



Quantitative Evaluation of Glodok Area Readiness along the Jakarta MRT Phase 2 Corridor Based on ITDP TOD Standard 3.0 Scorecard

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Abstract

Sustainable urban development emphasizes the integration of public transportation and land use to create more efficient urban mobility systems. In Jakarta, most studies have focused on the MRT Jakarta Phase 1 corridor, while evaluations of area readiness along the MRT Jakarta Phase 2 corridor remain limited, including in the Glodok area. This study aims to quantitatively evaluate the readiness of the Glodok area using the TOD Standard 3.0 framework developed by the Institute for Transportation and Development Policy (ITDP). The research adopts a descriptive quantitative approach through a scorecard-based assessment with a maximum score of 100 points. Data were collected through field observations, GIS-based spatial analysis, and urban planning documents. The evaluation results indicate that the Glodok area achieved a score of 49 points, categorizing it as Below Bronze. Although the area demonstrates strong structural potential in terms of urban density, mixed land use, and the presence of mass transit networks such as TransJakarta BRT and the MRT Jakarta Phase 2, the quality of pedestrian infrastructure, street network connectivity, and active mobility facilities remains limited. These findings highlight the need to improve walkability, urban connectivity, and active mobility integration to support the development of a more integrated and sustainable urban area.

Keywords: Transit-Oriented Development, ITDP TOD Standard 3.0, Jakarta MRT Phase 2, Glodok, urban mobility

Evaluasi Kuantitatif Kesiapan Kawasan Glodok pada Koridor MRT Jakarta Fase 2 berdasarkan TOD Standard 3.0 ITDP Scorecard

Abstrak

Pembangunan kota berkelanjutan menekankan integrasi antara transportasi publik dan tata guna lahan untuk menciptakan mobilitas perkotaan yang lebih efisien. Di Jakarta, sebagian besar kajian berfokus pada koridor MRT Jakarta Fase 1, sementara evaluasi kesiapan kawasan pada koridor MRT Jakarta Fase 2 masih terbatas, termasuk di kawasan Glodok. Penelitian ini bertujuan mengevaluasi secara kuantitatif kesiapan kawasan Glodok menggunakan kerangka TOD Standard 3.0 yang dikembangkan oleh Institute for Transportation and Development Policy (ITDP). Metode penelitian menggunakan pendekatan kuantitatif deskriptif melalui scorecard-based assessment dengan total maksimum 100 poin. Data diperoleh melalui observasi lapangan, analisis spasial berbasis GIS, serta dokumen perencanaan kota. Hasil evaluasi menunjukkan bahwa kawasan Glodok memperoleh skor 49 poin, sehingga dikategorikan dalam tingkat Below Bronze. Meskipun kawasan memiliki potensi struktural yang kuat dari sisi kepadatan kawasan, keberagaman fungsi lahan, serta dukungan jaringan transportasi massal seperti BRT TransJakarta dan MRT Jakarta Fase 2, kualitas infrastruktur pejalan kaki, konektivitas jaringan jalan, serta fasilitas mobilitas aktif masih terbatas. Temuan ini menunjukkan perlunya peningkatan walkability, konektivitas kawasan, dan integrasi mobilitas aktif untuk mendukung pengembangan kawasan yang lebih terintegrasi dan berkelanjutan.

Kata-kunci: Transit-Oriented Development, TOD Standard 3.0 ITDP, MRT Jakarta Fase 2, Glodok, mobilitas urban

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Introduction

Population growth and rapid urbanization in large cities such as Jakarta have increased the need for an efficient and sustainable transportation system. Data from Statistics Indonesia (BPS) recorded that the population of DKI Jakarta reached 10.67 million people in 2023 [1]. This condition is accompanied by the high use of private vehicles, which triggers congestion, air pollution, and the decline of urban environmental quality. In developing countries such as Indonesia, the car is still the main mode, so that it creates uncontrolled urbanization, high transportation costs, and a decline in the quality of life of the community [2], [3].

The latest data from the Provincial Government of DKI Jakarta show that in 2023, public transportation users were only around 4 (four) million people, or equal to 18.86 percent of the total 21.75 million daily trips [4]. The government targets an increase to 30 percent by 2030, through the strengthening of modal integration such as TransJakarta, MRT, LRT, and KRL, in line with the development agenda based on Transit-Oriented Development (TOD). In this context, the Glodok area is designated as one of the development areas along the Jakarta MRT Phase 2 corridor. However, until now there has been no study that specifically evaluates the readiness of the Glodok area based on the TOD Standard 3.0 framework developed by the Institute for Transportation and Development Policy (ITDP).

TOD is seen as a sustainable strategy that emphasizes the integration of mixed functions within a walking radius of 400–800 meters from the transit node. This approach aims to improve accessibility, support non-motorized mobility, and reduce dependence on private vehicles through the development of a dense area and diversity of land use [5], [6]. In Jakarta, this concept began to be applied in several Jakarta MRT Phase 1 areas, such as Dukuh Atas, Fatmawati, and Lebak Bulus, although studies show that these areas have not fully met the ITDP TOD standard, especially in the aspects of pedestrian infrastructure, residential density, and the integration of transportation modes [7]–[9]. The absence of a study that assesses the Glodok area shows the need for a comprehensive and measurable evaluation approach. One of the frameworks that is widely used internationally is the TOD Standard 3.0 Scorecard which developed by ITDP.

This framework covers eight main principles, namely walk, cycle, connect, transit, mix, densify, compact, and shift [10]. In this evaluation system, the *transit*

principle functions as (pre-condition) for the presence of high-capacity public transportation, so that it is not assessed in the form of a quantitative score, while the other seven principles are used as assessment indicators with a maximum total of 100 points.

