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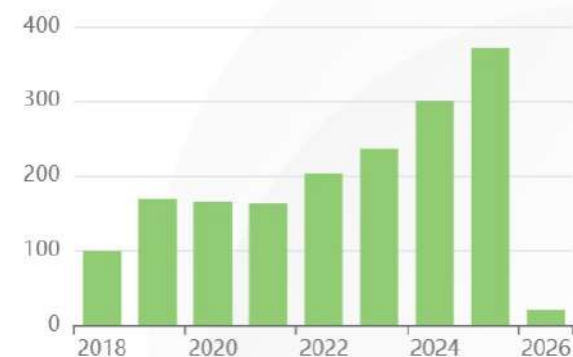
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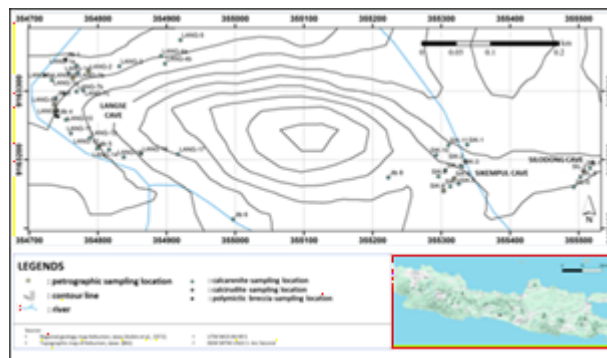


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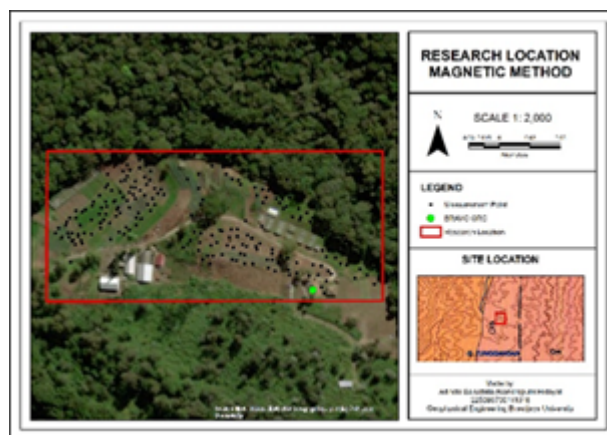
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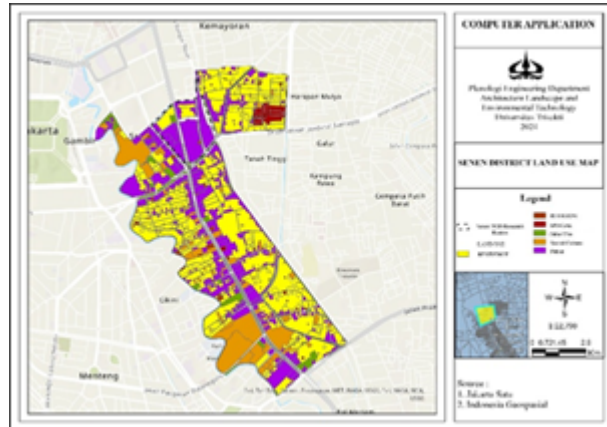

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Transit Oriented Development (TOD) Development in Senen Area, Central Jakarta, Indonesia

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Abstract

Senen area, Central Jakarta, is a strategic area that faces various problems, such as traffic congestion, lack of integration between modes of transportation, and minimal facilities for pedestrians and public transportation users. This study aims to evaluate the application of the TOD concept in the Senen area based on principles such as transportation integration, mixed land use, and pedestrian connectivity. This study uses a qualitative descriptive method approach, where the data used is secondary data obtained through literature studies. Literature studies are conducted by referring to previous studies and relevant institutional reports. The data collected includes spatial information, such as maps and geographic data, as well as non-spatial information, such as planning documents and policies. The results of the study indicate that the Senen area has great potential to be developed as a TOD area. Some steps that can be taken include improving connectivity between modes of transportation, improving public facilities, and adding green open spaces. In conclusion, the implementation of TOD in the Senen area can reduce the use of private vehicles, increase the efficiency of public transportation, and create a more comfortable and environmentally friendly city environment.

Keywords: Transit Oriented Development (TOD), Senen Area, Transportation, Spatial Planning.

1. Introduction

Transit Oriented Development (TOD) is a concept for developing an urban area that prioritizes the use of public transportation rather than private vehicles (Mohamad, Fahmy-Abdullah and Masrom, 2021). The TOD concept is intended as a solution for developing urban areas through development that is oriented towards the transit system so that it has the potential to reduce household transportation costs and improve the quality of life (Taki, Mahmoud and Maatouk, 2018). On the other hand, the development of areas with a mixed-use pattern is expected to increase regional accessibility and reduce travel needs which ultimately reduce environmental impacts and provide alternative solutions to avoid traffic congestion (Nigro, Bertolini and Moccia, 2019). According to the Regulation of the Minister of Agrarian Affairs and Spatial Planning/BPN Number 16 of 2017 concerning Guidelines for the Development of Transit-Oriented Areas, it is a concept for developing areas in and around transit nodes to provide added value that emphasizes integration between mass public transportation networks and non-motorized transportation networks, as well as reducing the use of motorized vehicles accompanied by the development of mixed and dense areas with medium to high intensity of space utilization (Singh et al., 2017).

DKI Jakarta as the nation's capital is also the center of activities for the surrounding area. As the largest city in Indonesia, DKI Jakarta also still faces challenges in urban problems such as severe congestion, one of which is. According to, in 2019 there were a total of 26.4 million daily travel movements in DKI Jakarta. The high movement places Jakarta as the 10th most congested city in the world

in 2019 (Taki, Maatouk and Lubis, 2018). The city of Jakarta is also one of the cities that has a lot of commuting behavior in it, including the study location, namely the Senen area which is designated as a secondary activity center with mixed activities (mix use) so that every day there is an increase in accessibility at transit points in the Senen area (Taki, Maatouk and Qurnfulah, 2017). Mixed activities at this location include trade and service activities, offices (Karina, Sumabrata and Berawi, 2025), TransJakarta transit mobility, terminals and train stations. In order for the handling of accessibility and integration between modes to be on target, it is necessary to develop integration between modes, one of which is the development of an area with the Transit Oriented Development (TOD) concept (Taki, Maatouk and Ahmadi, 2019).

In this case, the Senen area still has problematic issues, including congestion due to high accessibility and mobility in the area (Taki, Pamungkas, et al., 2024). This area has a central terminal and commuter and long-distance train stations, so there needs to be a re-arrangement for the integration of mass transportation, in addition, the high volume of traffic due to private vehicles that is not balanced with even road construction also causes congestion in this area (Taki, Rani, et al., 2024). Presidential Regulation Number 60 of 2020 concerning the Spatial Planning for the Urban Areas of Jakarta, Bogor, Depok, Tangerang, Bekasi, Puncak and Cianjur has mentioned several transit-oriented area development programs with the type of transit-oriented city development area, one of which is at Pasar Senen Station in Senen District. Through the DKI Jakarta Government in the 2010-2030 Jakarta City Spatial Planning Plan (RTRW) the results of the revision in 2019 began using the TOD concept planning to develop transit points spread

across the Jakarta City area. This point is in the form of intermodal terminals/stations at activity centers, rail transportation stations, highway mass transportation shelters (stops) and public transportation terminals, TOD concept planning in Jakarta City will not be achieved if its implementation has not or does not comply with the TOD Area development criteria. Based on existing conditions, the Senen area is currently in the development stage of markets, housing, transit stations and infrastructure, there is a need for a comparison between the TOD guideline criteria and the existing conditions of the area (Guthrie and Fan, 2016).

