: Leather, James, et al, 2011

This research was conducted by observation at the proposed ride-hailing transit locations as specified by PT. MRT Jakarta. Each location is then measured using the walkability index parameter developed by James Leather. Each parameter of the location is rated based on 1 – 5 scale, with 1 being the lowest and 5 being the highest. The rate number is converted into scores between 20 to 100 with the increment value of 20. The rate of 1 is equal to 20, 2 is equal to 40, 3 is equal to 60, and so forth. The resulted score of each parameter is then multiplied by the scoring weight as prescribed in table I. With the total sum of weight of 100, therefore, the multiplied numbers should be divided by 100 for each parameter. The same calculation method is done in all locations selected for this research. The average calculation for each station is done to find the true walkability rating. The final result is then matched with the walkability classification done by Clean Air Asia [10]..

TABLE II. WALKABILITY SCORE RANGE

Score Range	Category
0 - 50	"Not walkable"
51 - 70	"Waiting to walk"
71 - 100	"Highly walkable"

Source: Sudhir Gota, 2010

III. MAPPING

The first stage of the pedestrian walking quality assessment from the MRT stations to the proposed ride-hailing transit points is done by mapping the ride-hailing activity spots as well as measuring their distances to the proposed ride-hailing locations. The fact that not all MRT

stations are planned to have ride-hailing transit points should be taken into consideration. These stations are the ASEAN station, Bundaran HI station, and Istora Mandiri station. Thus, based on the proposed ride-hailing locations as planned by PT. MRT Jakarta, this research was undertaken at nine MRT stations including Lebak Bulus Grab, Fatmawati, Cipete, Haji Nawi, Blok A, Blok M BCA, Bendungan Hilir, Setiabudi Astra, and Dukuh Atas BNI.

TABLE III.   MAPPING OF PICK-UP AND DROP-OFF POINTS

Stations	Proposed Ride-Hailing Transit Points (distance from point to station access)	Existing Waiting Area (W) & Pick-Up/Drop-Off Points (DP) (distance from point to station access)
Lebak Bulus Grab	• Poin Square (260 m) • Sapta Taruna Street (40 m) • Pasar Jumat Intersection (320 m)	• Poin Square North Lobby (W) (285 m) • Sapta Taruna Street (W) (40 m) • Lebak Bulus Raya Street (DP) (60 m)
Fatmawati	• Fatmawati Intersection (200 m) • Taman Cilandak Street (20 m)	• Kartini Street (DP) (60 m) • Taman Cilandak Street (W+DP) (20 m)
Cipete	• Golden Fatmawati (120 m)	• Golden Fatmawati (W) (120 m) • McDonald's (DP) (20 m)
Haji Nawi	• Alfamart (50 m) • SD Cipete Utara (85 m)	• SD Cipete Utara (W) (85 m) • RS Fatmawati Raya Street (DP) (20 m)
Blok A	• Dharmawangsa Junction (50 m) • Blok A Market (40 m)	• Petogogan Street (W) (50 m) • Panglima Polim Street (DP) (20 m)
Blok M BCA	• Neo Hotel (70 m) • Blok M Plaza (30 m) • Mahakam Street (70 m)	• Mahakam Street (W+DP) (70 m)
Bendungan Hilir	• Hidayatullah Mosque	• Hidayatullah Mosque
Setiabudi Astra	• Setiabudi Raya Street	• Setiabudi
Dukuh Atas BNI	• Railink Station (120 m) • Blora Market (240 m)	• Blora Street (W+DP) (240 m) • Railink Station (W) (120 m)

Source: MRT Jakarta and author

The table above shows the observation mapping result, which identifies the ride-hailer locations for both passengers waiting and pick-up/drop-off. The locations for these activities are separated at several stations, though they are still in close proximity to their respective MRT station entryways. The furthest location is found at the North Lobby of Poin Square Mall, which is approximately 285 meters from the Lebak Bulus Grab Station. This study also found a few problematic facts around the MRT stations, such as the use of pedestrian pathways for the ride-hailers' motorcycle parking and the activities of passenger pick-up and drop-offs around the entrances of several stations. This incidence causes traffic blockings at different locations including Lebak Bulus Raya street, Panglima Polim street, and Blora street. It is known that for some Stations, the shelter development plan prescribes the same spots as the current stands, whereas for other Stations the ride-hailing points are located further away and thus require an extra walking effort by the commuters.

Fig. 2.   Existing pick-up & drop-off point

IV.   WALKABILITY ASSESSMENT

The walking quality assessment at the research locations was performed by field observations using nine parametric points. Each point is rated from 1 to 5, with 1 being the lowest and 5 being the highest. These points are then converted into scores of 20 to 100.