Based on this, this study aims to evaluate the conformity of the Glodok area to the standardization of TOD, while also identifying the challenges and opportunities of its development. This conformity is assessed against the international TOD standard using *TOD Standard 3.0*. The results of the study are expected not only to provide an objective picture of the level of readiness of Glodok, but also to produce strategic recommendations for the development of this area toward an integrated, inclusive, and sustainable environment, in line with the operation of the Jakarta MRT Phase 2.

Literature Review

Transit Oriented Development (TOD) has evolved as a strategic approach in supporting sustainable mobility as well as a framework for evaluating the readiness of urban areas. Within the context of sustainable city development, TOD is regarded not only as a planning concept, but also as a methodological instrument through the TOD Standard 3.0 that developed by ITDP [9], which enables an objective assessment of the challenges and opportunities of an area in integrating public transportation with urban functions.

TOD areas are characterized by high-intensity, multi-functional development concentrated around transit nodes within a walking radius of 400–800 meters. This approach encourages a shift in transportation modes toward the use of public transit, walking, and cycling, while reducing dependence on private vehicles. Hasibuan & Mulyani in 2022 [10], affirmed that TOD in developing cities such as Jakarta can significantly influence residents' mobility patterns. In line with this, Stojanovski [11] in his research also revealed that TOD is able to create a virtuous cycle, namely an increase in public transportation use that implies reduced congestion while improving urban quality of life. Given these characteristics, TOD is regarded as an important instrument in supporting the achievement of the Sustainable Development Goals (SDG 11), particularly the target of realizing cities that are safe, inclusive, resilient, and sustainable.

As already mentioned in the Introduction, the most widely used evaluation framework for assessing the readiness of transit-oriented areas is the TOD Standard 3.0 developed by the Institute for

Transportation and Development Policy (ITDP). This framework emphasizes eight main principles, namely walk, cycle, connect, transit, mix, densify, compact, and shift, with a maximum total score of 100 points, which is then classified into Bronze, Silver, and Gold. These principles are not only technical in nature, but are also considered academically relevant because they provide a quantitative as well as comparative measure of the effectiveness of TOD implementation across various assessment indicators. Singh et al. in 2017 [12], affirmed that the indicators in this scorecard are suitable for application in developing countries, while systematically identifying the strengths and weaknesses of an area [13]. Thus, the TOD Standard 3.0 functions not only as an evaluation instrument, but also as a strategic framework that connects theory, practice, and policy in sustainable urban planning.

In the context of Jakarta, the literature on TOD has grown increasingly since the operation of MRT Jakarta Phase 1. Various studies show that rail-based mass transit can drive the transformation of urban spatial structure and mobility patterns. The development of MRT Jakarta has the potential to reduce the number of motorized trips, increase the proportion of non-motorized transportation, and improve the urban spatial structure [14]. Moreover, the implementation of TOD has been shown to change people's travel behavior and improve urban transportation efficiency, with mixed functions and compact area development around transit nodes that encourage the use of public transportation while increasing walking and cycling activity [10], [15], [16]

Previous studies have also outlined the application of the TOD Standard 3.0 principles in Jakarta. On the aspects of walking (walk) and cycling (cycle), Purwantiasning & Bahri [17], highlighted the importance of providing safe pedestrian pathways and a pedestrian-friendly environment, particularly in heritage areas such as Kota Tua. The presence of good pedestrian pathways not only facilitates mobility, but also enhances the quality of life and cultural value of an area [17], [18]. Poerbo et al. added that compact area design prioritizing pedestrians has been shown to reduce people's dependence on motorized vehicles [16].

On the aspects of connecting (connect) and public transportation (transit), Uddin et al. in 2023 found that, through the development of a TOD index framework, commercial facilities located at transit nodes can promote movement efficiency [13]. Pedestrian connectivity from transit nodes to various land-use

functions thus becomes a crucial element of TOD success; without adequate connectivity, the effectiveness of TOD in driving a shift in transportation modes will be diminished [19].

The principles of mix, compact, and shift are also widely highlighted in the literature within the Jakarta context. The integration of residential, commercial, and recreational functions around transit nodes can create a dynamic environment while increasing the number of public transportation users [20]. High density in transit areas is also an absolute prerequisite for TOD to function effectively [21], one example being the emphasis on vertical housing development, which is an important strategy for addressing Jakarta's land limitations as well as a solution to curb urban sprawl [22], [23]. Thus, the concentration of development around transit nodes is able not only to strengthen accessibility, but also to improve the spatial efficiency of the city.

Beyond the technical scope, the success of TOD is also related to social dimensions, such as the risk of gentrification [24], the importance of increasing community participation [25], and the danger of a purely economic orientation [26], which may potentially weaken the essence of TOD as an instrument for improving urban quality of life. Thus, although the social aspect is not the focus of analysis in this study, the success of TOD must be viewed not only from a technical standpoint, but also in terms of the extent to which it integrates the principles of social justice and inclusivity.

The use of technical evaluation employing the ITDP standard has already been carried out in the MRT Jakarta Phase 1 area, although the results remain far from optimal or below the feasible threshold (not yet meeting the Bronze category). On the highest scale, namely 100 points, the study at MRT Fatmawati scored 51 points [7], where the physical condition of the area was not yet well arranged. Not much different, the Dukuh Atas area also did not reach the minimum threshold of 55 points and was therefore deemed not yet feasible, particularly with weaknesses in walkability, residential density, and the integration of transportation modes. Meanwhile, the Lebak Bulus area obtained a score of 62 points, or the fairly feasible category, although it still faces a number of weaknesses such as limited pedestrian pathways, street crossing facilities, bicycle parking, and a low connectivity ratio [8].

These three results show that although the concept of TOD has begun to be applied through the development of MRT Jakarta Phase 1, its

implementation remains partial and not yet fully in line with international standards. Studies on the implementation of TOD in Jakarta so far have largely focused on the MRT Phase 1 area, so that other areas such as Glodok, which is part of MRT Phase 2, have never been comprehensively evaluated. Yet Glodok holds a strategic position as a transportation node as well as a heritage area with distinctive spatial and social complexity. This research gap underscores the urgency of evaluating Glodok's readiness, in order to provide an objective overview while formulating strategic recommendations for the development of a more integrated, inclusive, and sustainable area.

