IOP Conference Series: Earth and Environmental Science

Transit Passengers-Oriented Built Environment: An Evaluation of Mode Shift and Street Network and Design

Transit Passengers-Oriented Built Environment: An Evaluation of Mode Shift and Street Network and Design

Luthfi Prayogi[1], Wafirul Aqli[2]

[1,2]Department of Architecture, Universitas Muhammadiyah Jakarta, Jalan Cempaka Putih Tengah 27, Jakarta Pusat 10510, INDONESIA

[1]lutfi.prayogi@ftumj.ac.id

Abstract. Recently there have been efforts on designing a built environment that encourages its residents to take transit more and use personal motorised vehicles less, commonly known as transit-oriented development (TOD). The outcome of such efforts can be evaluated by the mode shift from using a private motorised vehicle to taking transit occurring among the residents of the built environment. This article explores the mode shift that occurred among Transjakarta BRT corridor 1 passenger that is triggered by the street network and design around the Transjakarta corridor 1 bus stops. This article also evaluates the qualities of the street network and design around the mentioned bus stops to complement the passengers' mode shift explanation. This article is written using a qualitative approach and inductive rationalization. Information regarding the passengers' mode shift is obtained through an indirect interview, while evaluation on the qualities of the street network and design is carried out using space syntax analysis. This article finds that the magnitude of mode shift to taking Transjakarta corridor 1 due to the qualities of the street network and design around the bus stops is not significant. In line with that, the integration and connectivity of the streets around the observed segment of Transjakarta corridor 1 is relatively low. This article concludes that even though mode shift to taking Transjakarta corridor 1 is occurring, the street network and design around the Transjakarta bus stops have not contributed significantly in triggering the mode shift. This article proposes a relatively new approach in evaluating TOD, which is by simultaneously assessing the citizens' habit and preference and the built environment.

1. Introduction

A main feature and principle of transit-oriented development (TOD) that is widely agreed is developing a built environment that encourages its citizens to take transit more and use personal motorised vehicles less for their daily travel. The outcome and successful application of such a principle can be evaluated by the magnitude of mode shift from using a personal motorised vehicle to taking transit occurring among the residents of the built environment. [1-3] Meanwhile, bus rapid transit (BRT) has been acknowledged as a rapid transit that can work with TOD. There is much evidence showing that a BRT system is appropriate to be provided as part of a TOD. [3-5] Thus, for a built environment having a BRT system, the application of the mentioned TOD principle can be evaluated by the ability of the built environment to trigger its citizens to use the BRT system more and use personal motorised vehicle less. The application of the mentioned TOD principle in such a built environment can be evaluated by the ability of the built environment to trigger its citizens to shift to using the BRT system from using their motorised vehicles.

Transjakarta corridor 1 (Blok M-Kota) is the oldest operating BRT corridor in Jakarta; it has been in operation for 15 years (since 2004). Passing through some of Jakarta's most important spots and roads, Transjakarta corridor 1 has been carrying the most passenger compared to other Transjakarta corridors. The built environment around it, especially the central section of the corridor (i.e., Jl. Jend. Sudirman, Jl. MH Thamrin, Menteng, Jl. Medan Merdeka Barat) is commonly considered as the well-planned and well-designed built environment. The mentioned built environment has been developing and redeveloping since Transjakarta corridor 1 starts operating. High-density office, commercial, and mixed-use spaces have been built in the area since that time. However, there hasn't been any sound research that provides for a legitimate claim that the development and redevelopment in the area can be considered as transit-oriented development (TOD), neither that provides for a legitimate claim that Transjakarta corridor 1 is an agent of TOD.

2. Literature Review

2.1. Bus rapid transit mode shift, the built environment, and the street network and design

While mode shift from using a personal motorised vehicle to taking transit is an essential principle of transit-oriented development (TOD) [1-3], only a few researches have evaluated the occurrence of mode shift among citizens under the context of evaluating the occurrence of TOD [1]. Currie and Delbosc [5a] and Ernst [5b] have evaluated the percentage of a couple of BRT systems' passengers who previously drive a private motorised vehicle or use another mode of transports before taking the systems for the same type of trip.

