Analysis of Traffic Congestion Levels on Hertasning Baru Street

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ABSTRACT

Background: Congestion is a problem that occurs in almost all corners of the world. In Indonesia, especially the capital city of Jakarta, the congestion rate is 34%, even though this percentage is still relatively high. Makassar itself as the provincial capital is included in the 10 most congested cities in Indonesia. The congestion occurred because the increase in the number of vehicles was not proportional to the road construction. This study aims to analyze the level of congestion on Aroepala street and Tun Abdul Razak street in 2022. **Methods**. The type of research used is a mixed method with a sequential explanatory design approach. A total of 16 informants were determined by purposive and snowball sampling techniques. Data collection was carried out by observation and interview techniques. **Results**. of the study show that after the opening of roundabout access in 2022, the level of congestion on Aroepala street is included in category (F), meaning that traffic is obstructed, low speed, volume above capacity, often experiencing congestion for a long time. Furthermore, the level of congestion on Tun Abdul Razak street is included in category (C), which means the flow is stable, the speed can be controlled. **Conclusion**. Congestion on Aroepala Street causes health problems felt by the community when experiencing congestion and is related to psychology and ergonomics.

Keywords: vehicle; congestion; obstructed flow; low speed

ABSTRAK

Latar Belakang: Kemacetan merupakan permasalahan yang terjadi hampir di seluruh penjuru dunia. Di Indonesia, khususnya ibu kota Jakarta, tingkat kemacetannya sebesar 34%, meskipun demikian persentase tersebut masih tergolong tinggi. Makassar sendiri sebagai ibu kota provinsi termasuk dalam 10 kota termacetan di Indonesia. Kemacetan tersebut terjadi karena peningkatan jumlah kendaraan tidak sebanding dengan pembangunan jalan. Penelitian ini bertujuan untuk menganalisis tingkat kemacetan di Jl.Aroepala dan Jl.Tun Abdul Razak tahun 2022. **Metode**. Jenis penelitian yang digunakan adalah mixed method dengan pendekatan sequential explanatory design. Sebanyak 16 informan ditentukan dengan teknik purposive dan snowball sampling. Pengumpulan data dilakukan dengan teknik observasi dan wawancara. **Hasil**. Hasil penelitian menunjukkan bahwa setelah dibukanya akses putaran jalan pada tahun 2022, tingkat kemacetan di Jl.Aroepala termasuk dalam kategori (F), artinya arus terhambat, kecepatan rendah, volume diatas kapasitas, sering mengalami kemacetan dalam waktu yang lama. Selanjutnya, tingkat kemacetan di Jl.Tun Abdul Razak termasuk dalam kategori (C), yang artinya arus stabil, kecepatan dapat dikontrol. **Kesimpulan**. Kemacetan di Jl. Aroepala menyebabkan terjadinya gangguan kesehatan yang dirasakan oleh masyarakat saat mengalami kemacetan dan berkaitan dengan psikologi dan ergonomi.

Kata Kunci: kendaraan; kemacetan; arus terhambat; kecepatan rendah

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INTRODUCTION

Traffic congestion is a global problem and is predicted to worsen in the future (Kesuma et. al., 2019). Traffic congestion occurs due to population density, annual vehicle growth and the proliferation of delivery services (Afrin & Yodo, 2020). Based on a report from Tomtom Traffic Index, in 2019, the highest congestion in the world occurred in Bengaluru (India) with a congestion rate of 71%. Furthermore, in 2020 the highest traffic congestion occurred in Moscow Region (Russia) with a congestion level of 54%. Then, in 2021 the highest global congestion occurred in Istanbul (Turkey) with a congestion rate of 62%. This percentage increased slightly compared to 2020, indicating that people's activities returned to normal after the covid-19 pandemic.