Methods

This study employs a descriptive quantitative approach with reference to the TOD Standard 3.0 evaluation framework developed by ITDP, as an international reference standard in the assessment of transit-oriented areas. This approach was chosen because it enables an objective and measurable assessment of an area's readiness to apply TOD principles, while also providing a descriptive overview of the strengths and weaknesses of the area studied.

The evaluation was carried out using a scorecard-based assessment that is quantitative and replicable, so that the research results can be compared with other TOD studies that use a similar assessment framework across various areas. This evaluation framework consists of eight main TOD principles, namely walk, cycle, connect, transit, mix, densify, compact, and shift. However, in this assessment system, the transit principle functions as a precondition for the presence of high-capacity public transportation, and is therefore not scored quantitatively. Therefore, the numerical assessment in this study was carried out on seven (7) main principles with a maximum score of 100 points, while the transit principle was used as an indicator of fulfillment of the transit-oriented area requirement.

Research Location

The research location is focused on the Glodok area within a 500 m radius of the Glodok MRT station point (see Figure 1). The determination of this radius is based on the principle of walking accessibility of approximately 5 to 10 minutes from the transit node [9], [27]. Glodok was chosen because of its strategic position as a historic trading area as well as an urban mobility node with distinctive spatial and social complexity. To date, this area has never been comprehensively evaluated using a TOD evaluation framework, so this study is expected to fill the

research gap while providing data-based recommendations for the development of the area.

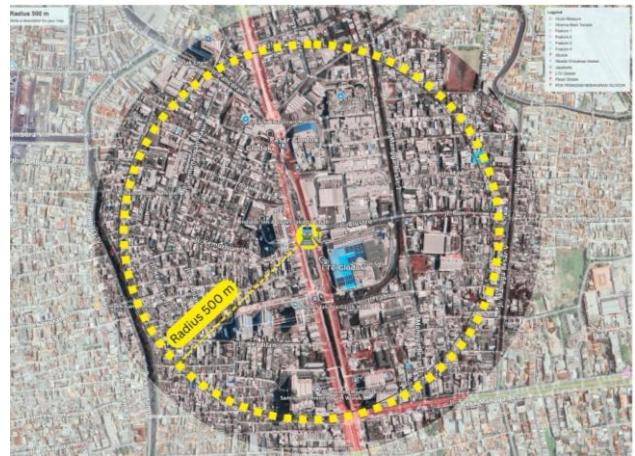


Figure 1. Plan Map of the Glodok MRT Area

Data Collection Techniques

Field data collection was carried out over three (3) months, namely during the period from May to July 2025. Observations were conducted directly in the Glodok area within a 500-meter radius of the planned MRT Jakarta Phase 2 location, namely the Glodok MRT station, with a focus on transit-oriented area assessment indicators. Field observations were conducted by a team of researchers and surveyors tasked with recording spatial data, documenting the condition of the area's infrastructure, and verifying the measurement results in the field. The involvement of several observers in this survey process also served as a control mechanism to improve the consistency and reliability of the observation results.

Spatial measurements were carried out using a combination of field observation, geographic information system (GIS) analysis, and the use of digital imagery such as Google Street View and Google Earth Pro. Measurements of sidewalk length, block size, and land-use distribution were analyzed using GIS software to obtain more measurable results, including for areas that are difficult to reach directly.

Secondary data were obtained from planning and urban planning documents, zoning regulations established by the government, and the spatial database from Jakarta Satu, which contains information on density, land use, and the transportation network. This combination of primary and secondary data was used to strengthen the validity of the assessment and to provide a comprehensive overview of Glodok's readiness as a TOD area.

Research Instrument

The research instrument uses a scorecard-based assessment grounded in the TOD Standard 3.0, comprising 100 points distributed across 25 main metrics based on the eight TOD principles. The walk and cycle principles emphasize priority for pedestrians and cyclists through the provision of safe and non-motorized-friendly infrastructure. The connect and transit principles focus on the integrated connectivity of pedestrian pathways and on the development of areas around public transportation nodes. Furthermore, the mix and densify principles emphasize mixed land-use with high density to maximize the use of space, while the compact and shift principles encourage area development with short travel distances and the provision of intermodal facilities to reduce dependence on private vehicles.

The following table summarizes the principles, metrics, and assessment weights in the ITDP TOD Standard 3.0.

Table 1. Scorecard in the ITDP TOD Standard 3.0

Principle	Metric	Indicator	Points
Walking (Walk)	Availability of pedestrian pathways that are safe, comfortable, disability-friendly & equipped with lighting	100%	3
		≥ 90%	2
		≥ 80%	1
		< 80%	0
	Availability of pedestrian crossings that are safe, comfortable & disability-friendly	100%	3
		≥ 90%	2
		≥ 80%	1
		< 80%	0
		≥ 90%	6
		≥ 80%	5
		≥ 70%	4
		≥ 60%	3
	Active building frontage (active frontage)	≥ 50%	2
		< 50%	1
		Building frontage permeability (Average number of entrances with permeable frontage per 100 meters of block frontage)	≥ 5
≥ 3			1
	< 3	0	
	Availability of shade and shelter	≥ 75%	1
< 75%		0	
Maximum Points for the Walking Principle			15
Cycling (Cycle)	Cycling path infrastructure (from the Station)	< 100 m	2
		< 200 m	1
		≥ 200 m	0
	Availability of bicycle parking facilities at the Station	Available	1
		Not Available	0
		Available	
	Percentage of bicycle parking facility availability in buildings	≥ 25%	1
		< 25%	0
	Availability of bicycle access into buildings	Available	1
Not Available		0	
Available			
Maximum Points for the Cycling Principle			5

