Analysis of Land Use Developments Along the LRT Line (Case Study: Polresta, Jakabaring and DJKA Station’s)

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ABSTRACT
Transportation has become a basic need that plays an important role in people's lives. To reach a place, a high level of accessibility is required. A high level of accessibility will affect the number of people coming to an area. Many people will affect the number of activities that require land. Therefore, this study aims to analyze land use trends that occurred in the time period before and after the South Sumatera LRT. LRT or Light Rail Transit is a type of public transportation in the form of light rail operating in urban areas. LRT is the first light rail transportation in Indonesia right in Palembang City. Therefore, it is interesting to see its relation to land change along the LRT route. This research was conducted at three stations which were case studies, namely Polresta, Jakabaring, and DJKA stations. This station was chosen because it is in Jakabaring. Jakabaring was chosen as the research area because it is a sub-district which is located on the border with other regencies but is still passed by the LRT. This research is a qualitative research using the overlay before-after analysis method through spatial data. This research uses the help of Arcgis software, through Intersect tools and multiple ring buffers. The results of the analysis are then used as data for further analysis using a pivot table in excel. The results of this analysis prove that there is a tendency for changes in land use within a certain radius. The trend is in the form of changes in land from swamps or paddy fields to deserted, trade and services as well as offices.

Key word: land use; transportation; South Sumatera LRT; before-after analysis; arcgis.

INTRODUCTION
Transportation is an important element in supporting community activities. While public transportation is public transportation with a rental or payment system (Putri, Yulanda, & Desga, 2016). Transportation comes from the Latin word, namely transportare. Transportare consists of two cities, namely trans and portare. Trans which means across or across while portare means to carry or carry (Kadir Abdul, 2006). Transportation has four main elements consisting of street, vici, motive power and station (Biomantara & Herdiansyah, 2019). According to Shofian Edy Harianto Bongso, Theo K.Sendow (2019), Transportation is a Derived Demand due to economic, social and cultural sector activities. Population growth and development of the above sectors will affect the level of use of public transportation. Space, time and infrastructure play an important role in connecting cities (Bettencourt, 2017). The transportation system will hold the most important element in fulfilling the development of the region (Hadihardja, 1997). Transport is a major mediator of sustainability in urban areas, as they influence the way people and goods move within cities (Tamin, 2007). The more people there are, the higher the chances of using private transportation. The large use of private transportation on the streets will cause a new problem, namely congestion. In line with that, Aminah (2012), revealed that public transportation problems will increase in direct proportion to increasing social and economic activities and travel requests. One solution that can be done is to increase the provision of public transportation. There are various types of public transportation, one of which is Light Rail Transit or better known as LRT. According to Law Number 23 of 2007 concerning Railways, it is stated that LRT is a low-speed mass transportation of 60-120 km/hour. In general, the LRT itself operates in urban areas. Its shorter tracks and more flexible paths make LRT suitable for use in urban areas. Referring to the title raised, the location of this research is in the city of Palembang, precisely in the District of Jakabaring. The South Sumatera LRT line itself was built across roads which are the main axis of Palembang City which is already congested so to see the usefulness of the South Sumatera LRT for...
land use would be difficult to do because it is located on the axis of a main road which has already been developed. However, to analyze the further impact of the South Sumatra LRT, the district administrative areas that border it are included. For this reason, the most distant district was finally chosen and it is still possible for land use development to occur due to the LRT transportation in this study. In Palembang itself, the LRT has been operating since 2018. The South Sumatra LRT is the first LRT built in Indonesia. Precisely in general can use it after the Asian Games event is held. Initially the aim of building the LRT was to help the mobility of athletes to avoid traffic jams considering that the distance between the airport and the Jakabaring area where the Asian Games was held was quite far. However, the real long-term goal expected by the government is to help facilitate the movement of Palembang people from Ulu to Ilir or vice versa so as to reduce road burden.