TABLE IV.   SCORER POINT CONVERSION

Rate	Conversion
1	20
2	40
3	60
4	80
5	100

Source: Sudhir Gota, 2010

A. Lebak Bulus Grab Station

There are three proposed locations for ride-hailing transit points at the Lebak Bulus Grab Station and they are located at the Poin Square Mall, Sapta Taruna street, and Pasar Jum'at Junction. In general, these locations have noticeably obstruction-free pedestrian walkways with a very minimum of transportation cramming. Therefore, they are given a range of scores from 60 to 100. In spite of this, there is still a lack of pedestrian amenities, such as street furniture and shading facilities. This could result in a score range of 20 – 40.
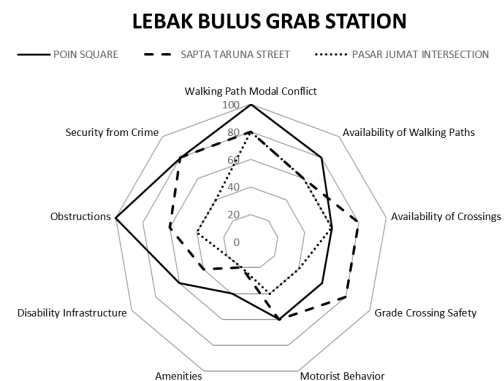

Fig. 3.   Walkability assessment at Lebak Bulus Grab Station

Fig. 4. Lebak Bulus Grab Station

B. *Fatmawati Station*

There are two proposed ride-hailing point locations in close proximity to the Fatmawati Station: at the Fatmawati Junction and on Taman Cilandak street. There is a very minimum intermodal conflict in both areas, which scores 80. As for the Fatmawati Junction area, only part of it has been developed with a good quality pedestrian way whereas the rest of it is still underdeveloped with narrow (only one meter wide) and damaged pavements. Street crossings at this location have proven as challenging considering the wide and busy traffic lanes on RS Fatmawati street (score point 20).
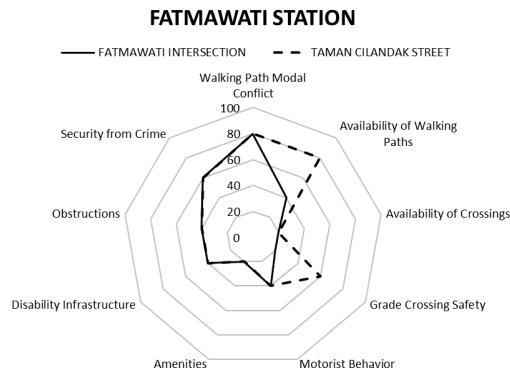

Fig. 5. Walkability assessment at Fatmawati Station

Fig. 6. Fatmawati Station

C. *Cipete Station*

There is only one proposed shelter location for this station and that is right at the front of Golden Fatmawati shopping centre. The facility in this location is considered as in good quality as it is safe, free of physical pedestrian obstruction, free of intermodal conflict, and exceptionally completed with good disability access (score point 80). The only shortcoming at this location is the challenging accommodation for a safe street crossing. This is due to the high traffic density and the insufficient crossing signs at the intersections of RS Fatmawati street and Cipete Raya street.
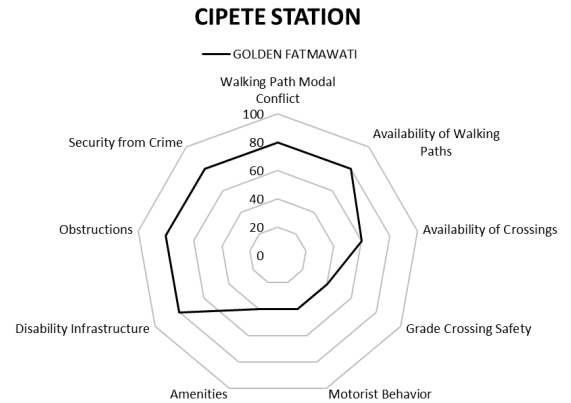

