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JOURNAL LINKS

The 6th International Symposium on Sustainable Urban Development (The 6th ISoSUD) 2023

The 6th INTERNATIONAL SYMPOSIUM ON SUSTAINABLE URBAN DEVELOPMENT (The 6th ISoSUD) 2023

The International Symposium on Sustainable Urban Development (ISoSUD) is a series of international activities organized by the Faculty of Landscape Architecture and Environmental Technology, Universitas Trisakti, Jakarta. The event is held once every 3 (three) years with themes related to current issues regarding sustainable urban development, in particular related to urban environmental management and environmental technologies. The activity aims to facilitate academics to publish their research results in order to enhance their scientific expertise as researchers.

The 6th ISoSUD in 2023 carried the theme "**From Recovery To Resilience: Building A Sustainable Future For A Better Life"** which means this symposium will focus on how we can recover from the difficult times caused by the COVID-19 pandemic and build a better future and sustainable. This theme also shows the importance of building resilience in facing future challenges, whether related to climate change, economic policies, or other social problems.

The COVID-19 pandemic that swept the world in the last four years has had a significant impact on human health, the global economy, and the daily lives of people around the world. It will take the concerted efforts of all countries and peoples to overcome this pandemic and rebuild the world after it. This pandemic underscores the need for global efforts to strengthen health systems, enhance societal resilience, strengthen international cooperation, and accelerate action to achieve sustainable development goals and combat climate change. This crisis provides an opportunity to make significant changes in the way we view and manage our economic and social activities and to create a world that is more sustainable and fairer for all people and our planet. Now is the time to make a difference, to make a profound systemic shift towards a more sustainable economy for the benefit of our people and our planet. In other words, now is the right time to undertake significant transformations in existing economic and social systems, which can help sustainably achieve the SDGs and fight climate change to ensure a better future for people and our planet. Overall, post-pandemic recovery must be based on the principles of sustainable development contained in the SDGs. By integrating the SDG goals into our recovery policies and actions, we can create a more sustainable, inclusive, and resilient future for our people and the world.

The 6th ISoSUD was held in the hybrid conference:

a. Day 1, on Wednesday, August 2nd, 2023, at Building M, 12th floor, Universitas Trisakti, Jakarta, Indonesia. There were 130 participants offline and 170 participants on the Zoom platform in the plenary session.

b. On day 2, on Thursday, August 3rd, 2023, using the Zoom meeting facility, 270 participants attended virtually on Day 2.

In this two-day International Symposium, experts, researchers, and academician shared their valuable insights and research findings. These esteemed presenters hail from 58 universities and institutions in Filipina, India, Indonesia, Iraq, Japan, Malaysia, Netherlands, Singapura, and Taiwan, reflecting the symposium's diverse and inclusive nature. The call paper system that has been used since the first ISoSUD in 2008 succeeded in inviting 165 manuscripts (more than 400 authors) that were presented offline and virtually. Then, 136 from 165 papers were selected further to be published in IOP Proceedings Indexed by Scopus. After another review process, 106 manuscripts were published in IOP EES. To improve the quality of the manuscripts, the organizing committee held a Coaching Clinic for Scientific Paper Writing on June 24th, 2023. Prof. Mohamad Ali Fulazzaky, Ph.D, delivered the coaching clinic.

The 6th ISoSUD 2023 involved co-host universities consisting of five from within the country and four from abroad: Universitas Jember (UNEJ), Jember, Indonesia; Universitas Islam Indonesia (UII), Yogyakarta, Indonesia; Universitas Pasundan (UNPAS), Bandung, Indonesia; Institut Teknologi Sepuluh November (ITS), Surabaya, Indonesia; Universitas Indonesia (UI), Jakarta, Indonesia; Universiti Teknologi Malaysia (UTM), Malaysia; Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia; The University of Kitakyushu, Japan; Chung Yuan Christian University (CYCU), Taiwan. During the class presentation session, a presentation from the participants representing the 6th ISoSUD co-host was carried out. Besides that, The 6th ISoSUD 2023 was supported as well by the Indonesian Society of Sanitary and Environment Engineers (IATPI), which has continuously supported our symposium since 2008. And sponsored by PT Enviro Cipta Lestari.