2. Research Methodology

This study uses a descriptive qualitative method approach, where the data used is secondary data obtained through literature studies (Sun et al., 2022). Literature studies are conducted by referring to previous studies and relevant institutional reports. The data collected includes spatial information, such as maps and geographic data, as well as non-spatial information, such as planning and policy

documents (Chaniago and Taki, 2022). The analysis process is carried out using overlay techniques and manual digitization to process spatial data and integrate non-spatial information. In addition, deductive methods are applied to examine the theory and criteria of Transit Oriented Development (TOD) guidelines (Taki and Maatouk, 2018). This analysis begins using a literature review to identify TOD theories and concepts, which are then used as the basis for formulating research variables (Zhang et al., 2019).

3. Results and Discussion

3.1 TOD Area Development Requirements According to ITDP

ITDP uses eight key principles known as the "8 Principles of TOD," which help create transit-friendly, sustainable, and inclusive areas (Bai et al., 2023). Here are the key criteria according to ITDP:

Table 1. 8 Principles of TOD

INDICATOR	VARIABLES	PROVISION
ACCESSIBILITY	Distance to public transportation	Measures how close a location is to a train station or bus stop.
	Availability of alternative modes of transportation	Assess the presence of bicycle lanes, pedestrian lanes, and public transportation.
DENSITY	Number of housing units per hectare	Measuring population density in TOD areas to support public transportation.
	Land use level	The percentage of land used for housing, commercial, and public facilities.
MIXED USAGE	Proportion of land use	Assess land use diversity (residential, commercial, public space).
	Availability of services and facilities	The presence of schools, parks, health centers within reach.
PEDESTRIAN ORIENTED DESIGN	Quality of sidewalks and pedestrian paths	Measuring the width, comfort and safety of pedestrian paths.
	Crossing facilities	Number and quality of zebra crossings or pedestrian bridges
PUBLIC SPACE	Green open space area	Measuring the amount of green open space available to the community
	Quality of public facilities	Assessment of parks, plazas, and other gathering areas
INTEGRATION WITH PUBLIC TRANSPORTATION	Connectivity between modes of transportation	How well is the public transport system integrated with other modes?
	Frequency of transportation services	Number of public transportation services in a certain time period
LEVEL AFFORDABILITY	Rental price or house price	Measuring housing affordability for low-income communities
	Percentage of income spent on housing	The ratio between housing expenses and household income.
ENVIRONMENTAL SUSTAINABILITY	Carbon emission reduction	Measuring the environmental impact of using public transport compared to private vehicles.
	Use of renewable energy	Percentage of renewable energy use in TOD development

3.2 The Purpose of Spatial Planning for the detailed Spatial Planning of Senen District

The objectives of spatial planning for Senen District are outlined in the Regional Regulation of the Special Capital Region of Jakarta Province Number 1 of 2014 concerning Detailed Spatial Planning and Zoning Regulations, as follows :

1. Realization of the arrangement of national scale office, trade and service centers integrated with mass public transportation in the Senen area.
2. Implementation of integrated transportation infrastructure development with pedestrian paths, mass public transportation, and other public

transportation to support TOD (Taki, Anita Sitawati Wartaman, et al., 2024).

3. Implementation of development and/or improvement of trade and service infrastructure environment by providing space for micro businesses and arranging passenger terminals in an integrated manner with railway transportation at Senen Station (Barus, Djaja and Transoportasi, 2023).
4. Realization of urban tourism
5. Realization of residential area development through environmental improvement and/or rejuvenation equipped with infrastructure integrated with mass public transportation.

6. Construction of public flats equipped with infrastructure integrated with mass public transportation.

3.3 Spatial Structure Plan for Senen District

The following is a map of the spatial pattern of the Senen District area, Central Jakarta.

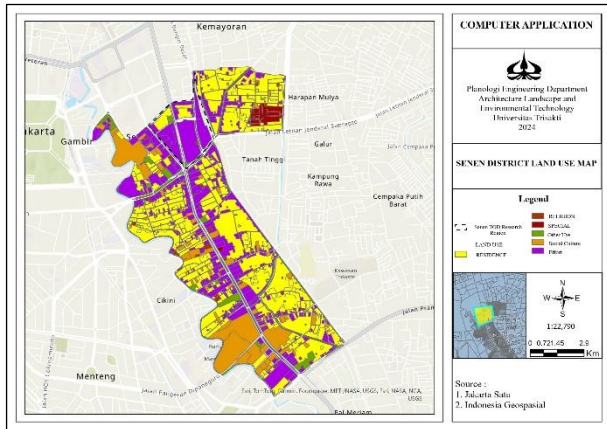


Fig 1. Land Use Map of Senen District

There is a Spatial and Regional Structure Plan for Senen District which is explained in DKI Jakarta Regional Regulation Number 1 of 2014 concerning RDTR and Zoning Regulations as follows :

1. The land transportation plan functions to smooth the flow of transportation and overcome traffic congestion by :
 - a) Development of mass public transportation infrastructure on special routes in the Harmoni-Pulo Gadung corridor, the Dukuh Atas-Pulo Gadung corridor, and the Kampung Melayu-Ancol corridor
 - b) Improvement of primary arterial roads throughout
 - c) Improvement of secondary arterial roads in each sub-district
 - d) Improvement of secondary collector roads in the sub-districts of Paseban, Kenari, Kramat, Senen, and Bungur sub-districts
 - e) Development of local roads in each sub-district
 - f) Implementation of phase II traffic restrictions in Kramat, Senen, and Paseban Sub-districts
 - g) Development of parking infrastructure in each sub-district
 - h) Development of pedestrian paths and bicycle paths on arterial, collector and local roads in each sub-district
2. The plan for evacuation routes and space infrastructure in Senen District is as follows :
 - a) Disaster evacuation route on the section
 - b) The intersection of the intersection and Kwitang Road in Senen Village and Kwitang Village
 - c) Kramat Roundabout Road in Senen Subdistrict and Kramat Subdistrict
 - d) Jalan Letjend Suprato in Bungur Village
 - e) Pejambon Street, Abdul Rahman Saleh Street, Senen Raya Street, and Kwini 2 Street in Senen Subdistrict

- f) Matraman Street in Kenari Subdistrict
- g) Scout Street in Paseban Subdistrict
- h) Senen Market Street in Senen Subdistrict
- i) Kramat Raya Street in Kramat Subdistrict
- j) Kwitang Street and Kenari Subdistrict
- k) Salemba Raya Street in Paseban Subdistrict

3. Transportation infrastructure plan

- a) Bus Stop Infrastructure
 - 1) Senen Central Bus Stop
 - 2) Atrium Stop
 - 3) RSPAD bus stop
 - 4) Ministry of Foreign Affairs bus stop
- b) Parking Provision
 - 1) provision of parking facilities for changing modes (park and ride) is available in the Senen area in Senen sub-district
 - 2) Parking on the road (on street parking) is carried out based on statutory regulations
- c) Railway Transportation Infrastructure
 - 1) Plans to develop an inner-city ring train via Senen Station in Senen Subdistrict and Kramat Station in Rawasari Subdistrict
 - 2) The Jabodetabek commuter train development plan is at Pasar Senen Station in Bungur, Kramat, Paseban and Senen Sub-districts
 - 3) The planned non-level crossing is located at the Fly Over/Underpass on Jalan Kramat Lontar in Kramat Subdistrict and on Jalan Diponegoro in Kenari Subdistrict
- d) Land Transportation Infrastructure Plan
 - 1) Development of mass public transportation infrastructure on special routes in the Harmoni-Pulo Gadung corridor, the Dukuh Atas-Pulo Gadung corridor, and the Kampung Melayu-Ancol corridor
 - 2) Improvement of secondary arterial roads in each sub-district
 - 3) Improvement of secondary collector roads in the sub-districts of Paseban, Kenari, Kramat, Senen, and Bungur
 - 4) Development of local roads in each sub-district
 - 5) Implementation of phase II traffic restrictions in Kramat, Senen, and Paseban Sub-districts
 - 6) Development of parking infrastructure in each sub-district
 - 7) Development of pedestrian paths and bicycle paths on arterial, collector and local roads in each sub-district