Principle	Metric	Indicator	Points
Connecting (Connect)	Presence of small blocks in the station service area	Shorter than or ≤ 110 m	10
		≤ 130 m	8
		≤ 150 m	6
		≤ 170 m	4
		≤ 190 m	2
	Prioritizing pedestrian and cycling path connectivity	More than 10% of Blocks	0
		Ratio ≥ 2	5
		Ratio ≥ 1.5	3
		Ratio ≥ 1	1
		Ratio ≤ 1	0
Maximum Points for the Connecting Principle			15
Public Transport (Transit)	Walking distance to the public transportation point (500 – 1000 m)	Meets TOD Requirements	
		Does Not Meet	
Maximum Points for the Public Transport Principle			-
Mixing (Mix)	Complementary land use within the TOD area radius	50 – 50% of Total Floor Area	8
		51 – 70%	6
		71 – 80%	4
		≥ 80%	0
	Access to local service points (80% of buildings) to local service types	3 Types	3
		2 Types	2
		1 Type	1
		≤ 80%	0
	Access to open space points (parks and playgrounds) from buildings, on foot	80%	1
		≤ 80%	0
	Availability of affordable housing	≥ 50%	8
		≥ 35–49%	6
		≥ 20–34%	4
		≥ 10–19%	2
		≥ 1 – 9%	1
		≤ 1%	0
	Presence of housing preservation	100% retained	3
		100% relocated within a 500 m radius of the previous address	2
		≤ 100%	0
Preservation of businesses and services		100% retained / relocated within a 500 m radius	2
		≤ 100% retained	0
Maximum Points for the Mixing Principle			25
Densifying (Densify)	Non-residential density relative to the baseline (a comparable pilot project	Higher & Radius 500 m	7

Principle	Metric	Indicator	Points		
	/ in the station service area)	Higher & Radius 500 – 1000 m	5		
		5% below & Radius 500	3		
		5% below & Radius 500 – 1000 m	2		
		> 5% below	0		
		Higher & 500 m coverage area denser than 1000 m	8		
	Residential density	Higher, 500 m not denser	6		
		5% below, 500 m denser than 1000 m	4		
		5% below, 500 m not denser	2		
		≥ 5% below	0		
		Maximum Points for the Densifying Principle			15
Compacting (Compact)	Urban Area (Buildable land / built-up area adjacent to previously developed areas	≥ 90%	8		
		90%	6		
		80%	4		
		70%	2		
		60%	0		
	Public transportation options	Present within a 1 km radius & high-capacity transit mode	2		
		Bike Share	1		
		Regular transit mode	0		
		Maximum Points for the Compacting Principle			10
		Shifting (Shift)	Off-street parking (percentage of land area)	0% - 10%	8
11 – 15%	7				
16 – 20%	6				
21 – 25%	5				
26 – 30%	4				
31 – 40%	2				
≥ 40%	1				
Density level of motor vehicle lanes	2 or fewer driveways		1		
	≥ 2		0		
	Area of road right-of-way for motor vehicle lanes from land area		≤ 15%	6	
≤ 20%		3			
≥ 20%		0			
Maximum Points for the Shifting Principle			15		
TOTAL POINTS			100		

Measurement Method

For each metric in the scorecard, a quantitative formula is used in accordance with the TOD Standard 3.0 evaluation guidelines. These formulas are designed to objectively assess the level of an area's readiness to apply TOD principles. For example, in the walk principle the indicators include the availability of pedestrian pathways, crossing facilities, active building frontage, permeability, and shade or shelter (see Tables 1 and 2)

Table 2. Measurement Formulas for the Walking Principle

Metric	Calculation Formula
Availability of pedestrian pathways	$\% = \frac{\Sigma \text{Disabled-Friendly Pedestrian Path}}{\Sigma \text{Existing Pedestrian}} \times 100$
Availability of pedestrian crossings	$\% = \frac{\Sigma \text{Intersections}}{\Sigma \text{Existing Intersections with Pedestrian Crossings}} \times 100$
Active building frontage (active frontage)	$\% = \frac{\Sigma \text{Pedestrian Path with Active Frontage}}{\Sigma \text{Existing Pedestrian Path}} \times 100$
Building frontage permeability	$n = \frac{\Sigma \text{Entrance Road Section for Pedestrian}}{100 \text{ m Building Frontage}} \times 100$
Availability of shade and shelter	$\% = \frac{\Sigma \text{Pedestrian Path with Protection (Shade-Shelter)}}{\Sigma \text{Existing Pedestrian Path}} \times 100$

Source: [27], processed by the Authors

These formulas represent the fact that scorecard-based measurement always compares actual conditions against the ideal standard. The other principles (cycle, connect, mix, densify, compact, shift) use similar formulas based on the assessment indicators and are not shown in full in order to avoid repetition.

Data Analysis Techniques

The collected data were then analyzed using a scorecard evaluation based on the assessment framework, with score thresholds set by ITDP (see Tables 1 and 2). Each indicator was scored based on the actual field conditions and information from secondary documents. The scores of all indicators were summed to obtain the total readiness value of the Glodok area. This value was then classified into the Bronze (56-70 points), Silver (71-85 points), or Gold (86-100 points) category in accordance with the provisions.

These results provide a comprehensive overview of the extent of Glodok's readiness as an ideal transit-oriented area, while also identifying its weaknesses and development potential.

Further analysis was directed at identifying the factors constituting the strengths and weaknesses of the area, so that this study not only produces a quantitative score, but can also provide a basis for formulating strategic recommendations in the development of Glodok toward an integrated, inclusive, and sustainable TOD area.

Research Results

Based on the evaluation using the TOD Standard 3.0 developed by ITDP, the Glodok area obtained a total score of 49 out of 100 points, and was therefore classified in the Below Bronze category. These results show that although this area has several characteristics that support the development of a transit-oriented area, there are still a number of aspects that need improvement to achieve the ideal TOD standard. The following are the field measurement results.