In Indonesia itself, the Tomtom Traffic Index states that the level of congestion in Jakarta continues to decline from 2018 to 2021, although it is decreasing, the figure is still relatively high. In 2018, traffic congestion in Jakarta ranked as the seventh most congested country in the world. In 2019, the level of traffic congestion in Jakarta was still the same as the previous year at 53%. In the following year, 2020, TomTom Traffic Index reported that the level of congestion in the capital city of Jakarta was 36%, down 17% from the previous year. This was due to the global covid-19 pandemic and the implementation of the PSBB. Furthermore, in 2021 the level of traffic congestion in the capital city of Jakarta decreased by 2%, namely 34%, although this percentage is still high when compared to other countries in the world (TomTom Traffic Index, 2021).

The level of congestion in Indonesia released by INRIX in a study entitled Global Traffic Scorecard 2021 shows that the five most congested cities in Indonesia are Surabaya, Jakarta, Denpasar, Malang and finally Bogor (Global Traffic Scorecard, 2021).

Makassar itself is listed as a city that often experiences congestion and is included in the top 10 most congested cities in Indonesia. Based on congestion data obtained from the Makassar City Transportation Office, it is stated that in 2020, the worst congestion occurred on Jl.Hertasning, Jl.Perintis Kemerdekaan, Jl.Urip Sumoharjo. In 2021, the level of congestion in Makassar city is worst on Jl.Hertasning. The traffic congestion is caused by the increase in vehicle volume which reaches 10-12% annually, while the increase in road volume is only 0.001% annually. In addition, as the capital city of the province and the center of the community's economy, there is a high population in Makassar city (Maryam & Said, 2021).

Based on data obtained from the Central Bureau of Statistics, the total population in South Sulawesi in 2021 was 8,956,181 people (Central Bureau of Statistics of South Sulawesi Province, 2022). The increase in population quantity is in line with the increase in vehicle volume every year. Based on data from the Korlantas Polri data, it states that South Sulawesi is the sixth largest number of vehicles in Indonesia (Korlantas Polri, 2021).

The step taken by the government to deal with congestion on Hertasning Baru Road is to close and reduce u-turn access with the aim of relieving long congestion. However, after the policy from the Provincial Transportation Office was implemented, the policy actually backfired and increasingly troubled the community, because the closure of several access turns on Jl.Aroepala and Jl.Tun Abdul Razak resulted in very severe traffic congestion at one of the access turns (u-turn) located on Jl.Tun Abdul Razak (TimurNews, 2022). Furthermore, due to the many complaints, demands and public protests to the government regarding the problem of severe traffic congestion that occurred on Jl.Tun Abdul Razak, finally the Provincial Transportation Office together with the Gowa Regency Government and the Makassar City Transportation Office opened several access turns on Jl.Aroepala in the hope of unraveling the congestion on Jl.Tun Abdul Razak (BugisPos, 2022).

Based on the description above, the researcher intends to conduct a study entitled "Analysis of Traffic Congestion Level on Jl.Hertasning Baru (Jl.Aroepala and Jl.Tun Abdul Razak) in 2022" with the aim of knowing the level of traffic congestion on the road.

METHODS

This research is a mixed method research with sequential explanatory design approach. This research was conducted in August-September 2022 on Jl.Aroepala and Jl.Tun Abdul Razak. Observations were conducted for one week on each road and were carried out during peak hours, namely morning at 06.00-08.00 WITA, afternoon at 11.00-13.00 WITA and afternoon at 16.00-18.00 WITA. Meanwhile, qualitative data collection was conducted in the second stage. Furthermore, data analysis was conducted based on the 1997 Indonesian Road Capacity Manual.

RESULTS

The calculation of vehicle volume is done by multiplying the number of vehicles obtained by the equivalent value of each type of vehicle. Table 1 show that the volume of vehicles that have been converted into passenger car units (smp) on Jl.Aroepala.