3.4 Existing Conditions of the Area

The existing condition of Senen District including our case study area, namely Pasar Senen Station, has activities and activities that are close to each other, including Malls, Markets, Terminals, Sports Arenas, Police Stations and Train Stations as in the picture below which are in accordance with the color of the land use of the area (Taki et al., 2018), namely as follows :

1. Green, an area designated as a protected function

2. Pink, the area designated for the function of the national capital
3. Yellow, residential area
4. Ungi, area designated for offices, trade and services
5. Abu, industrial area
6. Blue, designated area for non-green open space
7. Light brown, area designated for public and social services

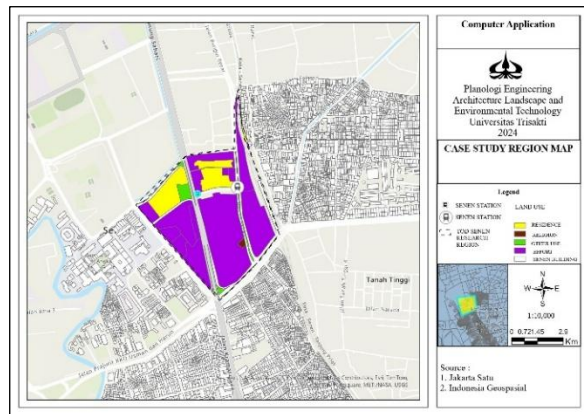


Fig 2. Map of the Case Study Area of Pasar Senen Station

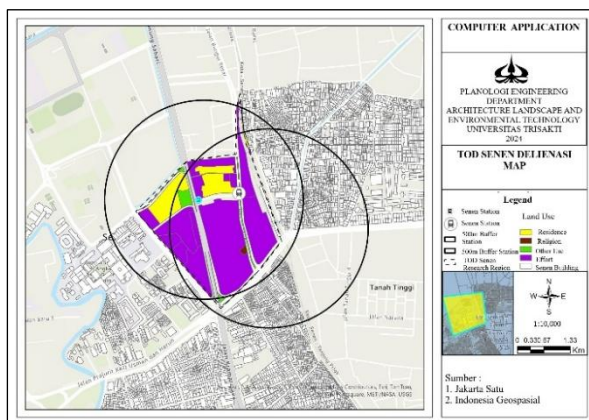


Fig 3. Map of 500 m TOD Buffer Area

There is a buffer map of the Pasar Senen Station area with a distance of 500 meters, which is in accordance with the criteria of the Regulation of the Minister of Agrarian Affairs and Spatial Planning/BPN Number 16 of 17 concerning Guidelines for the Development of Transit-Oriented Areas (TOD), namely there are 3 zones based on the distance from the transportation center (Berawi *et al.*, 2020) :

1. 300 meters: Core zone (land use intensity)
2. 800 meters: Development Zone (zone that is still effectively reachable by foot or bicycle)

3.5 Evaluation of TOD Criteria against Existing Conditions

Based on the existing conditions and characteristics above, it can be said that the Senen area is included in the urban TOD typology based on the criteria of the Ministry of ATR/BPN. The form and delineation of the area are with the character of TOD development of the City-sub City Service Center because the Senen area has the criteria of an economic center, especially for secondary functions and regional culture (Bolleter and Ramalho, 2020). In addition,

the Senen area was designated as a secondary activity center in the 2030 DKI Jakarta RTRW which has been described above, but the results of a survey conducted stated that there are still several criteria that have not been met in the development of the TOD area in Senen (Renne and Appleyard, 2019), Central Jakarta, as in the table below :

No.	TOD Principle	TOD Criteria	Existing Condition	Conformity Result
1.	Building Density	KLB 3-5 KDB Max 70%	KLB 3-5 40%-50%	In Accordance
2.	Residential Density	High Density Average Residential Density 12-38 units/1000 m2	High Density Average 15-35 units/ 1000 m2	In Accordance
3.	Land Use Diversity	% Housing area : % Non Housing 30%-60% : 40%-70%	% Housing area : % Non Housing 26 : 74% Too much Low housing number	Not yet Suitable
4.	Road Network Convenience	Integrated Transit System Network Pattern Bike Path	Difficult Integration and Feeder	Not Yet Suitable
5.	Distance Between Blocks	Block Size corresponds to a 5 minute walk, 70-200 meters	There are No. bike lanes yet Average block size with a walking distance of 100-200 meters between blocks 5-6	In accordance
6.	Pedestrian Conditions	Length of block face with path safe and accessible pedestrian for wheelchair users	The front of the block is in accessible due to fences and minimal wheelchair access	Not yet suitable
7.	Pedestrian comfort	Safe pedestrian and support for diffable infrastructure	Most pedestrians are safe and the infrastructure is disable	In accordance
8.	Pedestrian Design	Sidewalk available, park, plazas and other amenities Direction	There is No. sidewalk yet	Not yet Suitable
9.	Parking availability	Park and Ride	There is No. park yet not yet suitable for bicycle parking	Not yet suitable
	Bicycle parking	Bicycle Parking	There is No. bicycle parking yet	
10.	Parking lot conditions	Shared and restricted parking	Shared parking spaces are not restricted and	Not yet suitable

11.	Availability of Mode Types	Availability of short distance commuter (inside the city) micro bus, city bus, BRT, LRT, MRT, Long distance commuter (intercity, inter provincial), LRT, MRT, Fast Train, Train, Commuterline, Intercity Bus	some are not yet appropriate using on street Availability of Metro Trans, Transjakarta, Mikrotrans, mini trans, but there is no LRT or MRT Yet	In Accordance
12.	Frequency and headway	High frequency and headway	Average frequency and headway 7-15 minutes	In accordance
13.	Open Space Typology	Community scale (Community Scaled Park), environmental park (Small Park) according to standards service.	There are parks on a community scale, namely the struggle monument park, the station plaza Park, and the senen Jaya Market Park.	In accordance
14.	Open Space Capacity	RTH within a 5 minute walking radius, 10-15% of TOD is a park, easy accessed from transit location	There is park within a 5-7 minute walking radius and with a capacity of 10-20% of the TOD.	In Accordance
15.	Open Space Conditions	Open Spaces should be easily accessible, comfortable, have features that attractive on	The open space is just a garden with chairs and plants.	Not Yet Suitable
			Retail availability modern and coffee shop in the garden area	

From the table above, it can be stated that of the 15 TOD development criteria tables, only 8 are appropriate and meet the existing conditions of TOD development in the Senen area (Taki, Wicaksono and Badawi, 2023).

4 Conclusion

Based on the analysis of the existing conditions and characteristics of the Senen Area, in principle the

development of Transit Oriented Development (TOD) has met several main elements, such as population density and a maximum distance of 500 meters which are part of the TOD principle (Suryani, Harun and Astuti, 2020). However, in terms of design and accessibility, this area is still not fully in accordance with the criteria and guidelines for TOD development. The greatest inconsistency was found in the infrastructure aspect, especially in the road network pattern, which still needs adjustment to be in line with the TOD principle (Khaderi, Bakeri and Shukor, 2021).

This is due to various constraints, including suboptimal parking area management, limited green open space, and inadequate facilities for pedestrians (Stojanovski, 2020). Although several other aspects have been in accordance with the characteristics of TOD, there are still variables that need to be improved to support the development of the area as a whole (Tong et al., 2018).