In the plenary session, some main speakers delivered more focused seminar themes; they were:

Welcoming Speech:

Prof. Dr. Kadarsah Suryadi DEA – Rector of Universitas Trisakti

Opening Speech:

Ir. Diana Kusumastuti, MT. - Director General of Human Settlements, Ministry of Public Works and Public Housing Indonesia

Plenary Speakers:

Day-1

1. Prof. Lin Chi Wang - Chung Yuan Christian University (CYCU), Taiwan
2. Prof. Ir. Joni Hermana M.Sc.ES., Ph.D – Institut Teknologi Sepuluh November (ITS), Indonesia

Day 2

3. Prof. Ts. Dr. Azmi Bin Aris - Universiti Teknologi Malaysia (UTM), Malaysia
4. Prof. Dr. Eng. Toru Matsumoto - University of Kitakyushu, Japan
5. Associate Prof. Victor R Savage – Nanyang Technological University (NTU), Singapore

We believe that this event will be able to facilitate good networking among researchers, scientists, engineers, and practitioners with common interests, especially in sharing the latest research results, ideas, development, and applications in Sustainable Urban Development. Hopefully, all participants enjoyed the seminar and found this experience inspiring and helpful in their professional field. Thank you for choosing the 6th ISoSUD as your symposium reference. Let us embrace the spirit of collaboration and innovation as we strive towards a sustainable future for a better life. We hope to have your pleasant support and participation in the next three years on The 7th ISoSUD 2026.

Sincerely,
Assoc. Prof. Ariani Dwi Astuti, ST., MT., PhD
Chairperson of The 6th International Symposium on Sustainable Urban Development (ISoSUD) 2023

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Transit Oriented Development (TOD) network arrangement system in the City of Jakarta

Transit Oriented Development (TOD) network arrangement system in the City of Jakarta

H M Taki*, R Wicaksono and M A Badawi

Department of Urban and Regional Planning, Universitas Trisakti, Jakarta, Indonesia

*herika@trisakti.ac.id

Abstract. The city of Jakarta has grown very rapidly with more than 18.6 million private vehicles passing through it. Around 47.5 million people move in Jakarta and its surroundings, only 24 percent use public transportation. This trend of using transportation that is fast and uncontrollable, but not many people use public transportation. The purpose of this research is to provide direction to the public and the government so that the use of pedestrian-oriented public transportation and mass public transportation through the application of the TOD concept. This research method is descriptive argumentative in nature supported by data sources and processed qualitatively. The results of this study show that the application of TOD to mass transportation systems in Jakarta that currently exist or exist such as Commuter line stops or stations, Mass Rapid Transit (MRT), Trans Jakarta Bus Rapid Transit (BRT), Light Rapid Transit (LRT) has provided convenience and comfort for its users, as well as regional arrangement, passenger flow, and integration between mode. The conclusion of this study is that the TOD system that has been built can connect the downtown area with connected buffer areas via the BRT, MRT and LRT. This transportation system was developed managed by Jabodetabek Transportation Management Agency (PT. BPTJ).

1. Introduction

Transit Oriented Development (TOD) is a pattern of urban planning development that is integrated with the transportation system to create an efficient city. The concept of TOD has a goal, namely, to provide an alternative and problem solving for metropolitan growth which tends to have an oriented development pattern [1]. The TOD concept integrates the transit network regionally and complements existing environmental development strategies around transit nodes [2]. According to Calthrope (1993) in [3], The TOD area combines residential land use, trade, services, offices, open space, and public space to make it easier for people and users to travel by foot, bicycle, or other modes of public transportation.

There are several benefits of developing a city with the concept of TOD Areas, namely reducing the number of private vehicle users so as to avoid congestion, air pollution and greenhouse gas emissions, increasing transit passenger transportation and local revenue from transport fares, expanding mobility by reducing dependency on private vehicles, so as to reduce transportation costs, increase access to jobs and provide economic opportunities for low-income people, as well as create or create pedestrian communities to accommodate people to live healthier and more active lives. The novelty of this research is research on all stations such as Commuter line, Light Rapid Transit (LRT), Mass Rapid Transit (MRT) or Trans Jakarta Bus Rapid Transit (BRT) in big cities with dense populations in developing countries as happened in the capital city of Jakarta, Indonesia.

