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The Effect of Side Obstacles on Balang Tonjong Antang Traditional Market Activities, On-Road Performance

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Abstract: Balang Tonjong Antang Traditional Market is one of the traditional markets in the city of Makassar. The problem in this research area indicates a decrease in road performance that is characterized by frequent congestion on the road. This study aims to determine how the road performance affects side barriers depending on market activity. The components studied in this study are traffic flow, side barriers, vehicle speed, and average. The 1997 MKJI method was used in this study as an analytical technique to determine the traffic volume/hour (pcu/hour), the frequency of side barriers weights/hour, road capacity (C), degree of saturation (DS), and road service level (LOS), the results of the analysis at the location of this study indicate the average side obstacle class as High (H) (500-899), the road service level (LOS) is in class D. The average vehicle speed due to side barriers is 11.19 km/hour. Side barriers in this study greatly affect road performance on the Antang Raya road section, precisely in front of the Balang Tonjong traditional market.

Keywords: side obstacle, traditional market, on-road performance.

侧面障碍物对巴朗通宗安塘传统市场活动、道路性能的影响

摘要：巴朗通宗安塘传统市场是望加锡市的传统市场之一。该研究领域的问题表明道路性能下降，其特征是道路上频繁拥堵。本研究旨在确定道路性能如何因市场活动的侧面障碍而受到影响。本研究中研究的组成部分是交通流量、侧障碍、车辆速度和平均值。本研究中使用的分析方法使用 1997 MKJI 方法来确定交通量/小时 (控制器/小时), 侧障碍重量/小时的频率、道路通行能力 (C)、饱和度 (DS) 和道路服务水平（服务水平），本研究地点的分析结果表明平均侧障碍等级为高（H）（500-899），道路服务水平（服务水平）为 D 级。侧面障碍物的速度为 11.19 公里/小时。本研究中的侧障极大地影响了 安塘开斋节路段的道路性能，正好位于 巴朗通宗传统市场的前面。

关键词：侧面障碍，传统市场，公路性能。

1. Introduction

Roads are the most important element in realizing economic growth in Indonesia to achieve dynamic stability; the performance of roads and road capacity in Indonesia really needs attention. What is meant by road performance is the ability of the road to the extent to which the road can carry out its role. The road service level provides an interest in traffic generation, which we can see with the standard of road capacity in the category of road service level [1], [2].

Antang Raya in Makassar is a very important and strategic road whose function is as a primary collector

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road. Primary collector roads connect provincial capital cities with district/city roads. The capacity of the road must be greater than the average traffic volume.

Traffic jams that may often arise on the Antang highway in front of the Balang Tonjong traditional market can disrupt community activities. Congestion that may often occur at this time can negatively impact both on-road users and other vehicle drivers; congestion will definitely create tension (stress). Congestion will also appear as if there can be a negative impact from the economic side, the loss of time because the driver's journey is getting slower, besides that it will also be able to trigger negative effects such as vehicle noise disturbances on residents around the road that are experiencing congestion.

Based on the author's initial follow-up, at the location to be researched, there are vehicle activities that stop on the road, parking on the road, pedestrian activities using the road, vehicles entering and leaving the market and slow-moving vehicles, vehicles that have the potential to cause side barriers and disrupt the performance of the Antang Raya road, which is located around the Balang Tonjong Antang traditional market. Seeing the potential losses that can be caused by the presence of side barriers to the activities of the Balang Tonjong Traditional Market on Jalan Antang Raya, the researchers then tried to take the title of the research on *"The Effect of Side Barriers to Activities of Balang Tonjong Traditional Market, Antang on Road Performance"*.

2. Research Objectives and Problem Formulation

2.1. Destination

How is the performance of the Antang Raya road due to the side barriers of Balang Tonjong traditional market activities?

2.2. Hypothesis

To determine the performance of the Antang Raya road due to side barriers to the activities of the Balang Tonjong traditional market.

3. Literature Review

The road is a means of land transportation covering all parts of the road, including complimentary road buildings that have been designated for traffic, which are located above ground level and above ground, water, except for railway lines, lorry lines, and cable roads [3]. Traffic facilities and infrastructure, including road markings, traffic signal lights, and road user safety and road support facilities, are supporting infrastructure for the safety of road users, which are included in traffic infrastructure [12]. Roads are grouped according to their status, namely arterial, collector, local, and environmental roads [5].

Physically, a market is a place of concentration for several permanent and non-permanent traders. The market is also usually in an enclosed or open space or on the street. Traders usually occupy the market in their respective buildings available in the market area, temporary, semi-permanent, or permanent buildings. The markets can also be divided into general and special markets [11].