As a recommendation, the DKI Jakarta Provincial Government is advised to establish strategic cooperation with relevant stakeholders, including PT KAI, to develop the area around the station (Taki et al., 2017). Development priorities include improving pedestrian path facilities, building integrated pedestrian bridges, and providing adequate park and ride facilities (Jamme et al., 2019). This step is expected to accelerate the transformation of the Senen Area into a TOD area that is more inclusive, sustainable, and in accordance with applicable guidelines (Zareba et al., 2019).

Acknowledgements

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Bukti Korespondensi

Judul Artikel : ***Transit Oriented Development (TOD) Development in Senen Area, Central Jakarta, Indonesia***

Nama Jurnal : ***Journal of Geoscience, Engineering, Environment, and Technology (JGEET), Sinta 2***

Terbitan : Vol. 11 No. 02 : Juni (2026)

DOI: <https://doi.org/10.25299/jgeet.2026.11.02.22265>

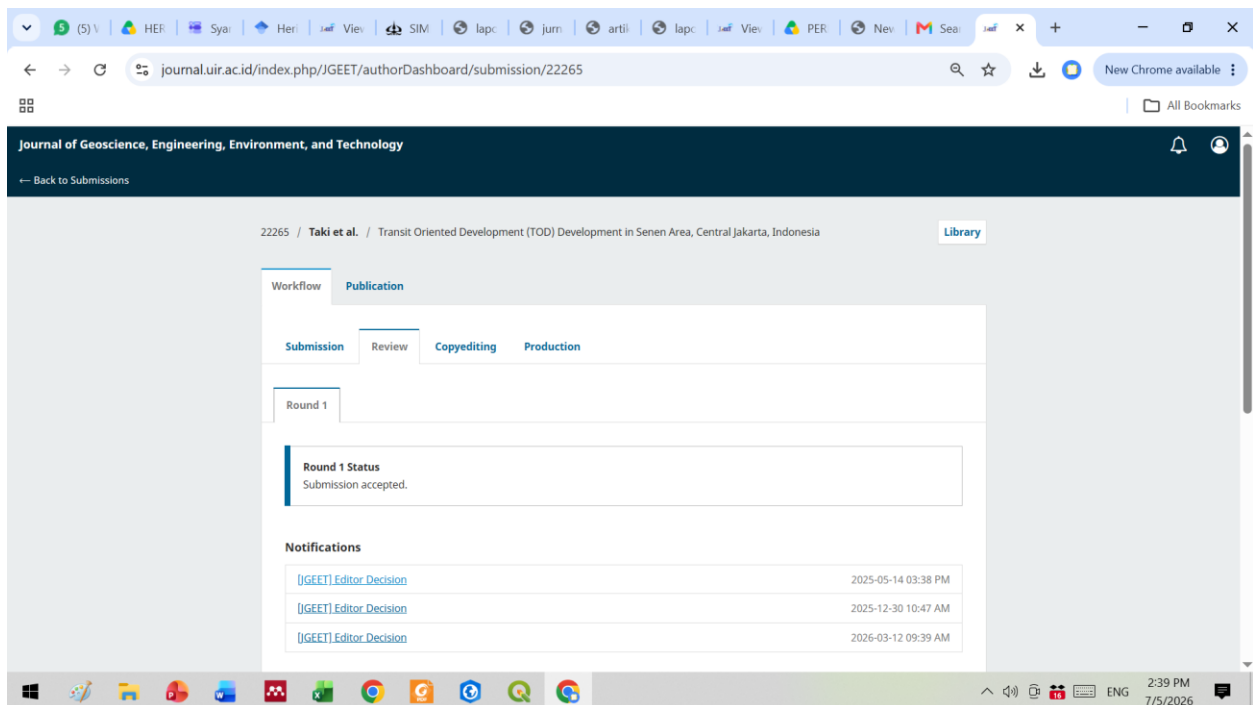
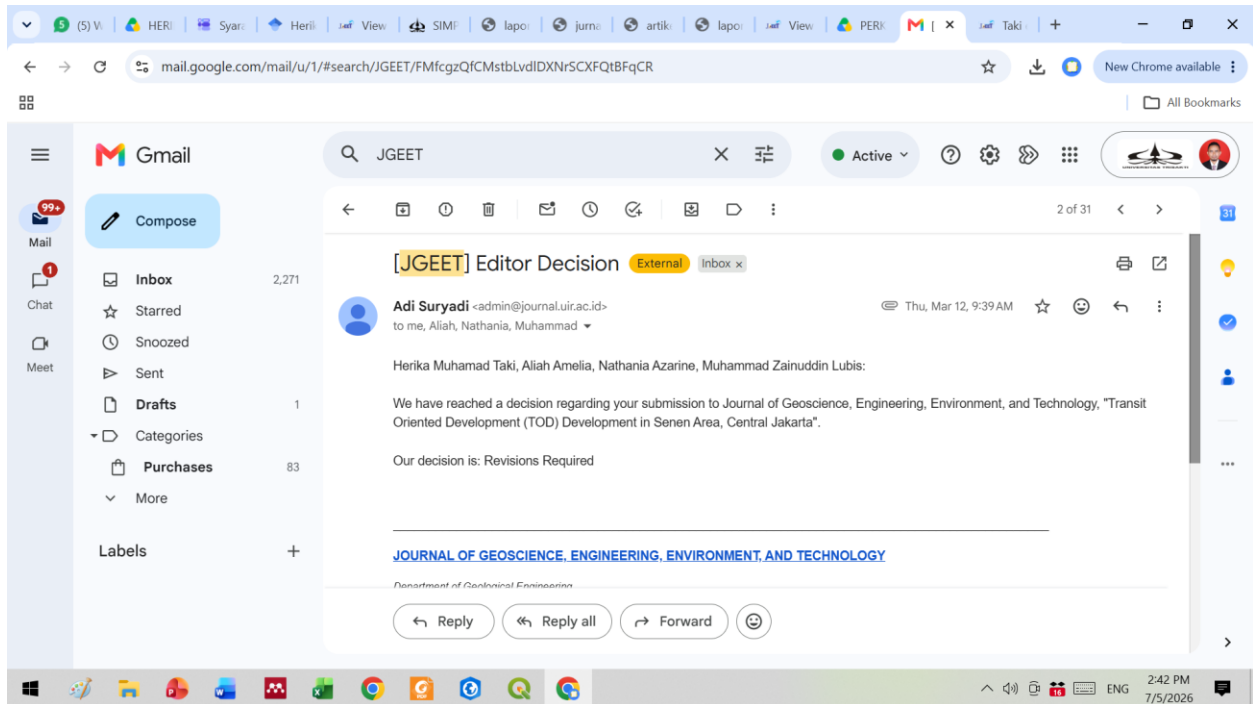
No	Perihal	Tanggal
1.	Submit pertama oleh penulis	05 Mei 2025
2.	Permintaan revisi	14 Mei 2025
3.	Submit revisi	24 November 2025
4.	Copyediting dan penerimaan artikel	12 Juni 2026