Tabel 1

Vehicle Volume Jl.Aroepala

Day	Lane 1	Lane 2	Total
Monday			
Morning	5.031*	4.064	9.095
Noon	2.15	2.259,4	4.41
Afternoon	3.641	4.87*	8.511
Tuesday			
Morning	3.657,8	4.064,4	7.722,2
Noon	1.842,4	2.095,6	3.938
Afternoon	2.955,6	4.167,2	7.122,8
Wednesday			
Morning	3.977,2	1.679,4	5.656,6
Noon	1.445,8	1.124	2.569,8
Afternoon	2.448,8	3.857,8	6.306,6
Thursday			
Morning	3.736,8	1.706	5.442,8
Noon	1.507,2	1.211,4	2.718,6
Afternoon	2.247,2	4.115	6.362,2
Friday			
Morning	2.555,6	1.590,8	4.146,4
Noon	657,8*	590,6*	1.248,4
Afternoon	1.979	2.417,6	4.396,6
Saturday			
Morning	2.074,8	1.017,8	3.092,6
Noon	1.075,8	999,6	2.075,4
Afternoon	2.405,2	1.603,8	4.009
Sunday			
Morning	1.193,2	836,8	2.03
Noon	1.055,4	1.319,6	2.375
Afternoon	2.585,6	2.239	4.824,6

Table 1 show that the highest vehicle volume on Jl.Aroepala lane 1 occurred on Monday morning with a value of 5,031 smp/hour. Furthermore, the lowest vehicle volume on lane 1 occurred on Friday afternoon with a value of 657.8 smp/hour. In addition, the highest vehicle volume in lane 2 on Monday afternoon with a value of 4,870 smp / hour and the lowest vehicle volume in lane 2 occurred on Friday afternoon with a value of 590.6 smp / hour. The following is the vehicle volume on Jl.Tun Abdul Razak.

Table 2 show that the highest vehicle volume on Jl.Tun Abdul Razak lane 1 occurred on Monday morning with a value of 1,709 smp/hour. Furthermore, the lowest vehicle volume in lane 1 occurred on Friday afternoon with a value of 375.6 smp. In addition, the highest vehicle volume in lane 2 occurred on Monday afternoon with a value of 2,396 smp/hour. Furthermore, the lowest vehicle volume in lane 2 occurred on Friday afternoon with a value of 339.6 smp / hour.

Table 3 show that In 2021, the level of traffic congestion on Jl.Aroepala was still low, namely in the condition that the round access on the road was still closed. At that time, Jl.Aroepala was categorized in road service level B. Meanwhile, in 2022, when several access points have been opened, Jl.Aroepala is categorized

as a level of service F. Meanwhile, Jl.Tun Abdul Razak is also one of the roads that is the center/area for making U-turns. In 2021, the road is categorized in road level of service F. Whereas, in 2022, the road is categorized in road level of service C, with constant flow conditions, speed can be adjusted based on flow conditions.

Tabel 2
Vehicle Volume Jl. Tun Abdul Razak

Day	Lane 1	Lane 2	Total
Monday			
Morning	1.709	1776,6	3.486
Noon	995	809,4	1.805
Afternoon	1.584	2395,8	3.98
Tuesday			
Morning	1601,8	1682,8	3284,6
Noon	866,6	842	1708,6
Afternoon	1424	2101,6	3525,6
Wednesday			
Morning	1542,2	1973,2	3515,4
Noon	869,8	1036,6	1906,4
Afternoon	1408	1851,2	3259,2
Thursday			
Morning	1646,8	1704,6	3351,4
Noon	854,2	839,2	1693,4
Afternoon	1392,6	2036,4	3429
Friday			
Morning	1101,2	1073,6	2174,8
Noon	375,6	339,6	715,2
Afternoon	1117,6	1080,6	2198,2
Saturday			
Morning	1495,2	1635	3130,2
Noon	813,6	771,8	1585,4
Afternoon	1375,6	2068,4	3444
Sunday			
Morning	1159,4	1105,4	2264,8
Noon	690,2	735,8	1426
Afternoon	1062,2	747,4	1809,6

DISCUSSION

Traffic volume is the number of vehicles that cross a point on a road and at a certain time. The types of vehicles in this study are classified into three, namely light vehicles, heavy vehicles and motorcycles. Light vehicles consist of cars, angkot, pick ups, medium buses and medium trucks.