The traffic congestion factor that usually occurs when observed on-road services is considered according to traffic conditions that are not running stable. The average speed of traffic starts to slow because of obstacles that interfere with existing road capacity so that traffic vehicles freedom of movement is somewhat decreased. In this situation, the volume-capacity situation is greater than or equal to 0.75 V/C > 0.75; if the service level has reached E, the traffic flow becomes unstable, resulting in a long delay called a traffic jam [9]. Congestion increases when the current is so high that the vehicles are very close to each other. Total congestion occurs when the vehicle must stop or move slowly [8].

Speed is the speed of a trip which is generally expressed in km/hour. Speed and travel time are fundamental measures of traffic performance of the existing road system, and speed is a key factor in redevelopment or new construction. Traffic simulation evaluates travel speed and speed to measure performance, layout, demand, and monitoring of road systems [10]. Space differences are caused by traffic variations, geometric design, and traffic control. differences by vehicle type (intermodal) are caused by differences in driver plans, vehicle performance capabilities, and road segment performance [6].

The capacity of a road segment is defined as the highest number of vehicles that can traverse a road segment per hour, in one direction for a two-lane road with a median or two-way total for a two-way road, for a certain unit of time under road and traffic conditions [13]. From the degree of saturation, it can be known whether the road segment will have adequate capacity or not. According to the Indonesian Road Capacity Manual [1], The performance of a road segment can be determined, the extent to which the capacity of a road can carry out

its functions [7], where according to the 1997 MKJI used as a parameter is the degree of saturation (DS).

4. Research Methods

4.1. Research Place and Time

This research was carried out on Jalan Antang Raya, precisely in front of the Balang Tonjong Antang traditional market, Makassar City, South Sulawesi.

The time that will be used for this research will be carried out when the preliminary survey is completed; data collection will be carried out for 1 (one) week, namely Monday to Sunday, research hours are carried out from 07:00 to 18:00 with an interval of 15 minutes, with a time of 07:00 – 18:00 WITA.

4.2. Method of Data Collection

Primary Data, namely data obtained when conducting a survey when research will be carried out in the field. This data includes

a. Road geometric conditions, road cross-sections, road situation maps.

b. Traffic volume and traffic speed.

c. The side barriers of activities used to analyze road capacity, types of vehicles to be observed are pedestrians (PED), parking and stopping vehicles (PSV), vehicles entering or leaving the side of the road (EEV), slow vehicles (SMV).

d. The condition of market activity used to analyze the performance of the road segment. Types of vehicles to be observed are motorcycles (MC), light vehicles (LV), medium-heavy vehicles (HV).

Secondary data, supporting data in this study, namely population data that can be obtained from relevant agencies and regulatory books that apply in Indonesia, which are the reference in conducting this research, namely the Indonesian Road Capacity Manual [2].

5. Results and Discussion

5.1. Traffic Volume

The traffic volume that has been obtained in 1 week of research on Monday - Sunday, April 26, 2021 - May 2, 2021, can be seen in Figure 1.

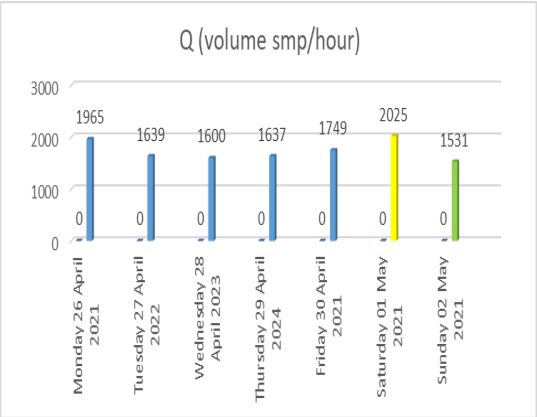

Fig. 1 The volume of SMP/hour

The results showed that the highest traffic volume was on Saturday, May 1, 2021, at 2025 smp/hour, and the lowest was on Sunday, May 2, 2021, at 1531 smp/hour.

5.2. Side Barriers (SF)

The total weight of side resistance (SF)/hour that has been obtained in 1 week of research on Monday - Sunday, April 26, 2021 - May 2, 2021, can be seen in Figure 2.