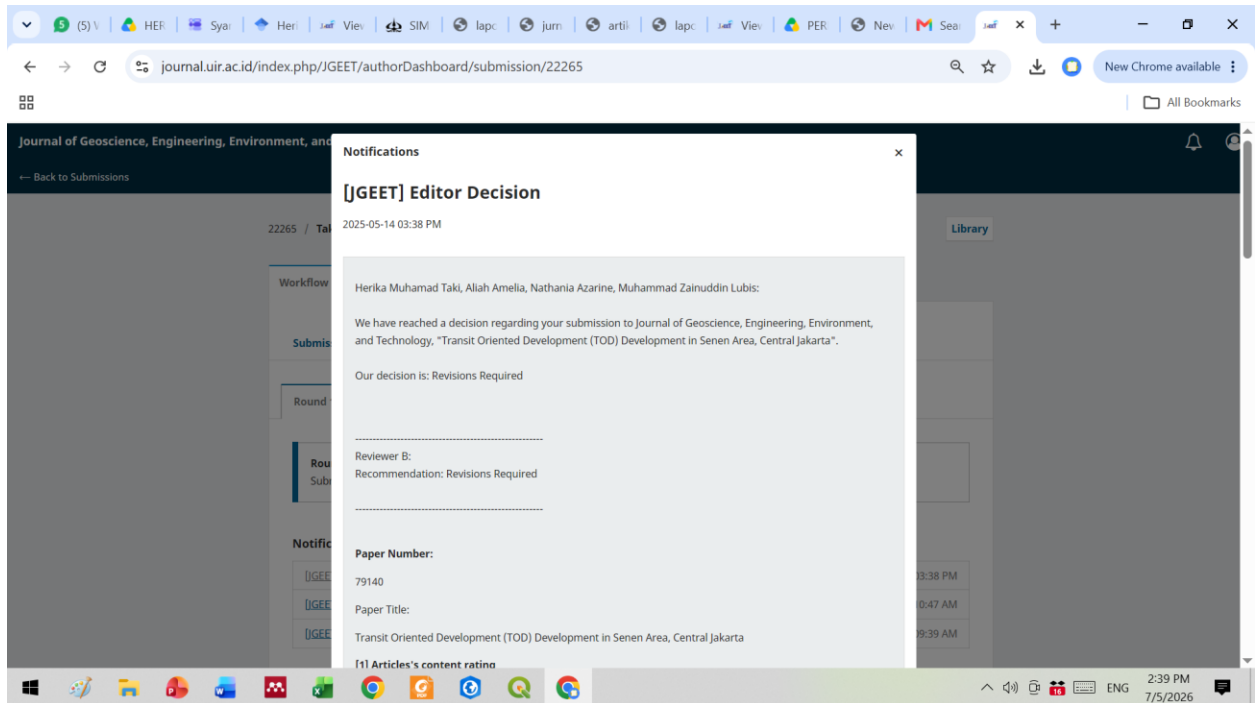
Keterangan Bukti:

1. Submit pertama oleh penulis

The screenshot displays the author dashboard for the Journal of Geoscience, Engineering, Environment, and Technology (JGEET). The page title is "Journal of Geoscience, Engineering, Environment, and Technology" with a "Back to Submissions" link. The breadcrumb trail shows "22265 / Taki et al. / Transit Oriented Development (TOD) Development in Senen Area, Central Jakarta, Indonesia". The "Publication" tab is active, showing a workflow with four stages: "Submission", "Review", "Copyediting", and "Production". Under the "Submission" stage, there is a "Submission Files" section with a search bar and a table listing the submitted file: "78726 Transit Oriented Development (TOD) Development in Senen Area, Central Jakarta.docx" (Article Text, May 5, 2025). A "Download All Files" button is present. Below this is a "Pre-Review Discussions" section with an "Add discussion" button and a table with columns: Name, From, Last Reply, Replies, and Closed. The table currently shows "No Items". The Windows taskbar at the bottom indicates the time is 2:38 PM on 7/5/2026.

2. Permintaan revisi





Notifications

[JGEET] Editor Decision

2025-05-14 03:38 PM

Herika Muhamad Taki, Aliah Amelia, Nathania Azarine, Muhammad Zainuddin Lubis:

We have reached a decision regarding your submission to Journal of Geoscience, Engineering, Environment, and Technology, "Transit Oriented Development (TOD) Development in Senen Area, Central Jakarta".

Our decision is: Revisions Required

Reviewer B:

Recommendation: Revisions Required

Paper Number:

79140

Paper Title:

Transit Oriented Development (TOD) Development in Senen Area, Central Jakarta

[1] Articles's content rating

Evaluation Criteria

Rounding numbers 1 to 5 evaluate each of these evaluation criteria of the articles contentwhere:

- 5 means complete suitability for publication
- 1 absolute grounds for refusal of the article.

The paper is written under "Instructions for Authors".

3

Paper title reflects the content and purpose of the research.

4

Summary includes information important for understanding the content of the paper.

4

The introduction clearly defines the purpose and objective of the work/research.

4

Worked out a review of previous research in the treated area.

3

The methodology is clearly defined.

3

Showing results support the applied methodology and conclusions.

4

The conclusion is based and contributes to the discharge of treated problems

4

Article is a contribution by the theory / practice.

3

[2] Articles's organization rating

Rounding numbers 1 to 5 evaluate each of these evaluation criteria of the articles content where 5 means complete suitability for publication while 1 absolute grounds for refusal of the article.

Article organization assessment criteria

The article is well organized and conforms to the "Instructions for authors".

3

The extent of the article is appropriate (up to 16 A4 pages).

3

Figures, tables and pictures are corresponding.

4

Terminology and measurement units are aligned with the metrology rules.

3

The references reflect the topicality of the article.

3

References are cited as directed by (Harvard system).

4

The article is written in standard language, relevant and interesting.

4

[3] Reviewer's recommendation

Choose one of the options, You state the article should:

Conditionally accept with the necessary as recommended by reviewer

3. Submit revisi

Response to Reviewer B

Manuscript Title: *Transit Oriented Development (TOD) Development in Senen Area, Central Jakarta*

We sincerely thank the reviewer for the valuable evaluation and constructive recommendations. We appreciate the time and effort devoted to reviewing our manuscript. In response to the review, we have carefully revised the manuscript to improve its scientific quality, clarity, and overall presentation. The revisions made are summarized below.

Reviewer's Evaluation	Authors' Response
The paper should be revised before publication.	Thank you for your constructive recommendation. We have carefully revised the manuscript to address the aspects identified during the review process. The revised version has been substantially improved in terms of content, organization, methodology, language, and presentation.
The manuscript should better follow the journal's Instructions for Authors.	We carefully reviewed the manuscript formatting and revised it to ensure compliance with the Journal of Geoscience, Engineering, Environment, and Technology (JGEET) author guidelines, including formatting, headings, tables, figures, references, and overall manuscript structure.
The review of previous studies needs improvement.	We expanded the literature review by incorporating additional recent and relevant studies related to Transit-Oriented Development (TOD). The revised literature review provides a stronger theoretical foundation and better positions our study within the existing body of knowledge.
The methodology requires further clarification.	The Methodology section has been revised to provide a clearer description of the research procedures, data collection, analytical framework, and assessment methods used in evaluating TOD development in the Senen area. These revisions improve the transparency and reproducibility of the study.
The article's contribution to theory and practice should be strengthened.	We strengthened the discussion by emphasizing the practical implications of the research findings for urban planning and TOD implementation in Central Jakarta. The manuscript also highlights the study's contribution to the growing body of knowledge on TOD assessment at the district level.
The manuscript organization, terminology, and references should be improved.	We carefully revised the manuscript organization to improve logical flow and readability. Technical terminology has been reviewed for consistency, and measurement units have been checked throughout the manuscript. We also updated and refined the reference list by including more recent and relevant literature while ensuring that all citations comply with the Harvard referencing style required by the journal.

Language quality.

The manuscript has been thoroughly proofread to improve grammar, sentence structure, clarity, and overall English language quality.

We sincerely appreciate the reviewer's constructive evaluation and recommendations. We believe that the revisions made have significantly improved the quality, clarity, and scientific contribution of the manuscript. We respectfully submit the revised manuscript for your further consideration and hope that it is now suitable for publication in the *Journal of Geoscience, Engineering, Environment, and Technology*.

The screenshot shows the author dashboard for the Journal of Geoscience, Engineering, Environment, and Technology. The page is titled "Journal of Geoscience, Engineering, Environment, and Technology" and includes a "Back to Submissions" link. The main content area displays submission details for submission 22265.