Prayogi [6, 7] summarised some issues that may trigger mode shift from using a private motorised vehicle to taking transit, especially to taking bus rapid transit (BRT), among citizens. The issues include the perception of the BRT system's service, such as the perception of the vehicle speed, frequency, and headway, fare competitiveness and affordability, transit network integration, and comfort, convenience, safety, and security. The issues also include the perception regarding the built environment around the BRT system, such as the perception regarding the street network design around the transit stops, availability of access to certain places to and from transit stops, and walkability and cycle ability of streets around the transit stops. While there hasn't been any definitive explanation on the ability of the built environment in affecting citizens' mode shift from using a private motorised vehicle to taking transit, there has been an extensive note on the citizens' mode choice in relation to the built environment. Estupinan and Rodriguez [8], Mohanty, et al. [9], and Ramezani, et al. [10, 11] explored the citizens' mode choice in relation to the walkability and cycle ability of the streets around the transit stops in their respective various study areas. Li et al. [12] explored the citizens' mode choice in relation to the availability of access to certain places to and from transit stops.

Garcia-Palomares et al. [13] and Ramezani, et al. [10] explored the citizens' mode choice in relation to the street network design around the transit stops. Garcia-Palomares et al. [13] discussed three street network patterns that generate different potential passenger figures for the transit stops located within the street network, that is irregular, orthogonal, and station-oriented street networks. They found that station-oriented street network pattern tends to generate more potential passengers for the transit stops within the street network, followed by orthogonal and irregular street network patterns. Ramezani et al. [10] explored local street networks of different levels of penetrability that have transit stops within it. They found that transit stops located within the local street network of a higher level of penetrability attract more transit passengers than ones located within the local street network of a lower level of penetrability. Figure 1 shows the types of street network patterns discussed by Garcia-Palomares et al. [13] while figure 2 shows examples of local street networks of different levels of penetrability explored by Ramezani et al. [10]. Prayogi and Hantono [6] concluded from their researches that street networks that provide more direct routes within it (including direct routes to and from transit stops) tend to generate more transit passengers. Prayogi and Hantono [6] presented a summary of the researches mentioned in this subsection.

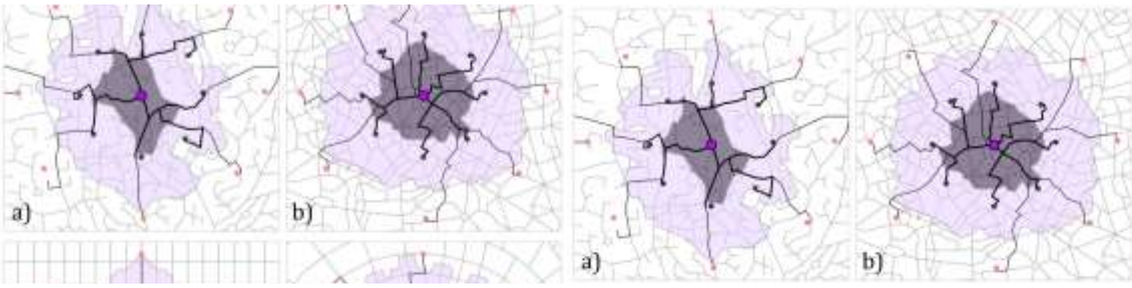

Figure 1. Examples of street networks: a) Irregular, b) Irregular, c) Orthogonal, and d) Station-oriented. Source: Garcia-Palomares, et al. [13], 2018.

Figure 2. Local street networks of different levels of penetrability. Source: Ramezani, et al. [10], 2018.

2.2. *Evaluation of the built environment*

Taking transit passengers' point of view as suggested by Ma and Cao [14], Prayogi and Hantono [6] suggested that the relation of mode shift and the built environment is explainable, and perhaps quantifiable, through the evaluation of two things, that are the perceived distance to and from BRT stops and the perceived safety and comfort on routes to and from BRT stops. Prayogi and Hantono [6] suggested that the built environment components previously pointed out and discussed by various researchers (e.g. footpaths, cycle paths, amenities, zoning, roads) are to be evaluated from the transit passengers' point of view, specifically from their perception of distance, safety, and comfort of the built environment components.

2.3. *Space syntax analysis*

Considering its ability of measuring and calculating distance, space syntax analysis could complement the evaluation of the built environment from passengers' points of view. Space syntax analysis can provide a quantified assessment of several features of the built environment by analysing the users' position, manner of moving, adapting, and orienting. [15] Some of the built environment features that can be evaluated are integration, connectivity, and intelligibility. Space syntax analysis can evaluate built environment components both in the form of points (e.g., land parcels, bus stops, etc.) and in the form of lines (e.g., streets, footpaths, cycle paths, pedestrian crossings, etc.).