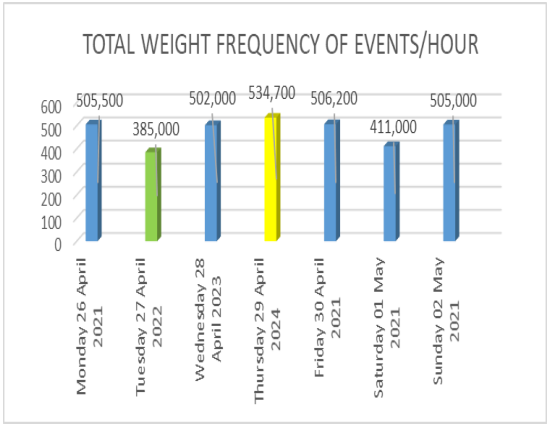

Fig. 2 Side resistance (SF) events/hour

The results showed that the highest side drag (SF) was on Thursday, April 29, 2021, at 534.700 frequencies of occurrence/hour, and the lowest on Tuesday, April 27, 2021, at 385.000 frequencies of occurrence/hour.

5.3. Speed (km/h)

The average speed that was obtained during one week of research on Monday-Sunday, April 26, 2021 - May 2, 2021, can be seen in Table 1.

Table 1 Peak hour average speed

Date and Time	Average Speed (km/h)
Monday, April 26, 2021	10.06
Tuesday, April 28, 2021	10.03
Wednesday, April 28, 2021	12.99

Continuation of Table 1	
Thursday, April 29, 2021	12.14
Friday, April 30, 2021	12.23
Saturday, May 01, 2021	10.74
Sunday, May 02, 2021	10.16

5.4. Capacity

The results of the capacity (C) data processing that were obtained during one week of research on Monday-Sunday, April 26, 2021 - May 2, 2021, are given in Table 2.

Table 2 Capacity analysis results (C)

Date and Time	Capacity (C)
Monday, April 26, 2021	2169.780
Tuesday, April 28, 2021	2321.160
Wednesday, April 28, 2021	2169.780
Thursday, April 29, 2021	2169.780
Friday, April 30, 2021	2169.780
Saturday, May 01, 2021	2321.160
Sunday, May 02, 2021	2169.780

The data processing resulted in the lowest capacity of 2169.780 smp/hour and the highest of 2321.160 smp/hour.

5.5. Degree of Saturation (DS)

The results of data processing of the degree of saturation (DS) that were obtained during one week of research on Monday-Sunday, April 26, 2021 - May 2, 2021, are given in Table 3.

Table 3 Results of the analysis of the degree of saturation (DS)

Date and Time	Degree of saturation (DS)
Monday, April 26, 2021	0.91
Tuesday, April 28, 2021	0.71
Wednesday, April 28, 2021	0.74
Thursday, April 29, 2021	0.75
Friday, April 30, 2021	0.81
Saturday, May 01, 2021	0.87
Sunday, May 02, 2021	0.71

The analysis of the degree of saturation (DS) revealed the highest result on Monday, April 26, 2021, the value of the degree of saturation was 0.91, and the lowest (0.71) was on Sunday, May 2, 2021.

5.6. Road Service Level (LOS)

The results of the level of road service that were obtained during one week of research on Monday-Sunday, April 26, 2021 - May 2, 2021, are given below:

a). Monday, April 26, 2021, 0.91, According to [1], if the value varies within 0.85 – 2.00, it is categorized as (E) a traffic jam, the speed is low.

b). Tuesday, April 27, 2021, 0.71, According to [2], if the value varies within 0.45 – 0.74, it is categorized as a value of (C) stable flow, the traffic starts to get crowded with limited speed.

c). Wednesday, April 28, 2021, 0.74, According to [2], if the value varies within 0.45 – 0.74, it is categorized as a value of (C) stable flow, the traffic starts to get busy with limited speed.

d). Thursday, April 29, 2021, 0.75, According to [2], if the value varies within 0.75 – 0.84, it is categorized as a (D) traffic saturation value, the speed starts to lower.

e). Friday, April 30, 2021, 0.81, According to [2], if the value varies within 0.75 – 0.84, it is categorized as a (D) traffic saturation value, the speed starts to lower.

f). Saturday, May 1, 2021, 0.87, According to [2], if the value varies within 0.85 – 2.00, it is categorized as a (E) traffic jam, the speed is low.

g). Sunday, May 2, 2021, 0.71, According to [2], if the value varies within 0.45 – 0.74, it is categorized as a (C) stable flow, the traffic starts to get crowded with limited speed.

6. Conclusions

Jalan Antang Raya, in front of the Balang Tonjong Makassar traditional market, is experiencing problems with its performance due to side barriers that reduce road capacity, the results of this study are the highest average service level (LOS) of 0.91 on Monday, April 26, 2021, and the lowest on Monday, Sunday, May 2, 2021, is 0.71, the average speed of vehicles on Monday to Sunday is 11.19 km/hour, and the largest traffic volume is found on Saturday, May 1, 2021, with a total volume of 2.025 smp/hour and the lowest on Sunday with a total volume of 1.531 pcu/hour.

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