The more developed the area, the more diverse the activities in the region. The transportation system will hold the most important element in fulfilling the development of the region (Hadihardja, 1997). This will also be directly proportional to the increase in population. These activities will require land. Improving the transportation network as an effort to increase accessibility has proven to be able to help develop an area (Pramana, 2018). Good accessibility from various modes of transportation, especially trains, will affect property values (Debrezion, Pels, & Rietveld, 2007). That is why there is an increase in land use. According to Dewo Kusumaningrat, Subiyanto, & Yuwono (2017). Land use comes from a mixture of human activities to meet the needs of life. According to Aminah (2012), the basic elements of infrastructure in urban development are the transportation system, transportation and land use will play a crucial role in government policies and programs. Land use is a combination of human activities on the biophysical environment over a wide range of time and spatial scales (Setiawan & Yoshino, 2020). Therefore, the aim of this study was to analyze land use trends that occurred before and after the existence of the South Sumatra LRT in the case studies of Polresta, Jakabaring and DJKA stations

**RESEARCH METHODS**

**Materials**

This research is a qualitative research. Qualitative research is a research approach to observe people's lives, history, behavior, organizational functionalization, etc. (Rahmat, 2009). The purpose of qualitative research is to describe in detail the phenomenon in a context of what is happening in the field of study (Fadli, 2021). The research started with field observations related to the development of the South Sumatra LRT. To support research, it is necessary to collect data on stakeholders related to spatial data in the form of land use in 2015-2020. After an analysis is carried out, it can be seen whether there has been a change or not along the LRT route. The research also departs from the theory of Marcus Tukan, Hozairi (2023), in his journal writing, one indicator of the success of inter-regional development is determined by the support of a reliable and highly capable transportation system. To analyze these developments, a before-after analysis was carried out to determine trends in land change. The input data needed is spatial land use data before and after the LRT. Then, an analysis was carried out using the Multiple Ring Buffer to analyze the tendency of land use at the specified radius. The results of this analysis are then detailed in a pivot table analysis to see trends in land use and changes in land use before and after the LRT.

This research is different from previous research because no one has raised the object of LRT transportation to the surrounding land use as research. Research on LRT is also still rare in Indonesia because only the city of Palembang has an LRT and has been operating, this is considered an opportunity in this research. In addition, the spatial analysis method using the Multiple Ring Buffer tool is also different from previous analyzes which generally only reached the data overlay stage.
Methods

This research was conducted in Jakabaring District, Palembang City. The location was chosen because it saw the dynamics of passengers which tended to be higher in Jakabaring District. The LRT line is divided into 5 zones, the zones taken in this study are zone 4 at Polretsa station and Zone 5 at Jakabaring and DJKA stations. The length of the LRT line route in each zone is 3 - 6 km. The research started from field observations to see the development of land use in the field. Analysis was carried out using Archgis software with the help of Multiple Ring Buffer tools.

Data Analysis

The analysis was carried out using a descriptive method on the results of the before-after analysis based on the trend of land use along the LRT route. The data inputted in the analysis process are land use data in 2015-2020 and South Sumatra LRT line alignment data. According to the overview description of the South Sumatra Light Railroad Management Center, the planning and feasibility study (FS) of the South Sumatra LRT was carried out in 2015 then construction in 2016. On this basis, land cover was taken in 2015 and 2020. This data will be processed systematically, along with the help of Archgis and Excel software for. In addition, the analysis is also supported by related literature studies.

RESULT AND DISCUSSION

To find out changes in land use that have occurred, the first step is to overlay land use data in 2015 and 2020. With a before - after analysis, we can find out the land use of a location in 2015 and then the land use in 2020 whether it is still the same or has changed. In general, it can be seen that there has been a land change. However, this needs to be further analyzed, what land changes are dominant along the LRT route.
To find out more clearly, it is done with the help of intersect. After entering the second layer of land change, you will see a comparison. For simplicity, a categorization of land uses that experience changes or not is carried out. So, the attribute table will look like the image below.

**Figure 4. Table Of Attribute Intersect Analysis**

After categorizing, to make it easier to read the data, the data is separated in Excel for further analysis using a pivot table. The aim is to see the magnitude of the area of change that occurs in each land use. The results of the intersection analysis show that there is indeed a change in land use. The magnitude of the change is visible. The results of this analysis show that the most dominant change is the use of swamp land in 2015 to become settlements in 2020 with an area of ±29 Ha and the use of vacant land in 2015 to become settlements in 2020 with an area of ±31 Ha. This area is the largest area of land use change that has occurred because other data shows a land change of ±10 Ha.
After that, it is necessary to analyze the linkages between the LRT lines and the land changes that have been analyzed. The analysis this time uses Multiple Ring Buffer. At this stage, the distance/radius of the buffer is determined. The radius distance guidelines that are often used are ¼ mile or 400 meters or multiples of 1 mile or 800 meters as network and service planning (Daniels & Mulley, 2013). However, to measure land change more broadly, this research uses a radius of 100 – 2500 meters to cover all areas of Jakabaring District. This analysis was carried out by inputting the LRT trace data and land changes that have been analyzed. To find out the linkages to South Sumatra LRT transportation, the analysis still uses Arcgis assistance on the Multiple Ring Buffer tool. The analysis is used to determine land changes that occur along the South Sumatra LRT route. Therefore, the layer included is the shp layer of spatial data on the South Sumatra LRT route and spatial data on the Jakabaring sub-district.

