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Traffic Management Analysis on the Bunggasi Road Section of Kendari City

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ABSTRACT

Bunggasi Street is one of the roads located in the Central Business District (CBD) area of Kendari City which is located in the Andounohu area. Based on the spatial map of the CBD area of Kendari City where the dominant activity that occurs on the road is economic activities which are marked by rows of Shop Houses (Shophouses), Markets, Mosques, Banks, Restaurants and so on. One of the factors that causes changes and increases in the shape of the area on this road is the existence of Marina Mart shopping centers and Anduonohu Market. The research "Traffic Management Analysis on Jl.Bunggasi Section" is located along the Bunggasi road, Kendari City, Southeast Sulawesi. Point zero is in front of the "Ayam Geprek Bosqu" Restaurant to the front of the HBM Store which is approximately 1.09 Km away. The performance of the Bunggasi road section in 2024 has the highest saturation degree of DJ (Saturation degree) on busy days of 0.41 which is included in the service level B, and on holidays it is 0.48 which is included in the road service level with category C. Based on the results of field findings through observations and traffic surveys conducted in the study of traffic engineering management on the Bunggasi Road section is the high volume of traffic during peak hours of activity and The small capacity of the road section is due to the parking on street and also due to the U-turn which causes congestion on the Bunggasi road section.

Keywords: traffic management; road performance; PKJI 2014

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INTRODUCTION

The rapid development in Kendari City spurred a change in traffic intensity, due to the construction of new buildings in the form of shopping buildings, terminals, offices, or the construction of business districts (Hidayat & Tato, 2021). Land use change is one of the factors that can affect the level of congestion in the city (Rantung et al., 2015; Wibawa, 2015). In general, there are three factors that cause the congestion problem to get worse over time, namely the continuous increase in vehicle ownership (*demand*), limited resources to carry out the construction of highways and other transportation facilities (*Supply*), as well as the suboptimal operation of existing transportation facilities (operating systems) (Irawan & Saputra, 2022; Wijaya Rangga Saputra & Wisnu Adi Irawan, 2022). Good traffic is the one that can realize smooth flow, sufficient speed, safe, convenient and cheap (Suharya et al., 2021). The Kendari City Government plans to build sports facilities as one of the important aspects in building sports. The existence of sports

facilities will add encouragement for the community and the government in promoting sports activities (Fanaqi et al., 2020; La Dimuru, 2023). In addition, sports facilities can provide benefits for the community and income for local governments (Rahayu, 2015). Therefore, adequate facilities and infrastructure are needed to accommodate football match activities. For this reason, it is necessary to have the latest Lakidende Stadium Development Planning design, to replace the existing stadium that currently exists, considering the current condition of the existing stadium which is poorly maintained and needs to be improved in several parts of the stadium (Mursyid, 2021). The imbalance between the growth of the number of vehicles and the uneven growth of road space and parking lots encourages the problem of urban traffic movement. The high growth of vehicles operating on the road is generally dominated by the increase in private vehicles, both cars and motorcycles, as a result of the low quality of service from public vehicles (Purwanto & Yulipriyono, 2015).

The problem of urban traffic congestion caused by the rapid development of the urban economy has become a hot topic of discussion (Agustin & Hariyani, 2023). Traffic congestion is a global phenomenon that is expected to get worse in the future. Traffic jams often occur ini Commercial area or shopping area as a result of space conflicts by users such as drivers, traders, buyers, and pedestrians (Sundari & Zulphiniar, 2015). Road Poultry is one of the roads in the area *Central Business District* (CBD) Kendari City which is in the Andounohu area. Based on the spatial map of the CBD area of Kendari City where the dominant activity that occurs on the road is economic activities which are marked by rows of Shop Houses (Shophouses), Markets, Mosques, Banks, Restaurants and so on. One of the factors that causes changes and increases in the shape of the area on this road is the existence of Marina Mart shopping centers and Anduonohu Market.