Space syntax analysis can provide a quantified value of the integration of spatial components. It does so by measuring how close each component is, that is, by measuring and calculating the relative distance of each component. The relative distance of each component is measured in depth. Space syntax analysis can also provide a quantified value of connectivity of spatial components. It does so by counting the number of spatial components that connect, both directly and indirectly, to other spatial components within a defined spatial configuration. [15, 16] Considering the mentioned space syntax analysis' abilities, we may argue that it can quantify the availability of direct routes within a street network that has been discussed by Prayogi and Hantono [6].

3. Methodology

3.1. Research framework, intention, approaches, and questions

This research is carried out under the framework of evaluating the application of transit-oriented development (TOD) features and the principle of developing a built environment that encourages its citizens to take transit more and use personal motorised vehicles less for their daily travel. This article intends to explore the effect of the built environment around Transjakarta corridor 1 stops towards the Transjakarta corridor 1 passengers' mode shift. The exploration is carried out through two inter complementing approaches, which are by exploring the passengers' opinion and perception and by evaluating the physical built environment. Thus, this article has two inter complementing research questions, that are "Do Transjakarta corridor 1's passengers shift to using the system due to the street network and design around the Transjakarta corridor 1 bus stops?" and "Do the street network around Transjakarta corridor 1 bus stops support for mode shifting to using Transjakarta corridor 1?" Among the built environment components summarised by Prayogi and Hantono [6], the street network and design were chosen as the research object considering their ability to be evaluated by the two approaches (i.e., exploring passengers' opinion and perception and evaluating the physical built environment). By answering the two research questions, this article may serve as a starter for further discussion on better street network planning and designing that may trigger people to use transit more and use personal motorised vehicle less, as envisioned by TOD. By taking the two approaches, this research may also propose a new approach in evaluating TOD.

3.2. Exploration of passengers' opinion and perception

Substances that are explored from the Transjakarta corridor 1 passenger were crafted following Prayogi and Hantono's [6] summary of the built environment qualities potentially triggering bus rapid transit passengers' modal shift. In line with the article's [6] approach, passengers were asked regarding the qualities of some built environment components related to their experience of taking Transjakarta corridor 1. The qualities that were asked are the comfort, safety, and integration, while the built environment components that were explored are footpath, cycle path, overhead pedestrian crossing, and street-level signalised pedestrian crossing. The exploration was carried out through indirect online interviews towards Transjakarta passengers in March 2019. The interviewees were intended to be random sampled; they were gathered through socialisation to online public transport passenger communities. The interview was carried out to 332 interviewees that count as 0,4% of Transjakarta daily passengers of the time. The indirect interview mainly utilised closed-ended questions and a 6-point Likert scale. The result of the interview was analysed using a simple distribution analysis.

3.3. Evaluation of the physical built environment

Qualities of the built environment around the Transjakarta corridor 1 bus stops that are evaluated were set considering the qualities summarised by Prayogi and Hantono [6]. The qualities that were evaluated are integration and connectivity, while the built environment components that were evaluated are the footpath and street-level pedestrian crossing of the street network around the bus stops.

The segment of Transjakarta corridor 1 that was evaluated is a segment spanning from (old) Tosari bus stop to Sarinah bus stop that includes Bundaran HI bus stop. The mentioned bus stops are the three central bus stops of Transjakarta corridor 1. They are located in the middle of the high-density commercial, office, and mixed-use zones. The zones have been experiencing development and redevelopment since Transjakarta corridor 1 commenced operation 15 years ago (2004). The high-density zones around the three mentioned bus stops serve as significant passenger generators for the whole Transjakarta corridor 1. The three bus stops collectively serve 15 Transjakarta routes. The central location of the segment and the high number of routes served make the segment a critical part of Transjakarta corridor 1.

The evaluation of the physical built environment was carried out through space syntax analysis utilising DepthmapX. The base map used is provided by Dinas Tata Kota DKI Jakarta and was produced in 2014. The mentioned base map is analysed using DepthmapX. Figure 3 shows the boundary of the evaluated street network. Boundary A shows the evaluated street network that is within about 400m-radius from the central bus stop, which is Bundaran HI bus stop. Boundary B shows the evaluated street network that is adjacent to the evaluated segment of Transjakarta corridor 1 (spanning from Sarinah bus stop to [old] Tosari bus stop).