Table 3. Field Measurement Results

Principle	Metric	Glodok Achieve-Ment	Score
Walking (Walk)	Safe & Comfortable Pedestrian Pathways	9,14%	0
	Safe & Disability-Friendly Crossings	14,2%	0
	Active Building Frontage	8,38%	0
	Building Frontage Permeability	9	2
	Shade & Shelter	15,21%	0
Total Walking Assessment			2
Cycling (Cycle)	Bicycle Lanes	Not Available	0
	Bicycle Parking at the Station	1 Limited Rack	0
	Bicycle Parking in Buildings	Only LTC Glodok	0
	Bicycle Access to Buildings	Not Available	0
Total Cycling Assessment			0
Connecting (Connect)	Block Sizes (Small)	126,2 m	0
	Pedestrian Connectivity	0,022	0
Total Connecting Assessment			0
Public Transport (Transit)	Walking Distance ≤500 m to the Transit Point	Fulfilled	
Total Transit Assessment			-
Mixing (Mix)	Complementary Land Use	58,17%	8
	Access to Local Services	≥3	3
	Access to Parks / Play Areas	Not Available	0
	Affordable Housing	Not Available	0

Principle	Metric	Glodok Achieve-Ment	Score
	Housing Preservation	100%	3
	Business/Service Preservation	100%	2
Total Mixing Assessment			16
Densify (Densifying)	Non-Residential Density	58,17%	7
	Residential Density	42,23%	8
Total Densifying Assessment			15
Compact (Compacting)	Urban Area	92,03%	8
	Public Transport Options	BRT, MRT (under construction), Non-BRT Bus (no bike share)	2
Total Compacting Assessment			10
Shifting (Shift)	Off-Street Parking	17,3%	6
	Vehicle Access Density (Driveway)	>2	0
	Road Area for Motorized Vehicles	44,38%	0
Total Shifting Assessment			6
TOTAL SCORE			49

The principles with the highest achievement are Densify (15/15), Compact (10/10), and Mix (16/25). These results show that Glodok has a high-density level, fairly good land-use diversity, and the characteristics of a relatively compact urban structure. This condition reflects that, spatially, this area already possesses several basic characteristics that support the development of a TOD area.

Conversely, the lowest achievements are found in the Cycle (0/5) and Connect (0/15) principles, which indicates that Bicycle Lane infrastructure and supporting facilities for cyclists are not yet available, causing the Cycle principle to obtain no score. In addition, the relatively large block sizes of the area and the low pedestrian connectivity ratio caused the Connect principle to obtain no score in this evaluation as well.

Significant weaknesses are also found in the Walk (2/15) and Shift (6/15) principles. The low score on the Walk principle indicates that the quality of pedestrian infrastructure in the Glodok area is still limited, both in terms of the availability of safe and comfortable pedestrian pathways, disability-friendly crossing facilities, and the availability of shade along pedestrian pathways. Meanwhile, for the Shift principle, the score obtained indicates that the dominance of motorized vehicles in the use of road space is still quite high, as seen from the percentage

of Off-Street Parking and the area of road space allocated to motorized vehicles.

On the other hand, for the Transit principle, the assessment is not expressed in the form of a score because this indicator functions as a precondition in the TOD evaluation framework. In this study, this indicator has already been Fulfilled, because the Glodok area lies within the ideal walking radius (≤ 500 meters from a public transportation node). In addition to being served by BRT TransJakarta and non-BRT bus services, this area will also be served by MRT Jakarta Phase 2, which is currently still under construction.

With a total of 49/100 points (Below Bronze), these results show that although this area has fairly good potential in terms of density and compact area structure, there remain several important aspects that need to be improved, particularly the quality of pedestrian infrastructure, area connectivity, and the provision of non-motorized mobility facilities.

Discussion

Referring to Table 3, the evaluation results show an imbalance in the application of TOD principles in the Glodok area. In general, there are two distinct groups of achievement. The first group, with low achievement, comprises the principles of walk, cycle, connect, and shift, which indicates that the area environment does not yet fully support active mobility. This condition is crucial because these principles are core elements in realizing a sustainable urban transportation system within the TOD framework.

Conversely, the second group, which shows relatively better achievement, comprises the principles of mix and densify. This achievement reflects Glodok's character as an old urban area with diverse land-use functions and high density. The compact and transit principles also possess strong structural capital in the form of a dominance of built-up area and the presence of high-capacity public transportation. However, this potential has not yet been fully converted into walking- or cycling-based mobility patterns due to the low quality of local access, such as sidewalks, crossing facilities, Bicycle Lanes, and shade elements.

The Walking Principle (Walk)

The evaluation results show that the walking quality in the Glodok area is still low. Of the total pedestrian pathway network spanning 21,275 meters, only about 9.14% is in a feasible or semi-feasible condition. Relatively good sidewalks are generally located along

main corridors such as Jalan Gajah Mada, Jalan Hayam Wuruk, and part of Jalan Pintu Besar Selatan, while most local streets such as Jalan Pancoran, Jalan Gloria, and Jalan Perniagaan are dominated by sidewalks that are narrow, damaged, and discontinuous, and are often occupied by illegal parking and informal commercial activity (street vendors) (Fig. 2).



Figure 2. Condition of Pedestrian Pathways in Glodok

This condition increases the friction cost for pedestrians, making journeys slower and less safe because it often forces pedestrians to step down onto the roadway. In addition, poor sidewalk quality also reduces social interaction along street corridors and weakens the city's natural surveillance function (eyes on the street) [28].