The existence of Marina Mart shopping centers and Andounohu Market is a major factor driving the change of this area, causing an increase in spatial conflicts between drivers, traders, buyers, and pedestrians. Therefore, this research is important in assessing the impact of development on congestion and formulating optimal solutions in better transportation planning in Kendari city. In addition, the latest Lakidende Stadium construction plan as a sports facility also needs to pay attention to traffic and accessibility aspects so as not to further aggravate the existing congestion conditions. Several previous studies have highlighted the problem of congestion and land use change due to urban economic growth. Study by Purwanto & Yulipriyono (2015) It was found that the growth of the number of private vehicles was higher than the growth of road space and parking lots was the main cause of the increase in congestion. This is exacerbated by the low quality of public transportation services which makes people prefer private vehicles. Meanwhile, research by Katiandagho, (2017) shows that traffic congestion in commercial or shopping areas is caused by spatial conflicts that occur between drivers, pedestrians, and economic activities. However, these studies are still general and have not specifically discussed the case of Kendari City, especially in the CBD area and its influence on the planning of new infrastructure development such as the Lakidende Stadium.

This research has a novelty in analyzing the relationship between the growth of

business districts and the level of congestion in Kendari City, especially on Jalan Bunggasi as one of the main points in the CBD area. In addition, this study also examines how the latest Lakidende Stadium development plan can affect traffic conditions and how transportation planning can be carried out to accommodate the development of urban infrastructure in a sustainable manner. By using a land use and transportation approach, this study is expected to provide more specific data-based recommendations in overcoming congestion in the strategic area of Kendari City.

The purpose of this study is to analyze the factors that cause the increase in congestion on Jalan Bunggasi and the CBD area of Kendari City, identify the impact of land use change on traffic movement, and examine how the construction of the latest Lakidende Stadium can affect accessibility and urban traffic. The benefits of this research include several aspects, both for local governments, communities, and the private sector. For the government, this research can be the basis for designing better transportation policies and optimizing urban planning so that economic growth and infrastructure development do not cause worsening traffic problems. For the community, this research is expected to increase accessibility and comfort in daily mobility. Meanwhile, for the private sector, the results of this research can be considered in developing a sustainable business by paying attention to transportation and land use aspects. Thus, this research is expected to make a real contribution to creating a more efficient and sustainable transportation system in Kendari City.

METHOD

This study is a descriptive quantitative research, which aims to analyze traffic management on the Bunggasi Road section in Kendari City, Southeast Sulawesi. Through a quantitative approach, this study collects and analyzes data systematically to describe traffic conditions based on road performance parameters, such as traffic volume, road capacity, *degree of saturation*, free flow speed, and travel time. This study uses the field observation method to obtain primary data, as well as the documentation study method to obtain secondary data. The data collected was analyzed using traffic performance analysis methods based on

Location and Time of Research

The research "Traffic Management Analysis on Jl.Bunggasi Section" is located along the Bunggasi road, Kendari City, Southeast Sulawesi. The zero point is in front of the "Ayam Geprek Bosqu" Restaurant to the front of the HBM Store which is approximately 1.09 Km away.

Traffic Management Analysis on Bunggasi Road Sections was carried out on busy days, Thursday, November 7, 2024 and on holidays, Saturday, November 9, 2024 on Bunggasi roads, Kendari City, Southeast Sulawesi.

Data Collection

Primary data in this study was obtained by taking traffic volume data, and road geometric data. Meanwhile, the secondary data taken was in the form of infrastructure around the road network that was reviewed, basic maps and administration of the study

location, maps of the existing road network, conditions of the existing road network, the condition of infrastructure around the road network that was reviewed, the operational existence of road sections and intersections at the study location.