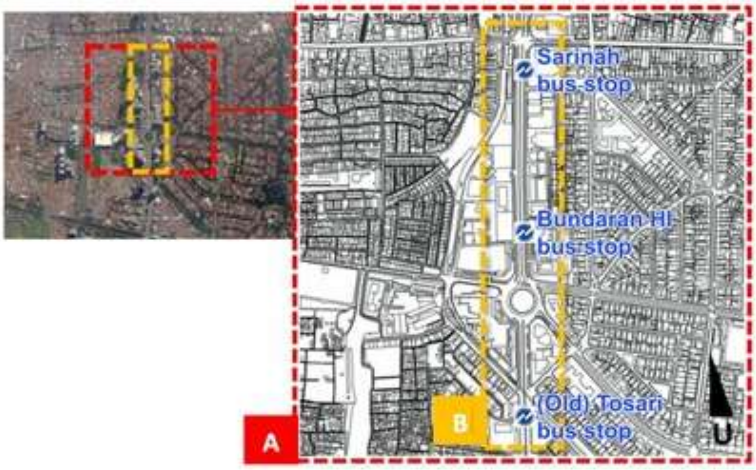

Figure 3. A. The boundary of the evaluated street network, B. The boundary of the evaluated street adjacent to the segment of Transjakarta corridor 1. Source: Google and Dinas Tata Kota DKI Jakarta, 2014, edited by authors.

4. Findings

4.1. Transjakarta corridor 1 passenger mode shift interview

Out of 332 interviewed Transjakarta passengers, 53 (16%) claimed that they use corridor 1 of Transjakarta more than other corridors. Out of 53 interviewed Transjakarta corridor 1 frequent user, 49 (92%) stated that they use other transport modes before shifting to using Transjakarta corridor 1 for the same kind of trip. Through closed-ended and directed questions with the possibility of choosing multiple answers, interviewees were asked about their reason of shifting to taking Transjakarta (corridor 1). Out of 49 interviewed Transjakarta corridor 1 mode-shifted frequent users, only 17 (35%) answered due to easiness of reaching and using Transjakarta. Only 29 (59%) interviewees gave positive opinion regarding the Transjakarta corridor 1's ease of access compared to the previously used mode of transport. Within a 6-point Likert scale with point 1 stands for 'Much harder' and point 6 stands for 'Much easier', the mean value of the interviewees' answer is 3.98 with 1.27 standard deviation. Figure 4 and 5 summarised interviewed Transjakarta corridor 1 passengers' opinion regarding the reason of shifting to using Transjakarta corridor 1.

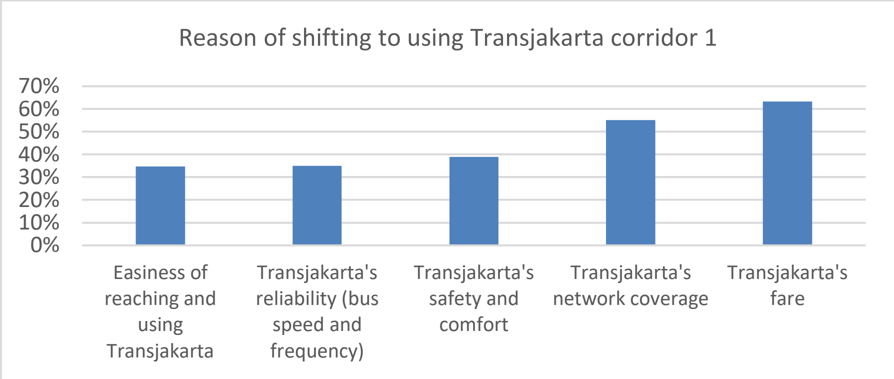

Figure 4. Summary of interviewed Transjakarta corridor 1 mode-shifted frequent passengers' reason of shifting to using Transjakarta corridor 1. Source: Authors' analysis.

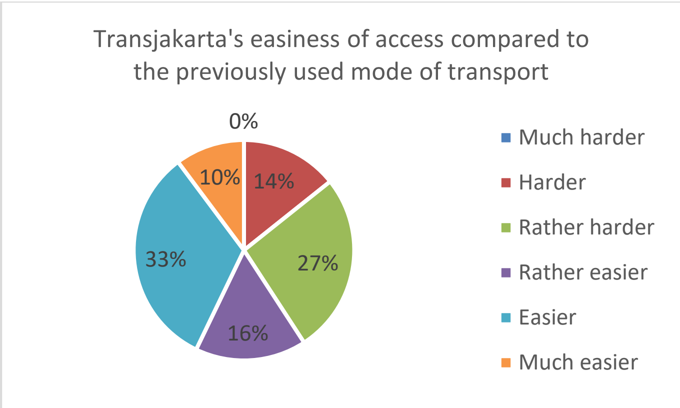

Figure 5. Summary of interviewed Transjakarta corridor 1 mode-shifted frequent passengers' opinion regarding Transjakarta's easiness of access compared to the previously used mode of transport. Source: Authors' analysis.