In terms of safety, only one (1) of eight (8) intersections has a formal crossing, while shade availability covers only about 15.21% of the total pedestrian pathways. This condition is inadequate for a tropical climate and contributes to increased heat stress for pedestrians. In fact, street vegetation elements are known to be able to lower surface temperatures by up to 3–9 °C and to improve walking comfort [29]. As a result, although building-frontage

permeability is relatively high (± 9 accesses/100 m), its benefits are not converted into good walkability because the pedestrian corridors as a whole remain discontinuous, uncomfortable, and unsafe.

Improving this condition requires physical and policy interventions, such as sidewalk revitalization with universal design standards, level pedestrian-path surfaces, continuous tactile paths, an effective minimum width of 2.5 m, and the provision of safe crossing facilities, as well as the arrangement of illegal parking and street-vendor activity through a street management program. Integrating transportation planning with the preservation of historic areas through a pedestrian priority zone [30] or a heritage walk corridor, which connects transit nodes with historic points. Collaboration with residents and local business actors is also important to maintain the vitality of pedestrian spaces through various participatory programs. This approach is in line with the findings of Talen & Koschinsky [31] which emphasize that walkability is determined not only by physical design, but also by spatial governance, multi-level policy, and community participation in maintaining public space.

The Cycling Principle (Cycle)

The cycle principle in the Glodok area shows very low achievement. In the TOD concept, the bicycle is a healthy, affordable, and environmentally friendly mode of transportation that therefore needs to be supported by safe infrastructure and adequate parking facilities. However, the observation results show that the Glodok area does not yet have adequate infrastructure to support cycling mobility.

Field observations show the absence of Bicycle Lanes, whether in the form of dedicated bike lanes or protected lanes, so that cyclists must share space with motorized vehicles in dense areas such as Jalan Gajah Mada and Jalan Hayam Wuruk. This condition has the potential to increase the risk of cyclist accidents by up to twofold [32].

In terms of intermodal integration, bicycle parking facilities are also very limited. Currently, only one (1) bicycle parking rack is available at the non-BRT TransJakarta bus stop (Fig. 3), and one (1) bicycle parking facility in front of the LTC Glodok Building (Fig. 4). In fact, the provision of bicycle parking at transit nodes can extend the reach of public transportation to a radius of 3-5 km [32].

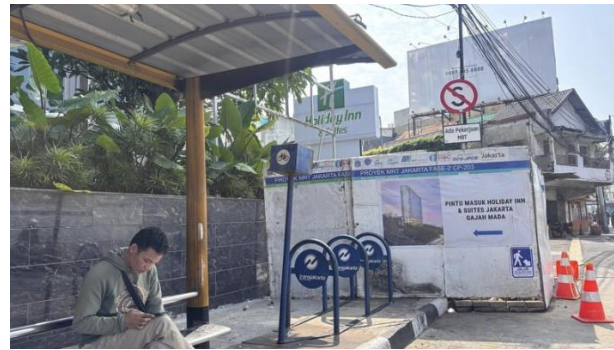


Figure 3. Bicycle Parking at the Glodok Stop



Figure 4. Bicycle Parking in front of LTC Glodok

In addition, to date there are no regulations or facilities that allow bicycle access into buildings, such as end-of-trip facilities in the form of changing rooms, lockers, or in-building bicycle parking, which have been proven to influence people's interest in cycling [33].

Given this condition, the cycle principle in the Glodok area is categorized as very weak because all indicators obtained 0 points, contrary to the ITDP TOD Standard, which emphasizes the provision of a safe bicycle network and adequate parking facilities, and integration with public transportation. Therefore, area development needs to be directed toward building protected Bicycle Lanes that connect transit nodes and activity centers, providing bicycle parking at TransJakarta stops, MRT stations, and public buildings, and implementing regulations regarding bicycle access into buildings.

The Connecting Principle (Connect)

The evaluation of the Connect principle shows that the level of connectivity in the street network of the Glodok area is still not optimal. Although the average block length is recorded at 126.2 meters, which relatively supports pedestrian mobility, about 13.5% of blocks exceed 190 meters, surpassing the ITDP threshold of 10% (Fig. 5 and Table 3).

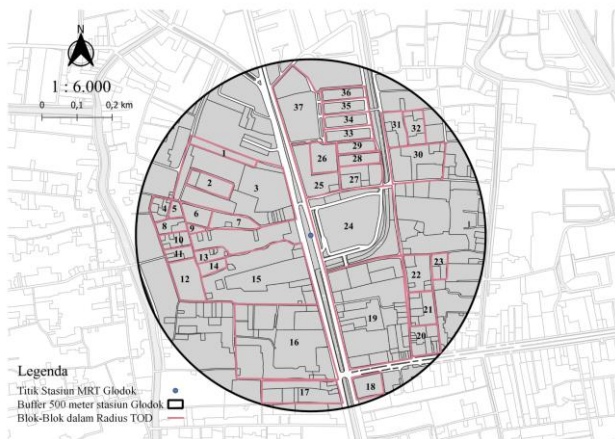


Figure 5. Blocks in the Glodok TOD Area

Table 3. Measurement Results for Small Blocks

Block No	Length (m)	Block No	Length (m)	Block No	Length (m)	Block No	Length (m)
1	186	11	72	21	88	31	96
2	118	12	105.5	22	93	32	86
3	252	13	90	23	68	33	118
4	71	14	76	24	180	34	118
5	45	15	297	25	144	35	118
6	80	16	275	26	76	36	118
7	147	17	217	27	114	37	161.5
8	78	18	136	28	114		
9	47	19	279	29	107		
10	80	20	70	30	138		

Large-sized blocks (>100 m) cause fragmentation of the street network and force pedestrians to take inefficient detours. Research shows that areas with smaller block sizes tend to have more vibrant urban activity because they provide a variety of travel routes, increase social interaction, and strengthen the vitality of urban space [34], [35].