Data Analysis Methods

1. Road performance analysis
   The calculation of the performance of the Bunggasi road section, which is a type of two-lane road section divided (4/2 T), was carried out during the existing conditions, then the performance results during the existing conditions were compared and analyzed for the impact on the traffic that occurred on the road section at the time of the operation of the Lakidende Stadium building. In this study, the calculation of road performance is based on PKJI 2014. The implementation stages are as follows:
2. Prepare research tools
3. Collecting primary data is to conduct a vehicle volume survey and speed survey after which measure the road geometry which includes measuring the width of the road, the width of the road shoulder and the observation of the condition of the road. Furthermore, secondary data such as location maps, land use conditions, and data from related agencies are collected.
4. Then analyze the data by determining the capacity value of the road section which includes (Basic capacity, Adjustment factors for the width of traffic lanes, Adjustment factors for separation of directions, Adjustment factors for side obstacle conditions, Adjustment factors for city size) with the following capacity formula:
   $$C = Co \times FCw \times FCsp \times FCsf \times FCcs$$
5. Degree of saturation (DJ) is defined as the ratio of road flow to capacity, which is used as the main factor in determining the performance level of intersections and road segments. After that, calculate traffic performance by determining the values of Saturation Degree (Dj), free avus speed (FV), and Travel Time (TT) with the formula for saturation degrees as follows:
   $$DS = Q/C$$

RESULTS AND DISCUSSION

Performance of Road Sections Existing Condition of Bunggasi Road Section

Table 1. Traffic Volume of Jalan Jend.Ahmad Yani on Monday (Busy Day)

No.	Section Name	Road Type	Status
1	Bunggasi Street	4/2 T	City

The following is a geometric description of the Bunggasi Road section:

Road Type : 4 lanes 2-way road divided (4/2 T)
Bandwidth : South 7.0 m
: North 7.0 m
Shoulder Width : South 1.5 m
: North 1.5 m

Median Width : 1.5 meters
Pavement Type : Bending Pavement
Road Status :City
Types of Alliances :Flat
Side Obstacles:Keep

Traffic Volume of Bunggasi Road

Table 2. Traffic Volume for 2 (Two) Days (Holidays and Busy Days) on Bunggasi Road Section

No	Day/Date	Traffic Volume (Kend/Hour)			Total Volume (Kend/Hour)	Ket.
		BC	KR	KB		
1	Saturday	3555	1188	92	4835	
2	Thursday	3302	1334	110	4746	

Table 3. Traffic Volume of Bunggasi Road Section on Busy Days

Proximity	Time Interval	Motor Vehicle Traffic Flow			Total Flow
		Light Vehicles	Heavy Vehicles	Motorcycle	
		ekr = 1	ekr = 1.2	ekr = 1.5	
		skr/hour	skr/hour	skr/hour	skr/hour
A	Morning (08.00 – 09.00)	466,0	55,9	366	887,9
	Afternoon (12.00 – 13.00)	521,0	663	473,6	1060,9
	Afternoon (17.00 – 18.00)	624	53,3	613,6	1290,9
B	Morning (08.00 – 09.00)	608	55,9	317,2	981,1
	Afternoon (12.00 – 13.00)	582	572	491,6	1130,8
	Afternoon (17.00 – 18.00)	502,0	63,7	433,4	1004,1
TOTAL		3303,0	352,3	2700,4	6355,7
AVERAGE		550,5	58,7	450,1	1059,3

The results of the analysis of traffic movements for peak hours on the Bunggasi Road section occurred at 17.00–18.00 WITA with 4746 knots/hour or 2295.0 skr/hour. The following are the results of the performance of traffic flow on the Bunggasi road section in 2024

Table 4. Traffic Volume of Bunggasi Road on Holidays

Proximity	Time Interval	Motor Vehicle Traffic Flow			Total Flow
		Light Vehicles	Heavy Vehicles	Motorcycle	
		ekr = 1	ekr = 1.2	ekr = 1.5	
		skr/hour	skr/hour	skr/hour	skr/hour
A	Morning (08.00 – 09.00)	366,0	466,0	55,9	887,9
	Afternoon (12.00 – 13.00)	646,8	585,0	52,0	1283,8
	Afternoon (17.00 – 18.00)	835,2	640,0	65,0	1540,2
B	Morning (08.00 – 09.00)	442,8	496	35,1	973,9
	Afternoon (12.00 – 13.00)	534,8	631	28,6	1194,4
	Afternoon (17.00 – 18.00)	586,8	548	54,6	1189,4
TOTAL		3412,4	3366,0	291,2	7069,6
AVERAGE		568,7	561,0	48,5	1178,3

