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Analysis of The Implementation of Transit Oriented Development (TOD) Policies to Optimize the Integration of Public Transportation Modes

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Abstract: Efforts to reduce congestion in Jakarta are by providing Transit-Oriented Areas (KBT) connected to several other modes of public transportation, such as Kereta Cepat Indonesia (KCI), LRT, MRT, and Transjakarta. The central government's plan related to Transit-Oriented Areas, the DKI Provincial Government has issued Perda 1/2012 concerning the 2030 regional spatial plan in Chapter 1 Article 75 "Transit-oriented development or Transit Oriented Development, hereinafter abbreviated as TOD, is an integrated area of various functional city activities with local and inter-local connectors". Transit-oriented development (TOD) standards aim to ensure the right of all people to access the city by walking and cycling safely to their destinations by fast and regularly scheduled public transport quickly and affordably and to live a healthy life without relying on private vehicles. This type of research is quantitative, using stakeholder and purposive sampling techniques. The results showed that overall, although the Dukuh Atas area has fulfilled several urban planning principles well, several areas still need to be improved, especially related to bicycle infrastructure, pedestrian accessibility, residential density, and affordable housing prices.

Keyword: Transit Oriented Development, Integration, Optimization, Public Transport Modes

INTRODUCTION

Jakarta is experiencing strong economic growth, making it the centre of the Indonesian economy and one of the fastest-growing cities in Southeast Asia (Karim et al., 2019). This growth is driven by key sectors such as trade, industry and services (Tampubolon & Kurniasih, 2022). At the same time, Jakarta's population also continues to grow rapidly, with more than 10 million residents within the city and more than 30 million in the Jabodetabek (Jakarta, Bogor, Depok, Tangerang, and Bekasi) agglomeration area (Ganesha & Husein, 2024). The city of Jakarta faces very high transportation volumes. More than 4 million passengers from Jabodetabek travel daily to and from Jakarta.

Transit-oriented development (TOD) is a planning approach that aims to create compact and dense communities centred around public transportation hubs (Kamruzzaman et al., 2014).

TOD seeks to reduce reliance on private vehicles and promote sustainable modes of transportation such as walking, cycling, and public transit. TODs usually have various housing options, commercial and retail spaces, and public facilities within walking distance from public transit stations (Berawi et al., 2020).

TOD has the potential to add value to urban public transit systems. By integrating land use, transportation, and environment, TOD can improve accessibility to work and other destinations, reduce private vehicle trips, and encourage sustainable modes of transportation. It can also create vibrant, walkable neighbourhoods with diverse uses and amenities (Frankhauser et al., 2018).

According to (Presidential Regulation of the Republic of Indonesia Number 55 Year, 2018), "the transportation system in the Greater Jakarta area (Jakarta, Bogor, Depok, Tangerang, and Bekasi) plays a crucial role in supporting national development and requires a holistic and integrated approach. In line with the central government's plan related to Transit Oriented Areas, the DKI Provincial Government has issued (Regional Regulation No. 1 Year, 2012) concerning the 2030 regional spatial plan. Chapter 1, article 75 states, "Transit-oriented development or Transit Oriented Development, hereinafter abbreviated as TOD, is an integrated area of various functional city activities with local and inter-local connectors".

The development and construction of Transit Oriented Development (TOD) areas in Indonesia are still full of problems and challenges. These problems are related to existing government regulations and policies related to developing and constructing Transit Oriented Development (TOD) areas. The basic regulations prepared by the Provincial Government of DKI Jakarta in supporting the development of Transit Oriented Development (TOD) include (Regional Regulation No. 1 Year, 2012) concerning RT RW DKI Jakarta, (Regional Regulation No. 1 Year, 2014) concerning the Detailed Spatial Plan and Zoning Regulations of DKI Jakarta and (Governor Regulation No. 44 Year, 2017) concerning the Development of Transit Oriented Development (TOD) Areas, with development points in the Dukuh Atas Area, Blok M Area and so on. This is important because, with these regulations, DKI Jakarta provides an example of the application of development other than based on regional potential and needs; the application of Transit Oriented Development (TOD) also requires commitment and readiness in terms of licensing.