Fig. 7. Walkability assessment at Cipete Station

Fig. 8. Cipete Station

D. *Haji Nawi Station*

There are two ride-hailer points to be located around Haji Nawi station. One is located at the Alfamart Cipete Raya and one is nearby Cipete Utara Elementary School. Both locations are considered as in good quality in terms of the provision of pedestrian walk lane and safety (score point 80). Unfortunately, the street crossing facility on Cipete Raya street is still very inadequate. This is due to the high density of automobile traffic around schools and commercial areas at its surroundings (score point 20). Moreover, both locations are still lacking pedestrian amenities including street furniture (score point 20).
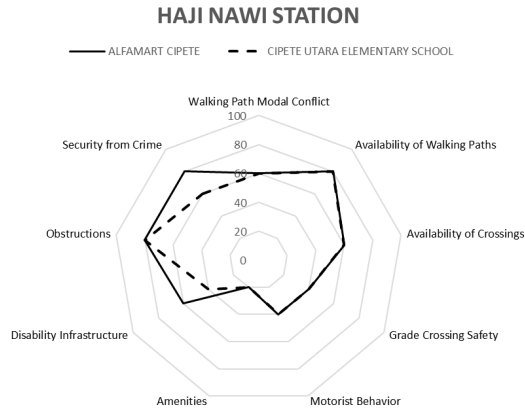
Fig. 9. Walkability assessment at Haji Nawi Station

Fig. 10. Haji Nawi Station near Alfamart

E. Blok A Station

There are two proposed locations for ride-hailing shelters at the Blok A station. One is located at the former land parcel of Blok A market and the other is at the Dharmawangsa street junction. The pedestrian pathway condition at the former Blok A market is considered as in good quality with a very wide pathway and relatively obstruction-free (score point 100). On contrary, the Dharmawangsa junction shows an inadequate condition of street walking facility with damages in many areas. In general, both stands have issues in terms of street crossing and pedestrian facilities (score point 40 – 60).
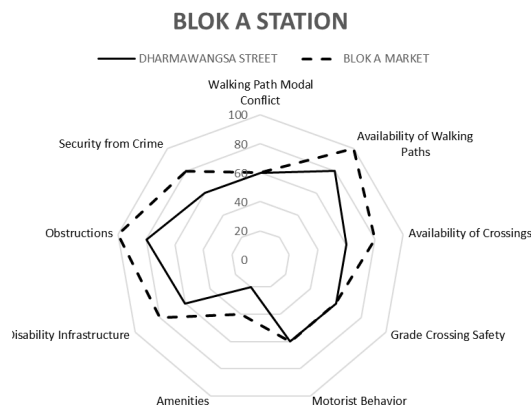

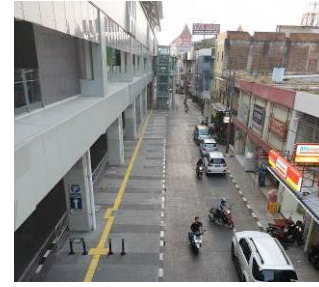Fig. 11. Walkability Assessment at Blok A Station

Fig. 12. Blok A Station point near Alfamart

F. Blok M BCA Station

The Blok M BCA station is the only intermodal transit station that is integrated with a shopping district and a shopping center. The proposed stand location is directed toward the surrounding areas of Mahakam street, around Plaza Blok M and at the surrounding of Neo Hotel Melawai. The walkability rating of both Mahakam street and at the surrounding of Neo Hotel Melawai are the same due to the insufficient pedestrian walking and crossing facilities (score point 40 – 60). At Plaza Blok M, however; the condition is slightly better with the very minimum intermodal traffic conflict, the provision of the pedestrian walkway as well as the pedestrian amenities (score point 60).
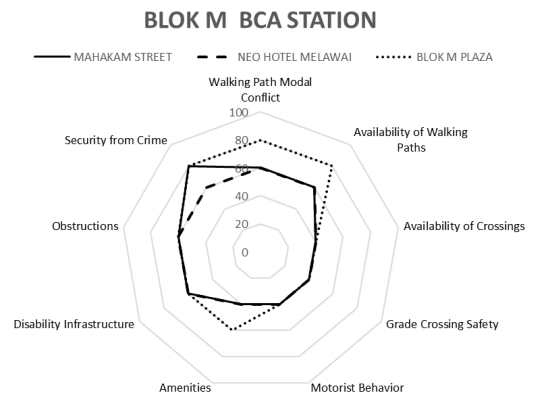