2. Methods

This section outlines the significance of the Jakarta metropolitan area as an important case study and the methods of data collection and analysis. Data collected in this study derived from The Ministry of Transportation, PT LRT Jakarta, PT MRT Jakarta. This study using the GIS method to map the transportation routes supporting TOD. This study analyzes each public transportation based on the routes and stops they have. With the analysis conducted, researchers can find out the advantages and disadvantages of each mode of transportation. The research data is secondary data obtained through literature studies from other studies and institutional review reports related to variables. The data obtained are spatial and non-spatial. Overlay techniques and manual digitization are used to analyze spatial and non-spatial data.

3. Results and Discussions

3.1. Study area

The Jakarta Metropolitan Area is an area consisting of 5 cities which is usually shortened to JABODETABEK (Jakarta, Bogor, Depok, Tangerang and Bekasi). The Jabodetabek metropolitan area is one of the largest metropolitan areas in the world, and is the largest urban area in Indonesia and even Southeast Asia [4]. The main problems faced by the city of Jakarta began when around the 1970s Jakarta developed into a big city. In the end, the development of the city of Jakarta could not be limited by administrative boundaries, it even connected with the surrounding urban areas such as Bogor, Tangerang and Bekasi which formed urban areas.

Jabodetabek as a megapolitan region in Indonesia has an area of 6,437.89 km^2 or only about 0.34% of the total area of Indonesia which is 1,916,906.77 km^2. However, the Greater Jakarta area has a population of 29,116,662 people or around 11% of Indonesia's population and is one of the most densely populated areas in Indonesia. With the city of Jakarta being a city of attraction for the surrounding cities, a qualified supporting transportation system is needed as a mode of access for daily workers who live in Jakarta's buffer zones.

3.2. Mass Rapid Transit (MRT)

Mass Rapid Transit (MRT) is a mass transportation and rapid transit system which is an effective and convenient electric rail-based transportation. The MRT system has proven its results with the many implementations of this mode of transportation by big cities in various countries [10]. The Jakarta MRT has succeeded in becoming a mode of urban transportation with main criteria that support the life and mobility of residents in big cities, in this case, Jakarta. MRT Jakarta has a large carrying capacity with a capacity of 300 people in one carriage and the MRT consists of 6 carriages. MRT Jakarta has a service which can have a short and fast travel time as well as short distances between trains or what we usually call rapid. In addition, the MRT has stations that are strategically located, namely at the center of community activities and activities as well as mode meeting points. Of course, the MRT answers the need for a very congested mode of transportation for the City of Jakarta, namely a mode that is fast, has a large carrying capacity, and reaches many strategic points in the City of Jakarta and is environmentally friendly.

The life and economic activity of a city depends on how easy it is for city residents to travel/mobilize and how often they can do it to various destinations within city [12]. The cost of the MRT project for the first phase of the 16-kilometer Lebak Bulus-Bundaran HI corridor which is being worked on is Rp 14.16 trillion. The funding scheme is 49% grants and 51% loans from the Japan International Cooperation Agency. The length of the MRT line, which was 8.50 kilometers, has increased to 14.60 kilometers. The additional costs are estimated to reach IDR 11.70 trillion. From the developed master plan, the socio-economic impact of TOD can reach IDR 15 trillion to IDR 20 trillion [11].

MRT Jakarta was built in 2013 and was completed in. For now, the MRT line that has been operating is the first MRT line that divides the city of Jakarta from the south to the north. This first phase of the MRT line connects the Lebak Bulus area with the center of Jakarta City at the HI Roundabout. The first

phase of the MRT crosses the Fatmawati area, Cipete, Blok M, Jalan Jendral Sudirman and ends at the HI Roundabout. The purpose of building the MRT, which has its starting point in the Lebak Bulus area, is to reach the people of South Tangerang, most of whom have activities and work in the center of Jakarta City. Besides that. Along with the operation of the phase 1 MRT line (Figure 1), the government is developing it.

An integrated transit area at several stations, with the aim of connecting different modes of transportation in this area, namely MRT Jakarta, Transjakarta Bus Rapid Transit (BRT), commuter trains (commuter line), and Light Rapid Transit (LRT). which will be integrated with each other through the pedestrian.