Sustainable transportation is one of the important aspects of sustainable urban development (Bagus & Yola, 2023). Sustainable transportation is a system that facilitates access to the basic needs of individuals or communities in a way that is safe and compatible with human and ecosystem health while considering equity between current and future generations (Rini et al., 2020). In this regard, transportation has a pivotal role, where the planning and provision of transportation systems must consider economic, environmental, and social factors.

Transit-oriented development (TOD) is an approach to development that promotes integration between public transportation and development activities. TOD positions the centre of activity in the transit area by considering the needs of pedestrians, so it needs to be supported by pedestrian paths. TOD creates dense mixed communities near transit where people enjoy easy access to jobs and services.

Sustainable urban development requires innovative and practical approaches to managing transportation systems. One such approach is Transit-Oriented Development (TOD), which integrates public transportation with development activities. TOD has been implemented in various cities around the world, including Jakarta, as an effort to create a sustainable transportation system.

Research conducted (Zafira et al., 2022) on the application of Transit Oriented Development (TOD) principles to realize sustainable transportation case study: DKI Jakarta's Dukuh Atas area concluded that basically, Transit Oriented Development (TOD) based areas prioritize efficiency in diverse types of land use, pedestrian space to create a sense of comfort

and safety while walking, efficient ease of access to public transportation transit points and other local services according to distance and time. Research conducted (Hafidh Al-Muwahidin & Muta, 2019) on the Development Strategy of the Transit Oriented Development (TOD) Area in Bekasi City concluded that the transportation aspects, aspects of space utilization and economic aspects of the priority order of development are the development of transit systems, public spaces, commercial, housing and offices.

The Transit-Oriented Development (TOD) policy implementation analysis aims to evaluate how the policy effectively improves the integration of public transportation modes. The analysis aims to identify how TOD can optimize coordination between different modes of transportation, such as buses and trains, to improve accessibility and connectivity. In addition, it seeks to assess the impact of TOD on the quality of public transportation services and its contribution to reducing congestion and carbon emissions. With a focus on TOD-based area development, the analysis also explores the social and economic impacts, including economic growth and improved quality of life. Finally, the analysis aims to provide recommendations for continuous improvement to ensure that TOD policies continue evolving and effectively meet public transportation integration objectives.

This research is expected to provide in-depth insights into the effectiveness of Transit-Oriented Development (TOD) policy implementation in improving the integration of public transportation modes. By evaluating the impact of TOD on coordination between different modes of transportation, quality of service, and reduction of congestion and emissions, this research aims to identify the strengths and weaknesses of the existing policy. In addition, the research is expected to reveal how TOD contributes to regional development, economic growth, and improved quality of life. The results of this study are also expected to provide valuable recommendations for continuous improvement and more effective strategies in planning and implementing TOD policies, as well as for strengthening overall public transportation integration.

METHOD

This study aims to explore and analyze the implementation of Transit Oriented Development (TOD) policies in the context of optimizing the integration of public transport modes. Specifically, the study will evaluate how TOD affects coordination and connectivity between different modes of transportation and its impact on service quality, congestion reduction, and carbon emissions. In addition, the study will investigate the contribution of TOD to regional development, economic growth, and improved quality of life. By exploring these aspects, the research is expected to provide a deep insight into the effectiveness of TOD policies and generate recommendations for continuous improvement and more efficient strategies in public transportation integration.

This research utilizes a qualitative method. The qualitative data processed in this research consists of a description of the characteristics of pedestrian paths and complementary facilities, the availability of pedestrian crossings, active and permeable building facades, characteristics of bicycle lanes and bicycle parking, block dimensions, walking distances, types and areas of land use, and others. The sampling technique used in this research is stakeholders. So, stakeholders are research informants. Stakeholder sampling is used to find out which experts or parties are suitable for use as samples in research.