The highest vehicle volume on Jl.Aroepala with the number in lane 1 occurred on Monday morning. The high volume of vehicles in the morning is due to almost all workers and school children leaving at that hour. Furthermore, the low volume of vehicles on Friday is due to the time of Friday prayers, so the traffic flow becomes quiet. The above is in accordance with research conducted by Heriadi (2021), which states that the lowest vehicle volume occurs on Friday afternoon at 12.00-13.00 amounting to 1023.6 smp / hour, the low volume of vehicles is due to the worship on Friday, so the flow of vehicles is rather quiet (Heriadi et al., 2021).

The volume of vehicle flow in the morning and evening is denser than during the day, this is because the majority of vehicles passing on Jl.Aroepala are those who travel to work and go home from work and pass through Jl.Aroepala. In line with the information above, research conducted by Sugiharto (2019) states that working hours, school hours and college hours both start at 07.00 and end at 16.00, resulting in a buildup or density of traffic in the morning and afternoon (Sugiharto, 2019).

In addition, on Monday through Friday the volume of vehicles is high. While on Saturday and Sunday the number of vehicles is low. In line with this information, Anisawitri (2020) in his research stated that the comparison of vehicle volumes from Monday to Sunday looks very dense on weekdays, namely Monday to Friday (Anisawitri et al., 2020).

Table 3
Comparison of Congestion Levels in 2021 and 2022

Nama Jalan	2021			2022		
	Q	Q_s	LOS	Q	Q_s	LOS
Jl.Aroepala	1.688	0,6455	B	4.129	15,789	F
Jl.Tun Abdul Razak	4.8	15,784	F	2.405	0,7908	C

Side obstacles on Jl.Aroepala were observed for one week, obtaining a total average side obstacle of 708.725. From the calculation of the average side obstacles, it is categorized as high, with the condition of commercial areas with high road side activities with weights (500-899).

The high class of side obstacles on Jl.Aroepala is caused by the many shops that line up, intersections, schools and warkop that do not have wide parking access, resulting in high road side activities. Side obstacles that are very influential on Jl.Aroepala are the activities of vehicles entering and leaving the side of the road, slow vehicles in this case rickshaws, garbage carts and bicycles, and also illegal parking.

Based on the results obtained, it can be concluded that high side obstacles are one of the causes of traffic congestion on Jl.Aroepala, because the higher the side obstacles of a road, the capacity of the road will also decrease and result in congestion. As research conducted by Hidayat (2020), which states that roadside activities affect the value of side obstacles so that congestion occurs on the Mayong market road during peak hours (Hidayat, 2020).

Furthermore, side obstacles on Jl.Tun Abdul Razak which were observed for one week, obtained a total average side obstacle of 203.25. From the average calculation, it is categorized in the low category, with special conditions for settlements, some public transportation, etc., with a weight of (100-299).

The condition of side obstacles on Jl.Tun Abdul Razak is dominated by parking/vehicle stops and vehicle activities that exit or enter from the side of the road because there is a large shop that is visited by the community and there is also an intersection which is the entrance gate of a housing estate.

The low value of the side obstacle class on Jl.Tun Abdul Razak is due to the condition of the road which is mostly residential and some other shops are still far from the highway but there is one shop which results in high vehicle activity in and out of the side of the road. Thus, it can be concluded that the side obstacles on Jl.Tun Abdul Razak are low. In line with this information, it is mentioned in research conducted by Saputra (2020), that high or low roadside activity or affects the performance of a road and also the speed of vehicles used (Saputra et al., 2020).

The results of the degree of saturation calculation illustrate the existence of capacity problems on a particular road. This is in accordance with Alkam's research (2021), stating that the degree is directly influenced by the capacity and volume of vehicles (Bastari Alkam et al., 2021).