Through closed-ended questions, interviewees were asked regarding the relation of various built environment components (i.e., footpath, cycle path, bus stop, overhead pedestrian bridge, signalised street-level pedestrian crossing) with their mode shifting decision. Out of 49 interviewed Transjakarta corridor 1 mode-shifted frequent users, 40 (82%) stated that the availability of pedestrian facilities around the bus stops make them shift to using Transjakarta corridor 1. However, only 28 (53%) interviewees gave positive opinions regarding the safety of the pedestrian facilities. Within a 6-point Likert scale with point 1 stands for 'Very unsafe' and point 6 stands for 'Very safe', the mean value of the interviewees' answer is 3.82 with 1.18 standard deviation. Similarly, only 30 (61%) interviewees gave a positive opinion regarding the comfort of the pedestrian facilities. Within a 6-point Likert scale with point 1 stands for 'Very uncomfortable' and point 6 stands for 'Very comfortable', the mean value of the interviewees' answer is 3.63 with 1.07 standard deviation. Furthermore, out of 49 interviewed Transjakarta corridor 1 modes-shifted frequent users, 16 (33%) stated that the availability of cyclist facilities around the bus stops make them shift to using Transjakarta corridor 1. Figures 6, 7, 8, and 9 summarised interviewed Transjakarta corridor 1 mode-shifted frequent passengers' opinion regarding the pedestrian and cyclist facilities around Transjakarta corridor 1 bus stops.

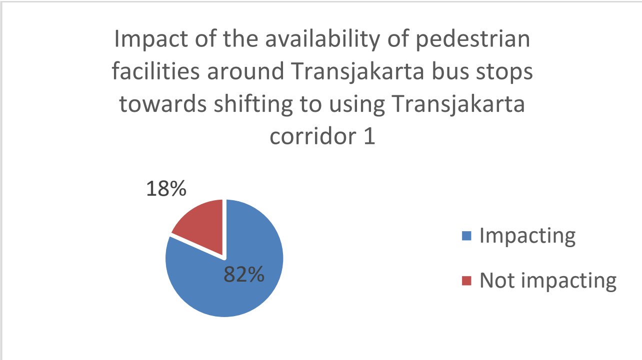

Figure 6. Summary of interviewed Transjakarta corridor 1 mode-shifted frequent passengers' opinion relating the impact of the availability of pedestrian facilities around Transjakarta bus stops towards shifting to using Transjakarta corridor 1. Source: Authors' analysis.

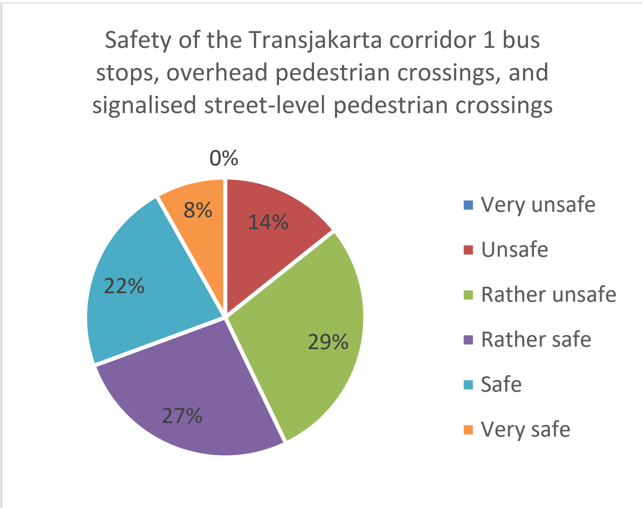

Figure 7. Summary of interviewed Transjakarta corridor 1 mode-shifted frequent passengers' opinion regarding the safety of pedestrian facilities around Transjakarta corridor 1 bus stops. Source: Authors' analysis.