Throughout the first half of 2022, it was recorded that 7,209,980 people used the Jakarta MRT service. This figure shows that transportation reaches an average of 39,834 people per day [9]. With improving conditions and maintaining and improving safety, security, comfort and on time performance standards, PT MRT Jakarta (Perseroda) is optimistic that it can meet the target of 40 thousand people per day by the end of 2022 [15]. From January to June, the highest number of service users was recorded in June with 1,914,723 people and the lowest in February with a total of 523,671 people. Thus, the daily passenger occupancy rate for MRT Jakarta is increasingly showing the public's interest in using this mass public transportation.

With the concept of a transit-oriented area, PT MRT Jakarta encourages several benefits for the community, namely [8]: reducing the use of private vehicles which have an impact on decreasing traffic jams and pollution; forming a society that likes to use public transportation and a healthy life; improve accessibility and employment opportunities; potential to create added value through increasing property values; increase the number of transit passengers and profits from ticket sales; increase the choice of modes of movement in urban areas.

The disadvantages of the Jakarta MRT include:

- Minimal integration. The factor that should be the advantage of the MRT is that integration or connectivity with other modes of public transportation or buildings around the station is almost invisible. So far, only Lebak Bulus Station and HI Roundabout are directly connected to TransJakarta and Blok M Station is connected to a shopping mall (Blok M Plaza).
- Narrow entrance. I don't know why the entrance design wasn't made to be able to use the escalator up and down, it was only installed up. The problem is the stairs are too steep for some people especially the elderly and children.
- Limited signal underground. Currently, not all telecommunications providers provide services at underground stations, as a result, some people still experience signal difficulties when the train enters the underground, including me.
- Information instructions are not clear. First, from the timetable or itinerary, there is very little information about this and even info about the last train is usually just piece of paper at the station entrance.

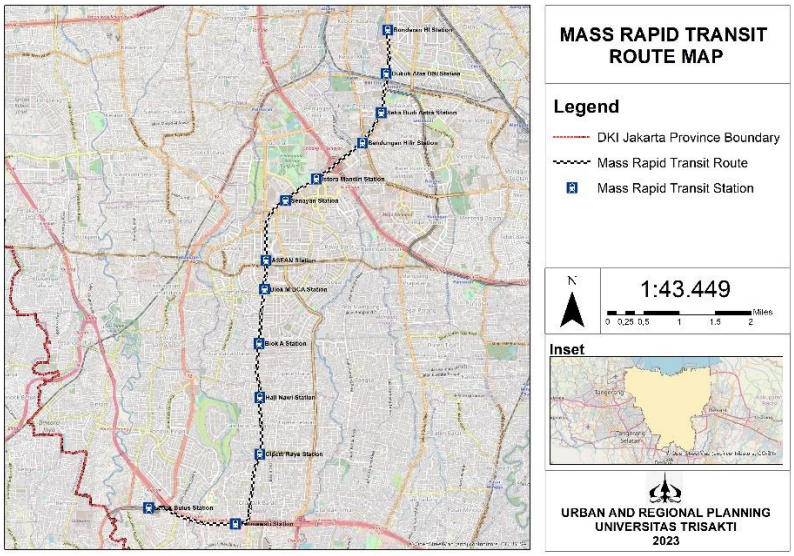

Figure 1. Phase 1 Mass Rapid Transit map.

3.3. Buss Rapid Transit (BRT)

Bus Rapid Transit (BRT) or busway is a high-quality bus-based transit system that is fast, convenient, and low-cost for urban mobility by providing pedestrian roads, infrastructure, fast and frequent service operations, marketing and service differences and advantages. to customers. Bus Rapid Transit (BRT) essentially emulates the performance characteristics of modern rail transportation systems [13]. A BRT system will typically cost 4-20 times less than Light Rail Transit (LRT) and 10-100 times less than a subway system. BRT also combines several elements such as special bus lanes which are generally in the median of the road, collection of off-board fares, level boarding, priority of buses at intersections, and other quality of service elements, such as information technology and strong branding.