Table 1. Research Informants

Stakeholder Type	Stakeholder Name
Government	Spatial Planning Section, DKI Jakarta City Planning Office
	Land Transportation Traffic Management Section, DKI Jakarta Transportation Agency
	Road Infrastructure and Utility Network Section, Bina Marga Agency of DKI Jakarta Province

Stakeholder Type	Stakeholder Name
Private	Transport Associate, Institute for Transportation and Development Policy (ITDP) Indonesia

The data collection method used in this research is based on primary and secondary data. Primary data is observation.

Table 2. Data Source

No	Data Required	Data Source
1	RTRW of DKI Jakarta Province Year 2010-2030	Website of DKI Jakarta BAPPEDA
2	RDTR and PZ of DKI Jakarta Province 2015-2035	Website BAPPEDA DKI Jakarta
3	Regulation of the Minister of ATR/BPN 2017 concerning Guidelines for the Development of Transit-Oriented Areas	Website of DKI Jakarta BAPPEDA
4	DKI Jakarta Governor Regulation No. 67 of 2019	DKI Jakarta BAPPEDA Website
5	Road Data	DKI Jakarta Provincial Transportation Agency
		DKI Jakarta Provincial Bina Marga Office
		DKI Jakarta BAPPEDA website
6	Land Use Data	Cipta Karya, Spatial Planning and Land Agency of DKI Jakarta Province
		DKI Jakarta BAPPEDA website

The data collection method used in this research is based on primary and secondary data. Primary data is observed data obtained indirectly or through intermediaries. Data obtained from secondary survey results can be in the form of official documents from government agencies, interview results, previous research and literature studies. The analysis technique used is Qualitative Analysis; in qualitative research, correct data collection is essential, and methods such as in-depth interviews, participant observation, documentation studies, and triangulation are used to ensure that the data is accurately described and using the Miles and Huberman Model is used to study data analysis in qualitative research both during and after the data collection stage. Miles and Huberman (Mardawani, 2020) divide three steps of activities in qualitative data analysis:

1. Data reduction
   Researchers function as compasses when they decipher data. Findings are the main goal of qualitative research. Consequently, data reduction must take into account everything odd, new, and unstructured that the researcher may encounter during his investigation.
2. Data presentation
   Data display is the next stage after data reduction. In qualitative research, visual representation of data can take various forms, including brief descriptions, charts, and flowcharts.
3. Conclusion drawing/verification
   Drawing conclusions or verifying them is the third stage of qualitative data analysis, according to Miles and Huberman. This is because the first findings are only provisional and can be revised if no more substantial evidence is found at the following data collection stage.