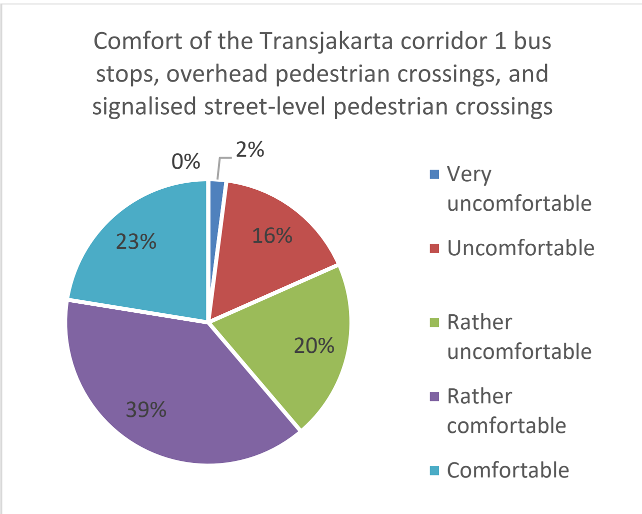

Figure 8. Summary of interviewed Transjakarta corridor 1 passengers' opinion regarding the comfort of pedestrian facilities around Transjakarta corridor 1 bus stops. Source: Authors' analysis.

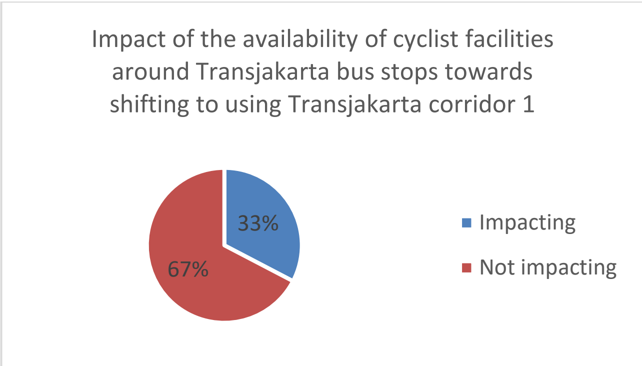

Figure 9. Summary of interviewed Transjakarta corridor 1 passengers' opinion relating the impact of the availability of cyclist facilities around Transjakarta bus stops towards shifting to using Transjakarta corridor 1. Source: Authors' analysis.

4.2. Street network and design analysis

4.2.1. Integration level of pedestrian facilities around the evaluated segment of Transjakarta corridor 1. Analysis of the integration of pedestrian facilities (i.e., footpath, signalised street-level pedestrian crossing) within the area shown in figure 3 using DepthmapX application generated the following values. The integration value of the pedestrian facilities adjacent to the evaluated segment of Transjakarta corridor 1 is 15,65 (with 0,93 as normalised value for correlation analysis). The highest integration value in the area is 104,57 (2.03); it is located at Jl. Kebon Kacang 9, west of the evaluated segment of Transjakarta corridor 1. The area having high integration value takes form as a low-rise, small-parcelled single-family housing area. The lowest integration value is 6.19 (0.30); it is located at Jl. Gereja Theresia, east of the evaluated segment of Transjakarta corridor 1. The area having low integration value takes form as low-rise, big-parcelled single-family housing, and high-rise, big-parcelled offices. The mean integration value is 37.49 (1.55), in which the integration value of the pedestrian facilities adjacent to the evaluated segment of Transjakarta corridor 1 scored slightly below the value. Figure 10 shows an overview of the integration level of pedestrian facilities around the evaluated segment of Transjakarta corridor 1.

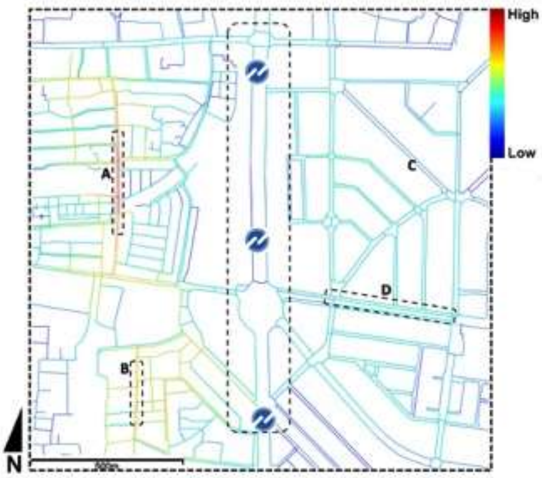

Figure 10. Overview of the integration level of pedestrian facilities around the evaluated segment of Transjakarta corridor 1. Spot A: Jl. Kebon Kacang 9, spot C: Jl. Gereja Theresia. Source: Google and Dinas Tata Kota DKI Jakarta, 2014, analysed and edited by authors.