Reviewer's Attachments

No Files

Revisions

Revision ID	Revision Title	Date	Type
90566	Transit+Oriented+Development+(TOD)+Development+in+Senen+Area,+Central+Jakarta.docx	November 24, 2025	Article Text
96399	Transit Oriented Development (TOD) Development in Senen Area, Central Jakarta.docx	February 10, 2026	Article Text
98517	Transit Oriented Development (TOD) Development in Senen Area, Central Jakarta.docx	March 30, 2026	Article Text

Review Discussions

Name	From	Last Reply	Replies	Closed
Transit Oriented Develop (TOD) in Senen Area, Central Jakarta	herika 2025-11-20 12:43 PM	-	0	☐

4. Copyediting dan penerimaan artikel

The screenshot shows the author dashboard for the Journal of Geoscience, Engineering, Environment, and Technology (JGEET). The URL is journal.uir.ac.id/index.php/JGEET/authorDashboard/submission/22265. The submission is titled "Transit Oriented Development (TOD) Development in Senen Area, Central Jakarta, Indonesia" by Taki et al. The dashboard has tabs for Workflow, Publication, Submission, Review, Copyediting, and Production. The Copyediting tab is active, showing a "Copyediting Discussions" section with an "Add discussion" button and a table with columns: Name, From, Last Reply, Replies, and Closed. Below this is a "Copyedited" section with a "Search" button and a table listing the submission. The submission details are: ID 103621, Title "Transit+Oriented+Development+(TOD)+Development+in+Senen+Area,+Central+Jakarta (1).docx", Date "June 12, 2026", and Type "Article Text".

Name	From	Last Reply	Replies	Closed
No Items				

ID	Title	Date	Type
103621	Transit+Oriented+Development+(TOD)+Development+in+Senen+Area,+Central+Jakarta (1).docx	June 12, 2026	Article Text

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Dear Mr. Muhammad Farid

Article Title "Transit Oriented Development (TOD) Development in Senen Area, Central Jakarta, Indonesia".

Thank you very much for your submission to our journal. We are pleased to inform you that your revised paper has been accepted for publication in June 2026 edition. Congratulations.

Please proceed to the next step for making payment of publication.

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Journal of Geoscience-Eng-Envi-Tech
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Dear Author,

Thank you for your notification.

The accepted letter has been revised accordingly. The name **Muhammad Farid** has been replaced with **Herika Muhammad Taki** as requested.

Please find the revised accepted letter attached.

Thank you.

Best regards,

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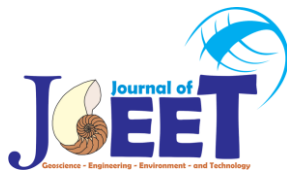
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RESEARCH ARTICLE

Transit Oriented Development (TOD) Development in Senen Area, Central Jakarta, Indonesia

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Abstract

Senen area, Central Jakarta, is a strategic area that faces various problems, such as traffic congestion, lack of integration between modes of transportation, and minimal facilities for pedestrians and public transportation users. This study aims to evaluate the application of the TOD concept in the Senen area based on principles such as transportation integration, mixed land use, and pedestrian connectivity. This study uses a qualitative descriptive method approach, where the data used is secondary data obtained through literature studies. Literature studies are conducted by referring to previous studies and relevant institutional reports. The data collected includes spatial information, such as maps and geographic data, as well as non-spatial information, such as planning documents and policies. The results of the study indicate that the Senen area has great potential to be developed as a TOD area. Some steps that can be taken include improving connectivity between modes of transportation, improving public facilities, and adding green open spaces. In conclusion, the implementation of TOD in the Senen area can reduce the use of private vehicles, increase the efficiency of public transportation, and create a more comfortable and environmentally friendly city environment.

Keywords: Transit Oriented Development (TOD), Senen Area, Transportation, Spatial Planning.

1. Introduction

Transit Oriented Development (TOD) is a concept for developing an urban area that prioritizes the use of public transportation rather than private vehicles (Mohamad, Fahmy-Abdullah and Masrom, 2021). The TOD concept is intended as a solution for developing urban areas through development that is oriented towards the transit system so that it has the potential to reduce household transportation costs and improve the quality of life (Taki, Mahmoud and Maatouk, 2018). On the other hand, the development of areas with a mixed-use pattern is expected to increase regional accessibility and reduce travel needs which ultimately reduce environmental impacts and provide alternative solutions to avoid traffic congestion (Nigro, Bertolini and Moccia, 2019). According to the Regulation of the Minister of Agrarian Affairs and Spatial Planning/BPN Number 16 of 2017 concerning Guidelines for the Development of Transit-Oriented Areas, it is a concept for developing areas in and around transit nodes to provide added value that emphasizes integration between mass public transportation networks and non-motorized transportation networks, as well as reducing the use of motorized vehicles accompanied by the development of mixed and dense areas with medium to high intensity of space utilization (Singh et al., 2017).

DKI Jakarta as the nation's capital is also the center of activities for the surrounding area. As the largest city in Indonesia, DKI Jakarta also still faces challenges in urban problems such as severe congestion, one of which is. According to, in 2019 there were a total of 26.4 million daily travel movements in DKI Jakarta. The high movement places Jakarta as the 10th most congested city in the world

in 2019 (Taki, Maatouk and Lubis, 2018). The city of Jakarta is also one of the cities that has a lot of commuting behavior in it, including the study location, namely the Senen area which is designated as a secondary activity center with mixed activities (mix use) so that every day there is an increase in accessibility at transit points in the Senen area (Taki, Maatouk and Qurnfulah, 2017). Mixed activities at this location include trade and service activities, offices (Karina, Sumabrata and Berawi, 2025), TransJakarta transit mobility, terminals and train stations. In order for the handling of accessibility and integration between modes to be on target, it is necessary to develop integration between modes, one of which is the development of an area with the Transit Oriented Development (TOD) concept (Taki, Maatouk and Ahmadi, 2019).

In this case, the Senen area still has problematic issues, including congestion due to high accessibility and mobility in the area (Taki, Pamungkas, et al., 2024). This area has a central terminal and commuter and long-distance train stations, so there needs to be a re-arrangement for the integration of mass transportation, in addition, the high volume of traffic due to private vehicles that is not balanced with even road construction also causes congestion in this area (Taki, Rani, et al., 2024). Presidential Regulation Number 60 of 2020 concerning the Spatial Planning for the Urban Areas of Jakarta, Bogor, Depok, Tangerang, Bekasi, Puncak and Cianjur has mentioned several transit-oriented area development programs with the type of transit-oriented city development area, one of which is at Pasar Senen Station in Senen District. Through the DKI Jakarta Government in the 2010-2030 Jakarta City Spatial Planning Plan (RTRW) the results of the revision in 2019 began using the TOD concept planning to develop transit points spread

across the Jakarta City area. This point is in the form of intermodal terminals/stations at activity centers, rail transportation stations, highway mass transportation shelters (stops) and public transportation terminals, TOD concept planning in Jakarta City will not be achieved if its implementation has not or does not comply with the TOD Area development criteria. Based on existing conditions, the Senen area is currently in the development stage of markets, housing, transit stations and infrastructure, there is a need for a comparison between the TOD guideline criteria and the existing conditions of the area (Guthrie and Fan, 2016).

2. Research Methodology

This study uses a descriptive qualitative method approach, where the data used is secondary data obtained through literature studies (Sun et al., 2022). Literature studies are conducted by referring to previous studies and relevant institutional reports. The data collected includes spatial information, such as maps and geographic data, as well as non-spatial information, such as planning and policy

documents (Chaniago and Taki, 2022). The analysis process is carried out using overlay techniques and manual digitization to process spatial data and integrate non-spatial information. In addition, deductive methods are applied to examine the theory and criteria of Transit Oriented Development (TOD) guidelines (Taki and Maatouk, 2018). This analysis begins using a literature review to identify TOD theories and concepts, which are then used as the basis for formulating research variables (Zhang et al., 2019).