Fig. 13. Walkability assessment at Blok M BCA Station

Fig. 14. Blok M BCA Station near Blok M Plaza

G. *Bendungan Hilir Station*

There is only one location proposed as the online ride-hailing stand and that is around Masjid Hidayatullah street. Currently, this location is already being used for the same activities. It is found that street crossing at this location is relatively easy due to very minimum intermodal conflict (score point 60 – 80). The only obstruction found is the insufficient pedestrian facilities which force the pedestrian to use both curb and the street to go from one point to another (score point 40). Another drawback at this location is the inadequate pedestrian facility and the poor quality of disability access (score point 20 – 40).
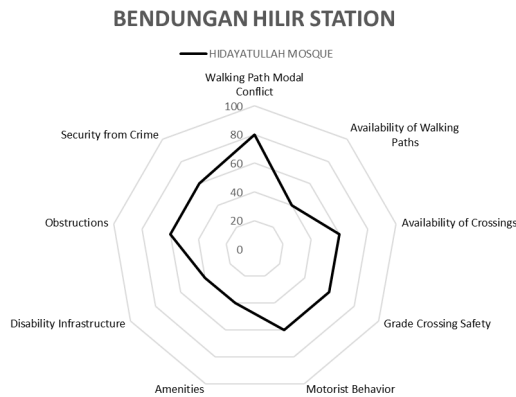

Fig. 15. Walkability assessment at Bendungan Hilir Station

Fig. 16. Bendungan Hilir Station near Hidayatullah Mosque

H. *Setiabudi Astra Station*

The Setiabudi Astra station is located in the primary business corridor of Thamrin and directly connected to the commercial towers surrounding the station as well as the Trans-Jakarta bus lanes through a 10 meter-wide pedestrian walkway. There is still a requirement, however, for access toward the areas of Karet and Kuningan from Setiabudi, which has not been accommodated yet. Travel to both areas is usually done by motorcycle rides or by crossing the streets. The ride-hailing activities have not been properly accommodated although it is understood that a development plan for a ride-hailing shelter is being undertaken. Thus, aside from that, the only drawback noted in this area is the inadequate facility for pedestrian and the unsafe street-crossing activities.
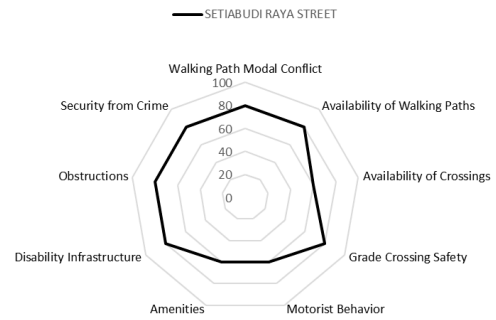

Fig. 17. Walkability assessment at Setiabudi Astra Station

Fig. 18. Setiabudi Astra Station

I. *Dukuh Atas BNI Station*

The Dukuh Atas BNI station is situated in an area that is under the Transit Oriented Development plan. There are two proposed locations for the ride-hailing shelters: the Blora Market and the surrounding area of the Railink station. At the latter, all the required parameters are met (with score ratings of above 80) except the improper pedestrian facility. In contrast, the Blora market provides a very limited walking space due to the existence of street vendors. Yet, street-crossing can be considered as easy since the streets are not as wide and the traffic is much slower.
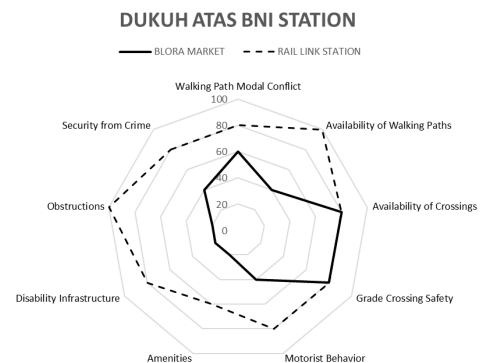

Fig. 19. Walkability assessment at Dukuh Atas BNI Station

Fig. 20. Dukuh Atas BNI Station near Blora Market

V. WALKABILITY RATING

The following table summarizes the walkability rating of each hail-riding shelter at all MRT stations that were observed. The results of the calculated rating are of each shelter then translated into the walkability category.

TABLE V. RIDE-HAILING TRANSIT POINT MAPPING

Station	Proposed Ride-Hailing Transit Points	Rating	Category
Lebak Bulus Grab	Poin Square	74	Highly walkable
	Sapta Taruna Street	48	Not Walkable
	Pasar Jumat Junction	24	Not Walkable
Fatmawati	Fatmawati Junction	41	Not Walkable
	Taman Cilandak Street	55	Waiting to Walk
Cipete	Golden Fatmawati	68	Waiting to Walk
Haji Nawi	Alfamart	61	Waiting to Walk
	Cipete Utara Elementary School	58	Waiting to Walk
Blok A	Dharmawangsa Junction	63	Waiting to Walk
	Blok A Market	77	Highly walkable
Blok M BCA	Neo Hotel	54	Waiting to Walk
	Blok M Plaza	53	Waiting to Walk
	Mahakam Street	64	Waiting to Walk
Bendungan Hilir	Hidayatullah Mosque	55	Waiting to Walk
Setiabudi Astra	Setiabudi Raya Street	75	Highly walkable
Dukuh Atas BNI	Railink Station	85	Highly walkable
	Blora Market	45	Not Walkable