TransJakarta is a mode of mass transportation to support the activities of the capital city by reaching many stop points without access to the MRT and LRT. At some point BRT is intended as a feeder fleet for other modes of transportation. TransJakarta is a BRT service with the longest route in the world, with a track length of 251.2 km with 260 stop points and 13 bus routes, which was originally operating from Pkl. 05.00 – Pk. 22.00 WIB, now operating 24 hours. The Regional Owned Enterprise (BUMD) PT Transportasi Jakarta (Transjakarta) is currently targeted to be able to transport as many as 1 million passengers per day. However, until now, TransJakarta passengers have only reached 800 thousand passengers per day. Even though it has not reached the target, the number of passengers continues to increase every day. This is accompanied by an increase in service quality and coverage of the TransJakarta BRT itself.

The advantages of BRT:

- Provide convenience at relatively low rates.
- BRT services have special lanes that are separate from other public vehicles. This BRT describes a transportation with a high capacity or commonly called the right of way.
- Overcoming high population density and mobility of people.

The weakness of BRT:

- BRT drivers in Jakarta sometimes disobey regulations and endanger drivers of other vehicles.
- For some courses, the waiting time is long, it can be more than 20 minutes. This is less efficient in terms of time.
- Longer travel time. Even though it is claimed to be jam-free because it has its own lane, it is not that fast either. Apart from that the road is also not too fast, it tends to be slow because you must be careful, the paths that sometimes twist because you must reach many stops also make the trip longer and not suitable for those who have limited time (Figure 2).

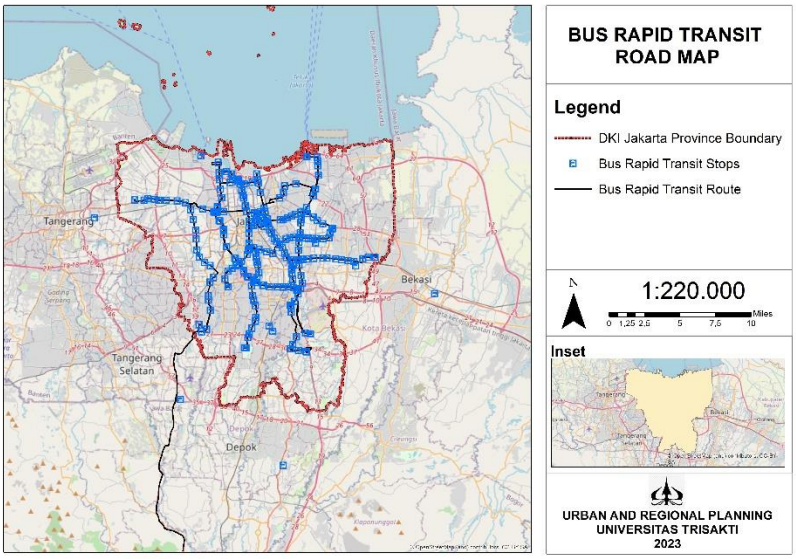

Figure 2. Bus Rapid Transit map.

3.4. Light Rapid Transit (LRT)

LRT or commonly called light rail is a passenger rail system that operates in urban areas with light construction and can run with other traffic or on special tracks, also called trams. LRT itself is a public vehicle that has a fairly slim body and is often known as the Integrated Cross Rail [7]. Unlike the MRT, this LRT can only carry passengers with a capacity of 257 people. This LRT also only consists of 4 cars in each series of trains. Every day, the LRT can carry up to 360,000 people, which is twice as much as the MRT. This is because the LRT only moves on flyovers, so it is not affected by traffic jams. Not only that, but this LRT also has a more flexible structure when compared to the MRT so that it is able to pass even narrower and circular lanes. The LRT has almost the same time as the MRT (Figure 3).

From the list of Jabodetabek LRT stations, there are 2 different types of stations, namely the Interchange Station type, Cawang Station, and the Typical Station type for 17 other stations. The difference from this type of station is the number of lines, station area and additional facilities in it. The Jabodebek LRT station design with the Interchange Station type consists of 3 floors. The 1st floor is the boarding and commercial area, the 2nd floor is the platform area, and the 3rd floor is the commercial area. Meanwhile, the Typical Station type consists of 2 floors. The 1st floor is the boarding area and the 2nd floor is the platform area, after its operational period after it was inaugurated in December 2019, passenger occupancy from the LRT itself is still quite low. This can be seen from the number of occupants of the passengers themselves.