The results of the analysis of traffic movements for peak hours on the largest Bunggasi road section occurred at 17.00–18.00 WITA with 4835 knots/hour. The following are the results of the performance of traffic flow on the Bunggasi road section in 2024

Capacity of Bunggasi Road Section

The analysis of the capacity of the road section is calculated for a total of 2 lane flows and is defined as a multiplication between the basic capacity (C0), which is the capacity at ideal conditions, with correction factors that take into account the difference in environmental conditions against the ideal conditions.

$$C = Co \times FCLJ \times FCPA \times FCHS \times FCUK$$

Information:

C = Capacity of road sections (junior high school/hour)
C0 = Base capacity for specific conditions (ideal) (skr/hr)
FCLJ = Traffic lane width adjustment factor
FCPA = Directional separator adjustment factor
FCHS = Side obstacle and Road Shoulder adjustment factors
FCUK = City size adjustment factor

Table 5. Capacity of Bunggasi Road Section

Proximity	Time Interval	C0	FCLJ	FCPA	FCHS	FCUK	C
A	Morning (08.00 – 09.00)	6600	1	1	0,95	0,90	5643
	Afternoon (12.00 – 13.00)	6600	1	1	0,95	0,90	5643
	Afternoon (17.00 – 18.00)	6600	1	1	0,95	0,90	5643
B	Morning (08.00 – 09.00)	6600	1	1	0,95	0,90	5643
	Afternoon (12.00 – 13.00)	6600	1	1	0,95	0,90	5643
	Afternoon (17.00 – 18.00)	6600	1	1	0,95	0,90	5643

Traffic Performance

1. Traffic Performance On Peak Days

   DJ (Degree of Saturation) at 17.00-18.00

   Known:

   Qtot = 2295 skr/hr

   C (Capacity) = 5643 skr/hr

   Settlement:

   DJ = Q/C

   = 2295 / 5643

   = 0.41

Table 6. Traffic Performance On Peak Days

Proximity	Time Interval	Traffic Flow (Q)	Capacity (C)	Degree of Saturation (Dj)
A	Morning (08.00 – 09.00)	997,9	5643	0,16
	Afternoon (12.00 – 13.00)	1060,9	5643	0,19
	Afternoon (17.00 – 18.00)	1290,9	5643	0,23
B	Morning (08.00 – 09.00)	981	5643	0,17
	Afternoon (12.00 – 13.00)	1130,8	5643	0,20
	Afternoon (17.00 – 18.00)	1004,1	5643	0,18
Q	Morning (08.00 –	1869,0	5643	0,33

TOTAL	09.00)			
	Afternoon (12.00 – 13.00)	2191,7	5643	0,39
	Afternoon (17.00 – 18.00)	2295,0	5643	0,41

The performance of the Bunggasi road section in 2024 has the largest DJ (Degree of Saturation) in the afternoon (17.00-18.00) of 0.41 at service level B (Flow is stable, but the speed of Operation starts is limited by traffic conditions) (Stable condition ≤ 0.8)

2. Traffic Performance on Holidays

DJ (Degree of Saturation) at 17.00-18.00

Known:

Qtot = 2729.6 skr/hr

C (Capacity) = 5643 skr/hr

Settlement:

DJ = Q/C

= 2729.6 / 5643

= 0.48

Table 7 Traffic Performance on Holidays

Proximity	Time Interval	Traffic Flow (Q)	Capacity (C)	Degree of Saturation (Dj)
A	Morning (08.00 – 09.00)	887,9	5643	0,16
	Afternoon (12.00 – 13.00)	1283,8	5643	0,23
	Afternoon (17.00 – 18.00)	1540,2	5643	0,27
B	Morning (08.00 – 09.00)	974	5643	0,17
	Afternoon (12.00 – 13.00)	1194,4	5643	0,21
	Afternoon (17.00 – 18.00)	1189,4	5643	0,21
Q TOTAL	Morning (08.00 – 09.00)	1861,8	5643	0,33
	Afternoon (12.00 – 13.00)	2478,2	5643	0,44
	Afternoon (17.00 –	2729,6	5643	0,48