In terms of intersections, although there are 58 intersections, only one (1) four-way intersection is equipped with a formal crossing facility in the form of a zebra crossing. This condition results in a pedestrian-to-motorized-vehicle connectivity ratio of 0.022, which is far below the minimum standard of 1, as recommended in the TOD evaluation framework [36]. This value illustrates that the intersection system in this area is still heavily dominated by motorized vehicles, while pedestrian mobility needs have not yet become a priority in the design of the street network.

This low connectivity results in increased travel distances, a diminished sense of safety, and reduced appeal of walking and cycling. To improve this condition, several interventions are needed, such as breaking up large blocks through mid-block crossings, providing safe crossing facilities at main intersections, and redesigning intersections to be safer for pedestrians and cyclists.

These efforts need to be integrated into a pedestrian network plan that connects main corridors such as Jalan Gajah Mada and Jalan Hayam Wuruk with the local street network, such as Jalan Pancoran, Jalan Perniagaan, and Jalan Gloria, so that non-motorized mobility becomes more efficient, safe, and aligned with the principle of transit-oriented development.

The Public Transport Availability Principle (Transit)

Transit is the backbone of the TOD concept because it enables people's daily mobility without dependence on private vehicles while strengthening the efficiency of a compact city. The presence of high-capacity public transportation also encourages the intensity of urban activity and the use of more sustainable transportation modes.

In the Glodok area, high-capacity modes are already available through BRT Transjakarta and non-BRT bus services, and will be reinforced by the presence of the MRT Jakarta Phase 2 Station, which is currently still under construction. This condition shows that this area structurally has strong potential to be developed as a TOD area.

Nevertheless, access to transit nodes is still limited. Feasible pedestrian pathways account for only about 9.14%, while bike sharing and bicycle facilities for short-distance trips are not yet available. Intermodal integration between MRT, BRT, and non-BRT buses is also still limited, particularly in pedestrian connectivity, transfer facilities, and the first-last mile mobility system. In fact, the effectiveness of TOD depends heavily on the integration of public transportation, pedestrian access, and multimodal connectivity [37].

Thus, although the public transportation base in Glodok is fairly strong, the application of the Transit principle is not yet fully optimal. Improving the quality of pedestrian pathways toward transit nodes, providing sustainable micro-modes such as bike sharing, and strengthening multimodal integration are needed so that the area can function as a more integrated and sustainable TOD environment.

The Land-Use Mixing Principle (Mix)

The Mix principle in TOD development emphasizes the diversity of land-use functions and activities within an area in order to create an active, inclusive environment that supports short-distance trips by walking and cycling. The diversity of land-use functions also plays a role in reducing dependence on motorized vehicles while enhancing the economic vitality and social interaction of the area.

Observation results (Fig. 6) show a relatively balanced composition between residential functions (42.83%) and non-residential functions (58.17%), which include trade, services, and other commercial activities. This composition falls within the complementary TOD range, namely 50–60%, so that the land-use indicator obtained the maximum score. This combination of residential functions and commercial activities supports activity in the area throughout the day (24 hours) while increasing the potential for non-motorized trips [38].



Figure 6. Complementary Land Use

The distribution of local services (Fig. 7) shows that health, education, and fresh-food facilities are available within a 500–1000 meter radius of the station, although most remain concentrated along main corridors such as Jalan Gajah Mada, Jalan Hayam Wuruk, and Jalan Pancoran–Gloria. This condition allows part of the community's daily needs to be met by walking or cycling, which has the potential to increase non-motorized mobility [39]. The proximity of facilities has also been shown to strengthen social interaction within the urban environment [40].



Figure 7. Access to Local Services

However, access to public open space remains limited. The survey shows that there is no playground meeting the standard ($>300 \text{ m}^2$ with at least 15 hours/day of

access) within a 500-meter radius, and only seven small green open spaces ($<300 \text{ m}^2$) were found, which are not yet optimal as spaces for public interaction. As a result, the community's quality of life and social interaction may potentially decline. Yet the presence of active open space can enhance the sense of safety and social cohesion of the city.

From a social standpoint, the study also shows the absence of affordable housing, so that this indicator obtained a score of 0 points. This condition may potentially trigger gentrification, namely the displacement of low-income groups due to rising land and rental prices [41]. Nevertheless, the housing preservation indicator obtained the maximum score because there is no plan to relocate existing settlements (Abdul of DPRKP, May 2025), so that the community's social networks are maintained [42]. In addition, the business and services preservation indicator also obtained the maximum score based on PT MRT Jakarta's commitment to maintaining local businesses within a 500-meter radius. Such preservation is important for maintaining the area's economic vitality as well as its cultural identity, as emphasized in Zukin [43] regarding the importance of urban authenticity and preventing homogenization within the city.

From a social standpoint, the survey shows the absence of affordable housing, so that this indicator obtained a score of 0 points. The absence of affordable housing raises the risk of gentrification, namely a condition in which the community.

Overall, the Mix principle in the Glodok TOD area can be categorized as fairly good, particularly in terms of land-use composition, access to local services, and the preservation of housing and businesses. However, the absence of affordable housing and limited public space remain the main weaknesses that may potentially reduce the inclusivity of the area.

Therefore, the area development strategy needs to be directed toward: (1) the provision of affordable housing through mixed-income housing schemes or balanced housing; (2) the construction of pocket parks and the revitalization of green open space; (3) the preservation of local businesses rooted in Glodok culture. Through these measures, this area has the potential to develop while retaining its historical character.

The Densification Principle (Densify)

The Densify principle is one of the important foundations in TOD development because the density

of an area plays a role in supporting the sustainability of public transportation. A dense area is able to generate a large base of public transportation users, so that services can operate more efficiently and sustainably [38].

The research findings show that Glodok has a relatively high level of activity density. The significant Non-Residential Density (Fig. 8) reflects Glodok's role as a historically valuable trade and services center that remains active to this day. This economic activity generates daily trip generation and attraction that support the use of transit modes [37].



Figure 8. Non-Residential Density Assessment

However, densification needs to be balanced with inclusive planning in order to maintain the quality of the urban environment, or to minimize gentrification.