Where LRT passengers every day only touch the figure of 1,500 passengers. This is still very far from the existing target, where PT LRT is targeting 7,500 passengers per day. The small number of users of the LRT itself is due to its accessibility and coverage area. Limited access and lack of integration with other public transportation means that LRT is not very popular. Short routes and many of the areas it serves are housing, not centers of community activities, are also the reason for the LRT's current quiet. It is hoped that if later the LRT phase one is connected to the phase two route, the LRT will experience an increase in passenger occupancy because it is already connected to other modes of transportation.

The advantages of LRT:

- Equipped with access facilities in the form of escalators, stairs and lifts, toilets, nursing rooms, prayer rooms, medical rooms, Passenger Information Display System (PIDS), passenger announcements, and CCTV.
- The Jabodebek LRT stations are located not far from the points of other public transportation modes so that it will make it easier for customers who will use the connecting public transportation.

- LRT Jakarta is designed as a comfortable and safe public transportation with international standards, with friendly and classy service.
- LRT Jakarta is also an environmentally friendly mode of mass transportation capable of reducing the production of carbon emissions from private vehicles. LRT passengers can save around 13-15 minutes of time.

The weakness of LRT:

- There is a loud sound when the LRT train stops. The sound of the brakes which is loud enough is also questioned by consumers.
- Loudspeakers in the LRT car can't be heard clearly when giving information.

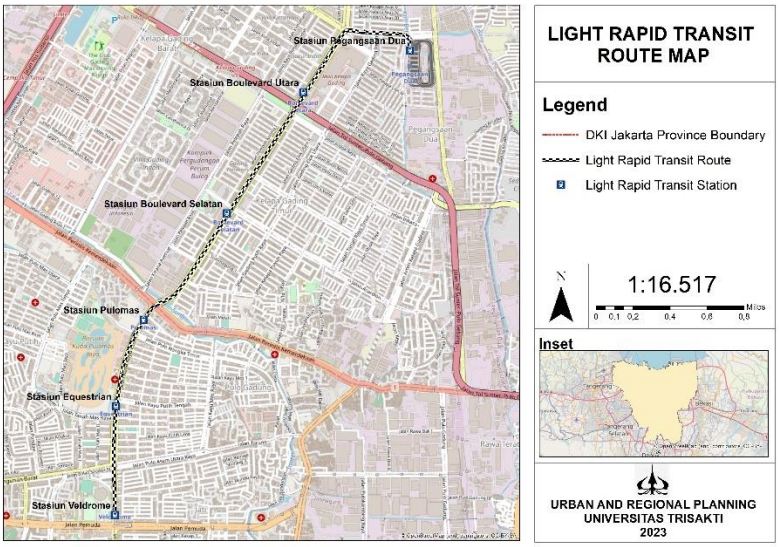

Figure 3. Phase 1 Light Rapid Transit map.

The city of Jakarta is currently served by three main transportation systems that support the TOD system and people's movements [5]. We can see this from several points in Jakarta, including in the Sudirman area, specifically SCBD (Sudirman Central Business District), Dukuh Atas area, and the Blok M area [14]. This area is integrated by two modes, namely Trans Jakarta and the MRT which connects office areas, shopping, and community activities. Based on the above explanation regarding the TOD network support system in Jakarta, which is served by the MRT, LRT and BRT, in fact the city of Jakarta is already heading towards a sustainable city that encourages its citizens to use public transportation. The transportation network, which is currently in the process of improving services for the affordability of locations within 400 meters, continues to be accelerated to support government regulations [6]. Where later a high-density TOD area with a mixed-use concept will be created. The area consists not only of office areas but also consists of residential, educational, shopping and recreational areas of the three available transportation systems, the LRT mode is the mode with the least occupancy. Phase 2 development acceleration is still being accelerated to achieve an optimal and efficient network. Meanwhile, MRT and BRT, which currently have quite a high number of users, are continuing to improve services so that the daily target of users can be achieved.