In the attribute table of the Multiple Ring Buffer analysis, the area of land use change is again set, then all data in the table of attributes is transferred to excel to be re-analyzed using a pivot table.
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From the results of the analysis it is known that at a distance of 100 meters, the tendency of land change that occurs is settlements – become offices. At a distance of 200 meters, the highest trend of land change is also settlements – offices and swamps – settlements. At a distance of 300 meters there are still settlements - housing and trade/services and the swamps have become settlements. At a distance of 400 meters, settlements become offices, swamps become settlements and vacant land becomes sports facilities. At a distance of 500 meters, swamps and settlements become the center of small and medium industries.

The results of the analysis show that there are significant changes in the dynamics of land use for settlements, trade and services as well as offices. This is in accordance with the results of field observations and supports the initial hypothesis of the research that there is indeed an increase in land use change after the LRT transportation. The large number of changes in land use, if examined further, could be due to increased accessibility to and from the LRT. This can also be seen from the most dominant types of land change, namely trade and services as well as settlements and offices. Each owner of these buildings certainly considers the ease of access to and from their building. The impact of the light rail service proves that the provision of transportation services is better than before the existence of light rail and has an impact on the land value of the vicinity of the rail service (Ransom, 2018). The movement of the flow of people, vehicles and goods will lead to various interactions because all interactions require travel (Tamin, 2000).

In line with this, in addition to the availability of land at affordable prices, non-physical factors that can affect changes in land use are the availability of public facilities, because more complete facilities will influence residents to settle in the area to support their activities (Resiwiyasa, Novie Fitiria., I Gede Sugiyanto., 2012). Babcock’s Axis Theory (1960) in (Intan M. Harjanti*, Khristiana. D. Astuti, Pangi, R. Yesiana, P. Anggraini & Septiarani, 2020), the existence of a transportation axis will have strength in physical development due to the association of the transportation axis with population mobility tall one. This is supported by the theory of Charles Colby (1933) in (Silondae, 2016), in the city there are dynamic forces that influence urban land use patterns created by the movement of residents both from the inside of a city to the outside and vice versa. Accessibility impacts land use and transportation changes by providing opportunities for each individual to participate in activities in geographic locations (Geurs & van Wee, 2004). Based on the quotation above, it is known that there is a close relationship between transportation and land use due to increased accessibility.

**CONCLUSION**

Based on the results of the analysis and discussion that has been carried out, it can be seen that public transportation, in this case the South Sumatra LRT, has had an impact on the development of a region. By using before-after analysis and buffering techniques for land use along the LRT line and around the case study station in this study, it was possible to determine land use before and after the South Sumatra LRT. The South Sumatra LRT is a potential generation that can become a generation for the development of the Jakabaring region. The remote location of

![Figure 7. Pivot table analysis](image-url)
Jakabaring makes this area very visible in its development. Based on the results of the analysis, it is known that there is a tendency for changes in land use along the LRT line at a certain radius. Within a radius of 100-500 meters, there is a tendency for changes in Adela's land for housing and trade/services and offices, both previously built and undeveloped land such as swamps and vacant land. Indeed, the use of land that is directly adjacent to the LRT line is in the form of a change in the function of existing land, for example from a residential area to an office building, because there is not too much vacant land on the side of the road. However, this is another indication that LRT has a further impact, namely social and economic impacts. As described above, the development of the transportation network has an impact on property and land values. The many changes in land use, if examined further, could be due to increased accessibility. With the easy reach of the Jakabaring Area, it has further increased the movement of people to this area. Increased accessibility will have a significant impact on land use in the Jakabaring area. With increased accessibility, it will certainly add to the variety of community activities. These activities certainly require land, the more important the activities are for the community, the placement tends to utilize and approach generation. That is why there are still changes in land use functions along the South Sumatra LRT line. LRT can be utilized as a potential for social and economic development. So overall in this study, since the existence of the LRT, it has proven that the Jakabaring area, starting from the Polresta station to the DJKA station, has experienced developments that have affected its land use.

REFERENCES