3. Results and Discussion

3.1 TOD Area Development Requirements According to ITDP

ITDP uses eight key principles known as the "8 Principles of TOD," which help create transit-friendly, sustainable, and inclusive areas (Bai et al., 2023). Here are the key criteria according to ITDP :

Table 1. 8 Principles of TOD

INDICATOR	VARIABLES	PROVISION
ACCESSIBILITY	Distance to public transportation	Measures how close a location is to a train station or bus stop.
	Availability of alternative modes of transportation	Assess the presence of bicycle lanes, pedestrian lanes, and public transportation.
DENSITY	Number of housing units per hectare	Measuring population density in TOD areas to support public transportation.
	Land use level	The percentage of land used for housing, commercial, and public facilities.
MIXED USAGE	Proportion of land use	Assess land use diversity (residential, commercial, public space).
	Availability of services and facilities	The presence of schools, parks, health centers within reach.
PEDESTRIAN ORIENTED DESIGN	Quality of sidewalks and pedestrian paths	Measuring the width, comfort and safety of pedestrian paths.
	Crossing facilities	Number and quality of zebra crossings or pedestrian bridges
PUBLIC SPACE	Green open space area	Measuring the amount of green open space available to the community
	Quality of public facilities	Assessment of parks, plazas, and other gathering areas
INTEGRATION WITH PUBLIC TRANSPORTATION	Connectivity between modes of transportation	How well is the public transport system integrated with other modes?
	Frequency of transportation services	Number of public transportation services in a certain time period
LEVEL AFFORDABILITY	Rental price or house price	Measuring housing affordability for low-income communities
	Percentage of income spent on housing	The ratio between housing expenses and household income.
ENVIRONMENTAL SUSTAINABILITY	Carbon emission reduction	Measuring the environmental impact of using public transport compared to private vehicles.
	Use of renewable energy	Percentage of renewable energy use in TOD development

3.2 The Purpose of Spatial Planning for the detailed Spatial Planning of Senen District

The objectives of spatial planning for Senen District are outlined in the Regional Regulation of the Special Capital Region of Jakarta Province Number 1 of 2014 concerning Detailed Spatial Planning and Zoning Regulations, as follows :

1. Realization of the arrangement of national scale office, trade and service centers integrated with mass public transportation in the Senen area.
2. Implementation of integrated transportation infrastructure development with pedestrian paths, mass public transportation, and other public

transportation to support TOD (Taki, Anita Sitawati Wartaman, et al., 2024).

3. Implementation of development and/or improvement of trade and service infrastructure environment by providing space for micro businesses and arranging passenger terminals in an integrated manner with railway transportation at Senen Station (Barus, Djaja and Transoprtasi, 2023).
4. Realization of urban tourism
5. Realization of residential area development through environmental improvement and/or rejuvenation equipped with infrastructure integrated with mass public transportation.

6. Construction of public flats equipped with infrastructure integrated with mass public transportation.

3.3 Spatial Structure Plan for Senen District

The following is a map of the spatial pattern of the Senen District area, Central Jakarta.

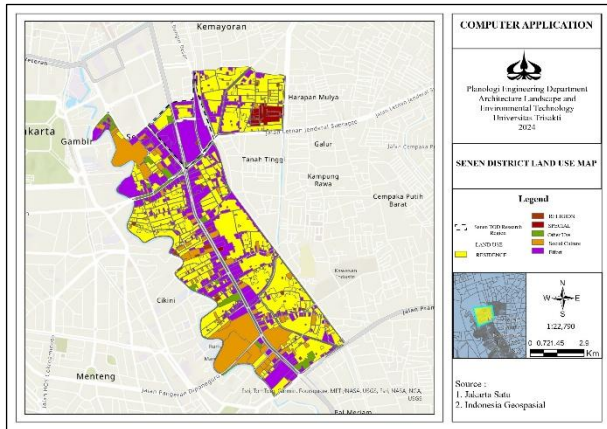


Fig 1. Land Use Map of Senen District

There is a Spatial and Regional Structure Plan for Senen District which is explained in DKI Jakarta Regional Regulation Number 1 of 2014 concerning RDTR and Zoning Regulations as follows :

1. The land transportation plan functions to smooth the flow of transportation and overcome traffic congestion by :
 - a) Development of mass public transportation infrastructure on special routes in the Harmoni-Pulo Gadung corridor, the Dukuh Atas-Pulo Gadung corridor, and the Kampung Melayu-Ancol corridor
 - b) Improvement of primary arterial roads throughout
 - c) Improvement of secondary arterial roads in each sub-district
 - d) Improvement of secondary collector roads in the sub-districts of Paseban, Kenari, Kramat, Senen, and Bungur sub-districts
 - e) Development of local roads in each sub-district
 - f) Implementation of phase II traffic restrictions in Kramat, Senen, and Paseban Sub-districts
 - g) Development of parking infrastructure in each sub-district
 - h) Development of pedestrian paths and bicycle paths on arterial, collector and local roads in each sub-district
2. The plan for evacuation routes and space infrastructure in Senen District is as follows :
 - a) Disaster evacuation route on the section
 - b) The intersection of the intersection and Kwitang Road in Senen Village and Kwitang Village
 - c) Kramat Roundabout Road in Senen Subdistrict and Kramat Subdistrict
 - d) Jalan Letjend Suprato in Bungur Village
 - e) Pejambon Street, Abdul Rahman Saleh Street, Senen Raya Street, and Kwini 2 Street in Senen Subdistrict

- f) Matraman Street in Kenari Subdistrict
- g) Scout Street in Paseban Subdistrict
- h) Senen Market Street in Senen Subdistrict
- i) Kramat Raya Street in Kramat Subdistrict
- j) Kwitang Street and Kenari Subdistrict
- k) Salemba Raya Street in Paseban Subdistrict

3. Transportation infrastructure plan

- a) Bus Stop Infrastructure
 - 1) Senen Central Bus Stop
 - 2) Atrium Stop
 - 3) RSPAD bus stop
 - 4) Ministry of Foreign Affairs bus stop
- b) Parking Provision
 - 1) provision of parking facilities for changing modes (park and ride) is available in the Senen area in Senen sub-district
 - 2) Parking on the road (on street parking) is carried out based on statutory regulations
- c) Railway Transportation Infrastructure
 - 1) Plans to develop an inner-city ring train via Senen Station in Senen Subdistrict and Kramat Station in Rawasari Subdistrict
 - 2) The Jabodetabek commuter train development plan is at Pasar Senen Station in Bungur, Kramat, Paseban and Senen Sub-districts
 - 3) The planned non-level crossing is located at the Fly Over/Underpass on Jalan Kramat Lontar in Kramat Subdistrict and on Jalan Diponegoro in Kenari Subdistrict
- d) Land Transportation Infrastructure Plan
 - 1) Development of mass public transportation infrastructure on special routes in the Harmoni-Pulo Gadung corridor, the Dukuh Atas-Pulo Gadung corridor, and the Kampung Melayu-Ancol corridor
 - 2) Improvement of secondary arterial roads in each sub-district
 - 3) Improvement of secondary collector roads in the sub-districts of Paseban, Kenari, Kramat, Senen, and Bungur
 - 4) Development of local roads in each sub-district
 - 5) Implementation of phase II traffic restrictions in Kramat, Senen, and Paseban Sub-districts
 - 6) Development of parking infrastructure in each sub-district
 - 7) Development of pedestrian paths and bicycle paths on arterial, collector and local roads in each sub-district