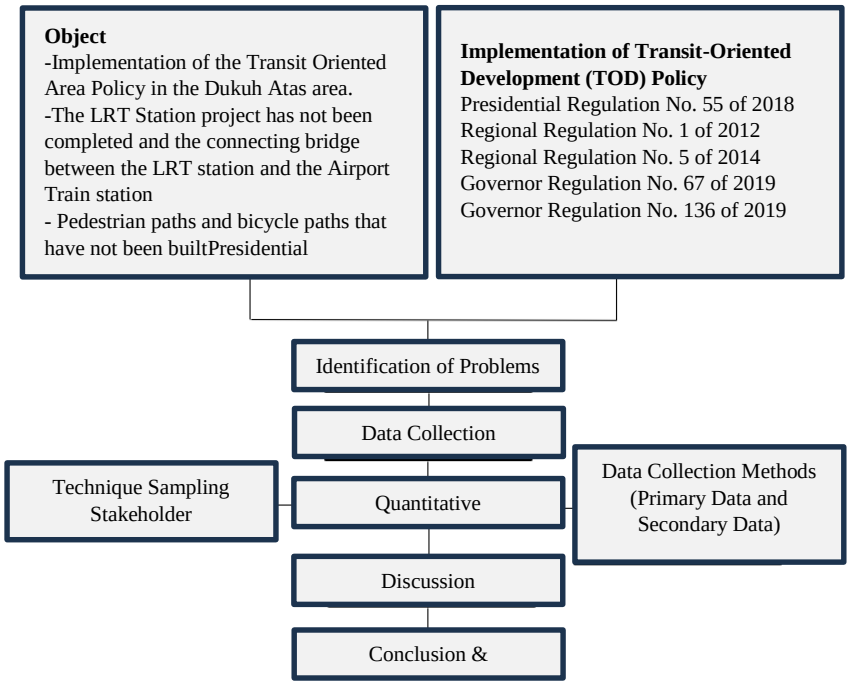

Figure 1. Flow of Thought

RESULTS AND DISCUSSION

This research was conducted in the Transit-Oriented Development (TOD) area of Dukuh Atas, Jakarta. Based on advice from the Jabodetabek Transportation Management Agency (BPTJ), PT MRT Jakarta is now creating a TOD area, also known as a transit-based area, to assist the DKI Jakarta Provincial Government's urban revitalization agenda.

In the focus of the question regarding "How is the regulation between the central government and local government in the implementation of the transit area in Dukuh Atas?" the researcher concluded that the relevant stakeholders assessed that Dukuh Atas as a TOD area in Jakarta received attention from the central government in terms of developing transportation infrastructure such as MRT and BRT. Coordination between the Ministry of Transportation, DKI Jakarta Provincial Government, and developers is needed to ensure good integration between transportation systems. The DKI Jakarta Provincial Government, through the RDTR and RTRW, regulates land use in Dukuh Atas, including transit areas, housing, trade, and public facilities by TOD policies. The arrangement and improvement of the Dukuh Atas area involves the application of policies on building density, provision of green open space, and accessibility to support public transportation-based mobility.

Regulations between the central government and local government in implementing the transit area in Dukuh Atas can be reasonable if there is effective synergy and harmonious coordination between the two levels of government. In the context of Dukuh Atas, one of Jakarta's main transit areas, successfully implementing the Transit Oriented Development (TOD) policy depends heavily on how the central and local governments harmonize their regulations and guidelines. The central government often sets the policy framework and technical standards to be followed, while local governments have a key role in local implementation, licensing, and supervision.

The success of TOD implementation in Dukuh Atas can be measured by the extent to which regulations set by the central government are integrated with concrete plans and actions taken by the local government. Suppose there is good coordination, for example, in infrastructure planning, transportation management, area development, and support in funding and policies. In that case, the regulation between the two parties is reasonable. However, there

are obstacles or discrepancies in implementation, such as differences in policy interpretation or conflicts of interest. In that case, improvements are needed to ensure the success and effectiveness of TOD implementation in the area.

In the focus of the question regarding "How is the implementation of Transit Oriented Development (TOD) policy in order to optimize the integration of public transportation modes in the Dukuh Atas Jakarta area?" the researcher concluded that the implementation of Transit Oriented Development (TOD) policy to optimize the integration of public transportation modes in the Dukuh Atas Jakarta area involves several strategic steps and concrete actions. The existence of Area Planning and Structuring, adjusting the RTRW to support TOD principles, including the structuring of areas that integrate residential, commercial, and recreational areas around transit centres. Ensure that development around transit stations such as MRT, BRT, and KRL follow mixed land use principles and update the RDTR to include regulations that support high-density and mixed-use around transit stations. This includes rules on building height, population density, and green areas.