18.00)

The performance of the Bunggasi road section in 2024 has the largest DJ (Degree of Saturation) in the afternoon (17.00-18.00), which is as large as 0.48 which is the service level C (Stable flow, but the speed of vehicle movement is controlled) (Stable condition ≤ 0.8).

Traffic Management Analysis on Bunggasi Road Section

From the results of the data processing, the traffic management that will be carried out on the Bunggasi road section is a preventive attitude. In article 3 of Law no. 22 of 2009 concerning Road Traffic and Transportation, it is stated that "Road transportation is organized with the aim of realizing traffic and road transportation safely, safely, orderly, smoothly and integrated with other modes of transportation to encourage the national economy, promote general welfare, strengthen the unity and unity of the nation, and be able to uphold the nation's strength" (Hermawan, 2016). This emphasizes that the implementation of road transportation is one of the goals to realize orderly and smooth transportation. In order to realize orderly and smooth transportation, it is by carrying out traffic management and engineering.

In KM 14 of 2006 article 2 it is said that traffic management and engineering are carried out with the aim of optimizing the use of the road network to improve safety, order and smooth traffic on the road, with the scope of the entire national road network, provincial roads, regency/city roads and integrated village roads, by prioritizing a higher road hierarchy. In general, traffic management aims to (Maharani, 2018):

1. To get the level of efficiency of the overall traffic movement, so that the level of accessibility of the entire region is quite high. The main consideration is the balance between movement demand and available supporting facilities.
2. To improve the level of safety of users that is acceptable to all parties, and to improve that level of safety as best as possible.
3. To protect and improve the state of environmental conditions where the traffic flow is located.

On the Bunggasi Road Section, the main problems that cause congestion are parking on the shoulder of the road, improper *u-turns* and street vendors on the shoulder of the road. In overcoming this phenomenon, it is necessary to make the following efforts:

1. Close all *U-turns* in front of *Marina Mart*, so that the traffic flow on the Bunggasi road section does not cause obstacles.
2. The prohibition of parking on the shoulder of the road (*Parking On Street*), and took took or *supermarkets* located on the Bunggasi road, further maximizes the available parking spaces so that parking on the street does not occur and does not hinder the flow of traffic.
3. The control of street vendors on the shoulder of the road is very necessary, because with the presence of street vendors on the shoulder of the road, it can cause congestion due to vehicles that stop and park on the road. Another problem that is often caused by the existence of street vendors is that their existence can sometimes cause

congestion, this is because there are still many street vendors who are not orderly in opening their stalls so that sometimes they use sidewalks and shoulders that block pedestrian paths, so this can hinder the flow of traffic

CONCLUSION

Based on the analysis of the calculations carried out, it can be concluded that the performance of the Bunggasi Road section in 2024 has the highest degree of saturation (DJ) of 0.41 on busy days which is included in the service level of category B, while on DJ holidays it reaches 0.48 which is included in category C. Field findings through observation and traffic surveys show a high volume of traffic during peak hours of activity, and the small capacity of the road section due to parking on the road. To address this problem, several strategies are recommended to local governments and policymakers. The strategy includes the need to complete road signs and markings in the Bunggasi Street area, law enforcement in the regulation and control of U-turns, especially on the Bunggasi Road section by the police and the Kendari City Transportation Office, as well as the closure of the U-turn in front of Marina Mart because vehicles exiting the store immediately turn around, causing congestion. In addition, it is necessary to arrange parking on the shoulder of the road (parking on street) on all sections of Jalan Bunggasi, especially in the Anduonohu Market and Marina Mart areas, so that traffic flow is not hampered and can run more smoothly.

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