3.4 Existing Conditions of the Area

The existing condition of Senen District including our case study area, namely Pasar Senen Station, has activities and activities that are close to each other, including Malls, Markets, Terminals, Sports Arenas, Police Stations and Train Stations as in the picture below which are in accordance with the color of the land use of the area (Taki et al., 2018), namely as follows :

1. Green, an area designated as a protected function

2. Pink, the area designated for the function of the national capital
3. Yellow, residential area
4. Ungi, area designated for offices, trade and services
5. Abu, industrial area
6. Blue, designated area for non-green open space
7. Light brown, area designated for public and social services

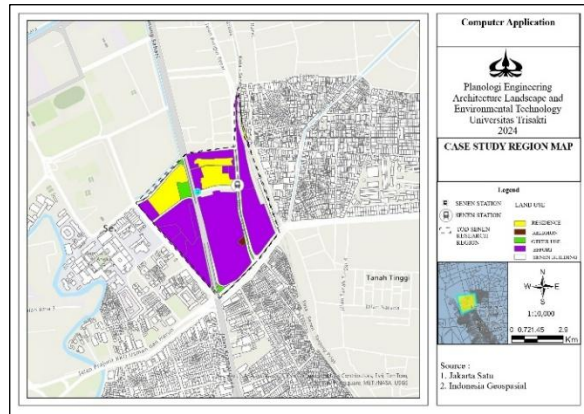


Fig 2. Map of the Case Study Area of Pasar Senen Station

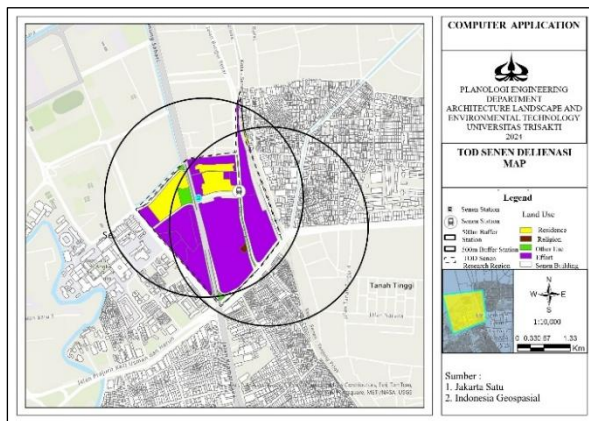


Fig 3. Map of 500 m TOD Buffer Area

There is a buffer map of the Pasar Senen Station area with a distance of 500 meters, which is in accordance with the criteria of the Regulation of the Minister of Agrarian Affairs and Spatial Planning/BPN Number 16 of 17 concerning Guidelines for the Development of Transit-Oriented Areas (TOD), namely there are 3 zones based on the distance from the transportation center (Berawi et al., 2020) :

1. 300 meters: Core zone (land use intensity)
2. 800 meters: Development Zone (zone that is still effectively reachable by foot or bicycle)

3.5 Evaluation of TOD Criteria against Existing Conditions

Based on the existing conditions and characteristics above, it can be said that the Senen area is included in the urban TOD typology based on the criteria of the Ministry of ATR/BPN. The form and delineation of the area are with the character of TOD development of the City-sub City Service Center because the Senen area has the criteria of an economic center, especially for secondary functions and regional culture (Bolleter and Ramalho, 2020). In addition,

the Senen area was designated as a secondary activity center in the 2030 DKI Jakarta RTRW which has been described above, but the results of a survey conducted stated that there are still several criteria that have not been met in the development of the TOD area in Senen (Renne and Appleyard, 2019), Central Jakarta, as in the table below :

No.	TOD Principle	TOD Criteria	Existing Condition	Conformity Result
1.	Building Density	KLB 3-5 KDB Max 70%	KLB 3-5 40%-50%	In Accordance
2.	Residential Density	High Density Average Residential Density 12-38 units/1000 m2	High Density Average 15-35 units/ 1000 m2	In Accordance
3.	Land Use Diversity	% Housing area : % Non Housing 30%-60% : 40%-70%	% Housing area : % Non Housing 26 : 74% Too much Low housing number	Not yet Suitable
4.	Road Network Convenience	Integrated Transit System Network Pattern Bike Path	Difficult Integration and Feeder	Not Yet Suitable
5.	Distance Between Blocks	Block Size corresponds to a 5 minute walk, 70-200 meters	There are No. bike lanes yet Average block size with a walking distance of 100-200 meters between blocks 5-6	In accordance
6.	Pedestrian Conditions	Length of block face with path safe and accessible pedestrian for wheelchair users	The front of the block is in accessible due to fences and minimal wheelchair access	Not yet suitable
7.	Pedestrian comfort	Safe pedestrian and support for diffable infrastructure	Most pedestrians are safe and the infrastructure is disable	In accordance
8.	Pedestrian Design	Sidewalk available, park, plazas and other amenities Direction	There is No. sidewalk yet	Not yet Suitable
9.	Parking availability	Park and Ride	There is No. park yet not yet suitable for bicycle parking	Not yet suitable
	Bicycle parking	Bicycle Parking	There is No. bicycle parking yet	
10.	Parking lot conditions	Shared and restricted parking	Shared parking spaces are not restricted and	Not yet suitable

11.	Availability of Mode Types	Availability of short distance commuter (inside the city) micro bus, city bus, BRT, LRT, MRT, Long distance commuter (intercity, inter provincial), LRT, MRT, Fast Train, Train, Commuterline, Intercity Bus	some are not yet appropriate using on street Availability of Metro Trans, Transjakarta, Mikrotrans, mini trans, but there is no LRT or MRT Yet Availability, Transjabodetabek, Train	In Accordance
12.	Frequency and headway	High frequency and headway	Average frequency and headway 7-15 minutes	In accordance
13.	Open Space Typology	Community scale (Community Scaled Park), environmental park (Small Park) according to standards service.	There are parks on a community scale, namely the struggle monument park, the station plaza Park, and the senen Jaya Market Park.	In accordance
14.	Open Space Capacity	RTH within a 5 minute walking radius, 10-15% of TOD is a park, easy accessed from transit location	There is park within a 5-7 minute walking radius and with a capacity of 10-20% of the TOD.	In Accordance
15.	Open Space Conditions	Open Spaces should be easily accessible, comfortable, have features attractive on	The open space is just a garden with chairs and plants. Retail availability modern and coffee shop in the garden area	Not Yet Suitable

From the table above, it can be stated that of the 15 TOD development criteria tables, only 8 are appropriate and meet the existing conditions of TOD development in the Senen area (Taki, Wicaksono and Badawi, 2023).

4 Conclusion

Based on the analysis of the existing conditions and characteristics of the Senen Area, in principle the

development of Transit Oriented Development (TOD) has met several main elements, such as population density and a maximum distance of 500 meters which are part of the TOD principle (Suryani, Harun and Astuti, 2020). However, in terms of design and accessibility, this area is still not fully in accordance with the criteria and guidelines for TOD development. The greatest inconsistency was found in the infrastructure aspect, especially in the road network pattern, which still needs adjustment to be in line with the TOD principle (Khaderi, Bakeri and Shukor, 2021).

This is due to various constraints, including suboptimal parking area management, limited green open space, and inadequate facilities for pedestrians (Stojanovski, 2020). Although several other aspects have been in accordance with the characteristics of TOD, there are still variables that need to be improved to support the development of the area as a whole (Tong et al., 2018).

As a recommendation, the DKI Jakarta Provincial Government is advised to establish strategic cooperation with relevant stakeholders, including PT KAI, to develop the area around the station (Taki et al., 2017). Development priorities include improving pedestrian path facilities, building integrated pedestrian bridges, and providing adequate park and ride facilities (Jamme et al., 2019). This step is expected to accelerate the transformation of the Senen Area into a TOD area that is more inclusive, sustainable, and in accordance with applicable guidelines (Zaręba et al., 2019).

Acknowledgements

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