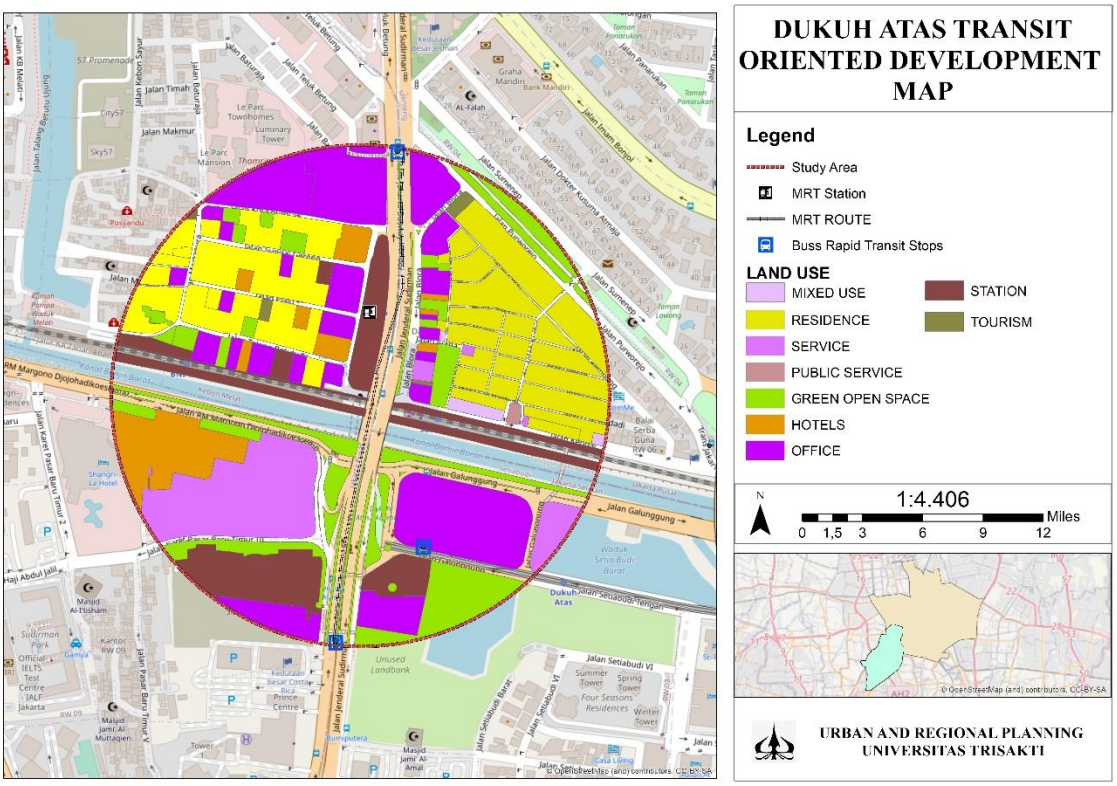

Figure 4. Dukuh Atas Transit Oriented Development land use.

The construction of Transit Oriented Development in Dukuh Atas (Figure 4), which consists of two modes of transportation, also has an influence on land use. The strong attraction of the central area of Jakarta City, which is the center of the working community, is the reason why the development of transportation modes is prioritized in the Dukuh Atas area. Land use around the Dukuh Atas Transit Oriented Development area has also changed, being dominated by office, business and service centers. Large national and global private companies compete to build and construct buildings around strategic TOD areas. However, the relevant government also regulates land use so that green open spaces and areas where people carry out their activities are maintained.

4. Conclusion

The results of this research show that DKI Jakarta, as a city that attracts movement from surrounding cities, seeks to provide direct transportation to office areas. The network of transportation modes is quite extensive, especially the Bus Rapid Transit network, which has succeeded in reaching the supporting cities of Jakarta, such as Depok, Bekasi, Tangerang and Bogor. The Mass Rapid Transit service is also a service that reaches the border areas between South Jakarta City and Depok City and South Tangerang City to the city center, namely Central Jakarta. The affordability of direct transportation modes to the city center also affects the area around the hub or intermodal transit, namely the Duku Atas Transit Oriented Development. Since intermodal connectivity has improved, land use in the Dukuh Atas area is dominated by office and business areas. This is nothing more than a reaction from offices and private companies wanting to have offices around the TOD area to make it easier for their workers to access it.

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