In 2021, the condition of the round access on Jl.Aroepala is still closed. So that the level of road service is categorized in road service level B, with constant flow conditions, speed is limited by traffic conditions, drivers are free to determine their speed. Whereas in 2022, which is in the condition that several roundabout access roads have been opened on Jl.Aroepala and Jl.Tun Abdul Razak, and Jl.Aroepala is categorized in road service level F, with conditions of stopped flow, low speed, volume exceeds capacity, and there is always congestion in a certain period of time. Traffic jams on Jl.Aroepala usually last for 20-40 minutes.

Furthermore, the condition on Jl.Tun Abdul Razak in 2021 is that the road is categorized in the level of service of road F, with conditions of obstructed flow, low speed, volume above capacity, often experiencing congestion for a long time, congestion at that time usually lasts several hours. While in 2022, Jl.Tun Abdul Razak is categorized in road service level C, with stable flow conditions, speed can be controlled by traffic conditions. Therefore, it can be seen that the determination and implementation of government policies related to traffic on Jl.Aroepala and Jl.Tun Abdul Razak greatly affect the level of congestion on these roads. So, it can be concluded that the absence of u-turn access on Jl.Aroepala results in congestion and accumulation on one access road on Jl.Tun Abdul Razak.

The results of this study are in accordance with the research of Yanti (2022), which states that with the existence of road loop access facilities located not far from an intersection, it does not hinder traffic flow on the road (Yanti, 2022).

When experiencing traffic jams, people will usually feel dizzy, headache, boredom, hunger, and fatigue. However, these feelings depend on the congestion conditions faced.

Furthermore, it is also known that there are several complaints felt by the community when experiencing traffic jams, namely headaches, dizziness, nausea, aches, back pain, heat, tightness due to dust and vehicle fumes and fatigue. These complaints and health problems will disappear after resting for 30 to 1 hour. In Prasetyani's research (2022), it is stated that the greatest health impact due to pollutants from vehicle emissions is shortness of breath. And the level of health hazard is categorized as high risk (Rini Prasetyani, M. Yudi Masduky Sholihin, 2022).

Complaints or health impacts felt by road users when experiencing traffic jams are certainly related to the psychology and ergonomics of road users, both during and after experiencing traffic jams. Based on the basic concept of ergonomic balance proposed by NIOSH, ILO and WHO, it is known that psychosocial factors are included in the important work capacity component in ergonomics, because psychosocial factors affect ergonomic aspects. Vice versa, some aspects of ergonomics are also factors that can cause psychosocial risks. So that both have a relationship with each other.

Briefly, it can be described that psychosocial aspects affect ergonomic aspects, for example when experiencing traffic jams, road users will feel bored or bored, because of these feelings, resulting in movements or postures that are not ergonomic, both during and after experiencing traffic jams. As a result, the body will ache and pain in certain parts. In addition, in the opposite condition where ergonomic aspects affect psychosocial conditions, for example, driving positions that are not ergonomic and static, will cause road users to feel uncomfortable and tired. This is in accordance with Pratama's research (2018), which states that there is a link between the level of congestion and the psychological condition of students (Pratama, 2018).

CONCLUSION

It can be concluded that the epidemiology of congestion in this case is the volume of vehicles and side barriers. The level of congestion (LOS) on Jl.Aroepala is included in category F. Meanwhile, the level of congestion (LOS) on Jl.Tun Abdul Razak is included in category C, where the level of congestion on Jl.Aroepala is higher than Jl.Tun Abdul Razak. The community assumes that the severe traffic congestion is the result of government policy that closes several roundabout access roads and the impact actually exacerbates congestion. Furthermore, there are health problems felt by the community when experiencing congestion and are related to psychology and ergonomics.

The suggestions are addressed to the South Sulawesi Provincial Transportation Office and the Directorate of Highways of Public Works and Public Housing to conduct an accurate analysis or field trials before making and enforcing a policy, conduct an accurate analysis or field trials before making and enforcing a policy, provide a dishub/police post and place several officers in charge of regulating traffic at peak hours in the border area between Gowa Regency and Makassar City.

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