4.2.2. Connectivity level of pedestrian facilities around the evaluated segment of Transjakarta corridor 1. Transjakarta corridor 1. Analysis of connectivity of pedestrian facilities (i.e., footpath, signalised street-level pedestrian crossing) within the area shown in figure 3 using DepthmapX application generated the following values. The connectivity value of the pedestrian facilities adjacent to an evaluated segment of Transjakarta corridor 1 is 2 (with 0,69 as normalised value for correlation analysis). The highest connectivity value in the area is 6 (0.95), it is located at several streets and alleys within Kebon Kacang and Kebon Melati neighborhood, west of the evaluated segment of Transjakarta corridor 1. The area having high integration value takes form as a low-rise, small-parcelled single-family housing area. The lowest connectivity value is 1 (0.60); it is located at Jl. Sumenep, east of the evaluated segment of Transjakarta corridor 1. The mean connectivity value is 2.73 (0.75), in which the integration value of the pedestrian facilities adjacent to the evaluated segment of Transjakarta corridor 1 scored slightly just around the value. Figure 11 shows the overview of the connectivity level of pedestrian facilities around the evaluated segment of Transjakarta corridor 1.

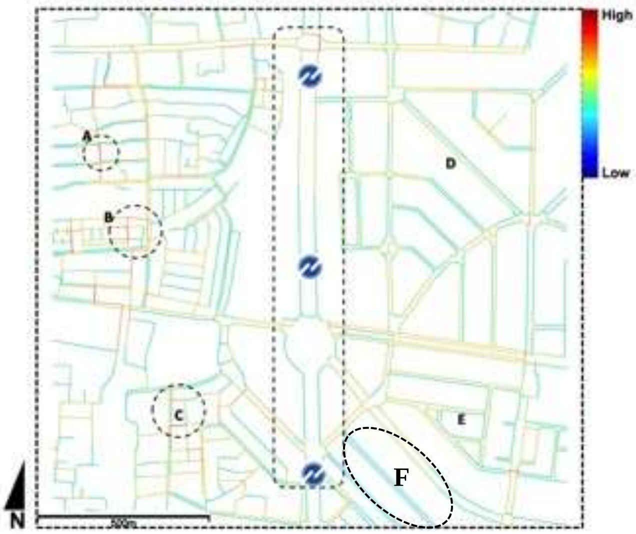

Figure 11. Overview of the connectivity level of pedestrian facilities around the evaluated segment of Transjakarta corridor 1. Spot A, B, C: Street and alleys in Kebon Kacang and Kebon Melati Neighbourhood. Spot F: Jl. Sumenep, the street segment had the lowest connectivity value. Source: Google and Dinas Tata Kota DKI Jakarta, 2014, analysed and edited by authors.

5. Conclusion and discussion

We may conclude that while mode shift occurs significantly among Transjakarta corridor 1 passenger, the mode shift is not significantly caused by the street network and design around Transjakarta corridor 1 bus stops. The built environment around the bus stops, including the street network, perceived by Transjakarta corridor 1 passenger as not giving the passengers more accessible access to Transjakarta corridor 1 compared to other transport modes. While the impact of the availability of pedestrian facilities around the Transjakarta corridor 1 bus stops towards shifting to using Transjakarta corridor 1 is high, the Transjakarta corridor 1 mode-shifted frequent users generally perceive the pedestrian facilities as just quite safe and quite comfortable.

Meanwhile, street network and design around the evaluated segment of Transjakarta corridor 1 doesn't support for shifting to using Transjakarta corridor 1 as theorized by Prayogi and Hantono [6]. The street network and design in the evaluated area is neither highly integrated nor connected. These could trigger perceived longer distance one must travel to and from Transjakarta corridor 1 bus stops, decreasing his/her willingness of using Transjakarta corridor 1. Overall, we may conclude that the street network and design in the evaluated area around Transjakarta corridor 1 bus stops don't trigger people to use Transjakarta corridor 1. Thus, it is not the ideal street network and design as envisioned by transit-oriented development (TOD). Considering the findings from the Transjakarta passengers' interview and street network and design evaluation, we may say that TOD hasn't occurred entirely in the evaluated area.