Design and build an integrated transportation network, including MRT, BRT, KRL, and bicycle systems. Connect all modes of transportation with the main transit facility at Dukuh Atas to facilitate intermodal transfers as well as Develop transit hubs at key stations such as Dukuh Atas Station, with facilities such as BRT terminals, MRT stations, and KRL stations in one integrated area. These facilities should provide easy access and intermodal transfers. Policies and Regulations establish zoning policies that encourage mixed Development (residential, commercial, and recreational) around transit hubs. This includes incentives for developers to build projects that comply with TOD principles and Develop fare policies that support integrating transportation modes. For example, an integrated payment system allows passengers to use one ticket for multiple modes of transportation. Sustainable Development, increasing green open spaces around transit stations to create a better environment and support non-motorized mobility. These green spaces also serve as recreational areas for residents. It also ensures that TOD development considers social and economic aspects by providing affordable housing and good accessibility.

On the focus question of "How to overcome the irregularities that occur due to the lack of integration of spatial planning with transportation planning?" the researcher concluded that To overcome the irregularities that occur due to the lack of integration of spatial planning with transportation planning, a practical approach is to develop and implement spatial plans that are integrated with the transportation system. Development of Integrated Plans: develop master plans incorporating spatial and transportation aspects involving all stakeholders, including local governments, urban planners, and communities. Inter-agency Coordination: improve coordination between central and local governments to ensure spatial planning and transportation policies are mutually supportive and do not overlap. Technology Implementation, using information technology and monitoring systems to improve planning and monitoring, including GIS (Geographic Information Systems) for data analysis and visualization. Policies and Regulations: implement policies and regulations that require integrating spatial and transportation systems in all development projects. Public Participation involves the public in the planning process to ensure that their needs and aspirations are considered, which can help identify and address issues that may not be apparent to the authorities.

CONCLUSION

Based on the analysis of the level of suitability of the Dukuh Atas area based on the TOD concept, it is found that all blocks have not met up to 56 points to be categorized as bronze TOD areas. Block 4 is the block that has the highest level of conformity at 46 points, while block 5 is the block that has the lowest level of conformity at 37 points. Only 4 out of 8 principles have an average level of conformity exceeding 50%, namely an average of 64% on

the principle of blending, an average of 60% on the principle of merging and the highest average of 96% on the principle of switching and the principle of transit is 100% compliant. Meanwhile, those that have not met or with an average level of conformity below 50% are in walking, cycling, connecting and compacting.

The Transit Oriented Development (TOD) policy implementation in Dukuh Atas, Jakarta, shows positive results thanks to the attention and coordination between the central and local governments in developing transportation infrastructure such as MRT and BRT. This success relies on the synergy between the Ministry of Transportation, Jakarta Provincial Government, and developers to ensure effective integration between transportation systems. Through the RDTR and RTRW, the local government has regulated land use in the Dukuh Atas area to support TOD principles, including the regulation of transit areas, housing, trade, and public facilities.

The arrangement and improvement of the area involves policies on building density, provision of green open space, and accessibility. This research highlights that good regulation occurs when there is harmonious coordination between the central and local governments, including infrastructure planning and area development. However, to overcome the disconnect between spatial planning and transportation, it is recommended that there should be integrated spatial planning, improved coordination between agencies, application of technology for planning, and policies and regulations that support integration. Public participation is also essential to consider community needs in any development project.

Although this research has provided valuable knowledge on the analysis of Transit Oriented Development (TOD) policy implementation to optimize the integration of public transportation modes, some shortcomings need to be noted. First, this research may not have fully covered all perspectives and experiences of various stakeholders, including local communities with different views on the impact of TOD. Second, the analysis may be limited in data or geographical coverage, so the results may not fully represent all transit areas in Jakarta or other cities. Third, the study may not have fully considered aspects of long-term dynamics and policy changes that may affect the implementation of TOD in the future. In addition, the methodology used may have limitations regarding the accuracy or rigour of the analysis, such as the lack of in-depth quantitative data. Lastly, not all of the recommendations provided may be practically applicable without appropriate adjustments to local conditions or changes in government policies. Therefore, it is essential to complement this research with further studies and continuous evaluation to ensure that TOD policies can be implemented effectively and sustainably.

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