Source: Author

The table above shows that there are four proposed ride-hailing transit points that are highly walkable. Meanwhile, there are four other points that score the lowest point in its walkability category, and therefore considered as not walkable. The points that score the highest are located at Poin Square (Lebak Bulus Grab Station), Blok A Market (Blok A Station), Setiabudi Raya Road (Setiabudi Astra Station) and Railink Station (Dukuh Atas BCA Station). These locations have been appropriately developed with sufficient pedestrian walkway, with a very minimum amount of walkway obstructions, and has no conflict amongst many transportation modes. On the contrary, the points that are considered as not walkable are located on Sapta Taruna Street (Lebak Bulus Grab Station), Pasar Jum'at Junction

(Lebak Bulus Grab Station), Fatmawati Junction (Fatmawati Station), and Blora Market (Dukuh Atas BNI Station). These points are categorized as not walkable due to unpleasant walking experience, which includes an unergonomic width of the pedestrian walkway of 0,6 – 1 meter, in comparison to the standard width of minimum 1,2 meter [11], bare minimum supporting facilities for pedestrians, difficulties in safe street-crossing, and many physical obstructions toward the pedestrian flows. This general assessment shows the quality of pedestrian experience within the walkability parameters.

TABLE VI. AVERAGE WALKABILITY RATING AND DESIGN RECOMMENDATION

Parameter	Average Rating	Design Recommendation
Walking Path Modal Conflict	71,48	In general, there is minimum conflict. There is a need for a good pedestrian walkway design to prevent a larger intermodal conflict in the future, for example by the use of bollards.
Availability of Walking Paths	65,93	It is imperative to ensure that a proper pedestrian walkway is being developed on all to suitably connect all segments.
Availability of Crossings	59,63	There is a need to provide a safe and consistent crossing facility at all stations, for example by means of a pelican crossing
Grade Crossing Safety	55,56	Most collection and drop-off points are situated on busy streets and therefore there is a need to regulate the vehicle speeds approaching such locations, for example by providing a raised crosswalk or texture pavement.
Motorist Behavior	50,37	The pedestrian safety has become heavily compromised with the tendency of motorcycle riders to drive against the traffic flow as well as on the pedestrian walkway. Therefore, prevention toward such behaviour is needed through a good quality pedestrian access design.
Amenities	38,15	Almost all locations are lacking proper pedestrian facilities and amenities. Attention must be directed toward the provision of public chairs, lights, and shelter to enhance the comfort of the pedestrians.
Disability Infrastructure	56,67	Accessibility has been accommodated in the form of tactile paving and ramps but there is a need for physical adjustments toward the ramp angle and access at intersections at many locations.
Obstructions	70,74	In general, there is no significant obstruction at the ride-hailing transit points, nonetheless, there is a need to pay attention to the pedestrian walkway design to prevent access by street vendors and motorcycles.
Security from Crime	62,22	There is a minimum possibility for crimes, nevertheless, it is recommended that a security enhancement be done through brighter street lights and CCTV installation.

Source: Author

VI. CONCLUSION

There has been a good effort in accommodating the needs of the online ride-hailing activities around the MRT Jakarta stations. This endeavor is considered as an approach to sustain a convenient passenger transfer without disrupting traffic in the surrounding areas. It is noted that the ride-

hailing transit point locations have been particularly selected based on land availability and the previous locations of the ride-hailing activities. The consequences of this arrangement often result in the extension of walking distance, which potentially diminishes the public interest in such walking experience. This walkability measurement of the selected locations depicts their existing conditions and can be used to develop the next parameters, especially for this research topic.

The assessment shows that amongst thirteen locations, there are four locations that rate as highly walkable and four other that rate as not walkable. The feasibility aspects include very minimum intermodal conflicts, a good safety rating, no significance of physical obstructions, and the good provision of pedestrian walkways that connect the MRT Jakarta stations with the ride-hailing transit points. Overall, there are still a few aspects that require meaningful improvements including a good provision of pedestrian facilities and a means of easiness in street-crossings. This improvement is essential as a way to promote a convenient and comfortable experience for the Jabodetabek commuters in changing public transportation modes from their places of origin to reach their final destinations.

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