Overall, this principle can be said to have been achieved quantitatively through the high intensity of economic activity and land use. Nevertheless, qualitative intervention is still needed to ensure that the area's density can support the urban environment in a sustainable manner, through: (1) the integration of inclusive housing to prevent social segregation; (2) improving the connectivity of pedestrian and cycling paths toward dense commercial zones, and (3) the revitalization of public space to accommodate residents' activities within a high-intensity environment.

The Compactness Principle (Compact)

The Compact principle emphasizes the spatial proximity between housing, employment, services, and public transportation so that trips are shorter, more energy-efficient, and environmentally friendly [44], [45]. In the Glodok TOD area, survey results show that 82.31 hectares, or 92.03% of the area, is built-up land, indicating a dominance of urban functions consistent with the characteristics of a

compact city. This condition is reinforced by the presence of the MRT (under construction), BRT TransJakarta, and non-BRT buses that support transit-based mobility

Nevertheless, limitations are still evident in the absence of a bike-sharing system or micro-mobility modes for first-last mile connectivity, as well as the lack of pedestrian-friendly public open space. Yet such active modes have been shown to be important in strengthening the accessibility of the area [46].

Therefore, the strengthening of this principle needs to be directed toward providing sustainable micro-mobility modes, such as bike sharing or public bicycle rental, as well as improving the quality of public space through comfortable sidewalks, safe Bicycle Lanes, and the provision of open spaces such as pocket parks. Such intervention is important to ensure that the area's density is not only spatially efficient, but also socially efficient (equity, comfort, and the community's quality of life).

The Shifting Principle (Shift)

The Shift principle in the Glodok area shows a condition that is still weak in controlling the use of private vehicles. Field survey results show that there are five (5) Off-Street Parking facilities, with the proportion of parking area reaching 17.3% of the area's total land (Fig. 9). Although parking control is beginning to be evident, this figure is still relatively high for a transit-oriented area.

In addition, the density of motorized vehicle access (driveway density) was recorded at more than two (2) driveways per 100 meters of block frontage, particularly along the Jalan Gajah Mada and Jalan Hayam Wuruk corridors. This condition triggers the fragmentation of pedestrian paths and increases conflicts between motorized vehicles and active modes. A similar pattern is seen in the allocation of street space, where 44.38% of the road width is still designated for motorized vehicles, indicating the dominance of cars in the area's street-space structure.



Figure 9. Off-Street Parking Area

These findings are consistent with recent research showing that the higher the minimum parking requirements (MPRs), the higher the rate of car ownership, thereby perpetuating dependence on private vehicles [47]. Conversely, the reduction or elimination of minimum parking requirements is an effective strategy that is increasingly used in European and North American cities to encourage a shift toward sustainable transportation modes. This is reinforced by Barter [48], who emphasizes that Asian cities have a great opportunity to apply parking restraint strategies to reduce the dominance of cars, given their strong public transport user base and high urban density. Thus, parking restrictions can become an effective instrument for reducing dependence on cars.

Therefore, the strengthening of the Shift principle needs to be carried out through progressive parking management, consolidation of vehicle access to maintain the continuity of pedestrian paths, the application of speed limits for motorized vehicles, and the redistribution of street space into sidewalks, protected Bicycle Lanes, and public space. In addition, the application of an Electronic Road Pricing (ERP) policy on main corridors such as Jalan Hayam Wuruk and Jalan Gajah Mada can serve as an additional instrument for reducing the attractiveness of car use in the area.

Conclusion

The quantitative evaluation of Glodok's readiness as a transit-oriented area shows that this area obtained a score of 49 out of 100 points based on the TOD Standard 3.0 framework developed by ITDP, and is therefore categorized at the Below Bronze level. Nevertheless, this area has fairly strong structural capital, particularly in the Mix, Densify, and Compact principles, as reflected in the area's density, the diversity of land-use functions, and the dominance of built-up area that supports a compact city character, as well as the high intensity of the area's economic activity. The Transit principle, or the presence of mass transit networks such as BRT TransJakarta, non-BRT bus services, and the construction of MRT Jakarta Phase 2, also strengthens the area's potential.

Conversely, several main TOD principles related to active mobility and the control of private vehicles still show low achievement, particularly in the Walk, Cycle, Connect, and Shift principles. The limited quality of sidewalks, the unavailability of cycling infrastructure, the low connectivity of the pedestrian network, and the dominance of vehicle lanes remain the main problems. Therefore, efforts are needed to improve

the area's score so that it becomes an ideal TOD area, particularly in the principles that received low scores.

The recommended development priority strategies are as follows.

Table 4. Development Priority Strategies for Glodok TOD

Priority	Main Strategy	Principle
1	Sidewalk revitalization & widening of pedestrian paths to a minimum of 2.5 m	Walk
2	Safe Crossings	Walk & Connect
3	Protected Bicycle Lanes	Cycle
4	Bicycle Parking & Bike-Sharing, E-Scooters at Transit Nodes	Cycle & Transit
5	Mid-Block Crossing	Connect
6	Addition of Vegetation and Street Furniture along Pedestrian Paths	Walk
7	Progressive Parking Fees	Shift
8	Consolidation & Restriction of Driveways	Shift
9	Development of Affordable Housing (Mixed-Income Housing)	Mix
10	Development of Pocket Parks or Public Open Spaces >300 m ² within a 500-meter radius	Mix

However, this study has limitations because it focuses only on one (1) study area and has not yet examined in depth the aspects of user behavior or transportation policy dynamics. Therefore, future research is recommended to expand its scope to other TOD areas in Jakarta or Asian cities for comparison, while integrating community-perception survey approaches and policy evaluation in order to provide a more comprehensive picture of TOD implementation in urban areas. Thus, future TOD development can be designed in a more adaptive, inclusive, and empirically evidence-based manner.

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