This article exhibits the use of a relatively new approach in evaluating TOD, that is, by simultaneously evaluating the citizens' habit and preference (i.e., passengers' mode shift and related preferences) and the built environment (i.e., the street network and design). This approach can complement other existing approaches, such as evaluating the features of the developed, built environment (e.g., property price, population and activity density, entropy index, etc.). This article specifically shows that an area having high-density mixed-use infill urban redevelopments around a rapid transit corridor may actually not having a TOD considering that the area's street network and design don't provide for the mode shift to using the rapid transit system. The high-density mixed-use infill urban redevelopments may be another phenomenon but TOD. However, for the approach to be used and deliver a valid result, the data might need to be collected more carefully. The investigated passengers/residents/citizens might need to be precisely the ones of the investigated built environment.

This article also offers a practical approach to designing street networks under TOD as the overarching principles. The street network is to be created by considering public transport passengers' experience of using it, especially by considering passengers' perception of safety and comfort. The street network is also to be designed by considering the connectivity and integration with public transport stops.

6. References

[1] Prayogi L 2017 Bus Rapid Transit Oriented Development: A Review of Modal Shift-triggering Ability of a Bus Rapid Transit (BRT) System *Proceeding of International Workshop un Urban Planning and Community Development* 75-84

[2] Prayogi L 2018 TOD Concept among Architecture Graduates *International Journal of Built Environment and Scientific Research* **2(2)** 141-146

[3] Suzuki H, Cervero H, Iuchi K 2013 *Transforming Cities with Transit: Transit and Land-use Intgration for Sustainable Urban Development* (Washington, DC: World Bank Group)

[4] Cervero R 1998 *The Transit Metropolis: A Global Inquiry* (Washington, DC: Island Press)

[5] Curtis C, Renne J L, Bertolini L 2009 *Transit Oriented Development: Making It Happen* (Abingdon: Routledge)

[5a] Currie G, Delbosc A 2014 *Assessing Bus Rapid Transit System Performance in Australasia* Research in Transportation Economics **48** 142-151

[5b] Ernst JP 2006 *Initiating Bus Rapid Transit in Jakarta, Indonesia* Transportation Research Record **1903** 20-26

[6] Prayogi L, Hantono D 2018 *Bus Rapid Transit-oriented Development: A Review of Built Environment Qualities Potentially Triggering Bus Rapid Transit Passengers' Modal Shift* Internation Journal of Engineering Research & Tehcnology **7(8)** 302-305

[7] Prayogi L, Satwikasari A F 2019 *Bus Rapid Transit-oriented Development: An Identification of Bus Rapid Transit System Passengers' Modal Shift Potential Considerations* CSID Journal of Infrastructure Development **2(1)** 127-136

[8] Estupinan N, Rodriguez D A 2008 *The Relationship between Urban Form and Station Boardings for Bogota's BRT* Transportation Research Part A **42** 296-306

[9] Mohanty S, Bansal S, Bairwa K 2017 *Effect of Integration of Bicyclist and Pedestrians with Transit in New Delhi* Transport Policy **57** 31-40

[10] Ramezani S, Pizzo B, Deaking E 2017 *An Integrated Assessment of Factors Affecting Modal Choice: Towards a Better Understanding of the Causal Effects of Built Environment* Transportation **40(5)** 1-37

[11] Ramezani S, Pizzo B, Deaking E 2018 *Determinants of Sustainable Mode Choice in Different Socio-cultural Contexts: A Comparison of Rome and San Francisco* International Journal of Sustainable Transportation

[12] Li X, Liu Y, Gao Z, Liu D 2016 *Linkage between Passenger Demand and Surrounding Land-use Patterns at Urban Rail Transit Stations: A Canonical Correlation Analysis Method and Case Study in Chongqing* International Journal of Transportation Science and Technology **5** 10-16
[13] Garcia-Palomares J C, Sousa Ribeiro J, Gutierrez J, Sa Marques T 2018 *Analysing Proximity to Public Transport: The Role of Street Network* Boletin de la Asociacion de Geografos Espanoles **76** 102-130
[14] Ma L, Cao J 2017 *How Perceptions Mediate the Effects of the Built Environment on Travel Behviour* Transportation **45** 1-23
[15] UCL Space Syntax otp.spacesyntax.net Retrieved in December 2019
[16] Siregar A 2014 *Tentang Pejalan Kaki: Masihkah Ada Ruang untuk Pejalan Kaki* Kompasiana http://jakarta.kompasiana.com Retrieved in December 2019

Acknowledgment

This research was partially funded by Pusat Kajian Afiliasi dan Teknologi (Pakarti) Fakultas Teknik Universitas Muhammadiyah Jakarta.