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ANALYSIS OF THE CHARACTERISTICS AND PARKING NEEDS OF PARINGIN MARKET,BALANGAN REGENCY

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ABSTRACT

As one of the shopping centers in the Paringin area, Balangan Regency, Paringin market is needed by the community, especially in Balangan Regency. The problem that is often found in areas that have high activity such as markets is parking. One thing that needs to be done to reduce this problem is to analyze the parking area in the area. Things that need to be analyzed are parking characteristics, namely by analyzing parking volume, parking accumulation, parking duration, turnover rate (*parking turn over)*, parking capacity (*parking supply)*, parking index, and parking demand analysis. The purpose of this study is to determine the characteristics of parking and parking requirements in the Paringin market. The method used in this study is a direct survey in the field to obtain the number of parked vehicles, namely by recording the number of vehicles entering and leaving for 3 days according to actual conditions in the field. From the results of this study, it was found that the highest volume was 208 vehicles, the highest accumulation was 50 vehicles and the average parking duration was 2,083 hours/vehicle. The highest turn over value is 0.253 vehicles/SRP/hour, and the highest parking index is 55.68%. The number of parking lots currently available is 103 parking lots so that this capacity is sufficient to accommodate parking users during peak hours.

Keywords: parking characteristics, parking demand, paringin market

I. INTRODUCTION

This research was conducted in Balangan Regency, South Paringin on Ahmad Yani street close to Paringin National Monument Park. On Jalan Ahmad Yani there is 1 market, namely Paringin Market. The research location can be seen in Figure 1.

Markets a place for community accumulation where buying and selling transactions that have various supporting facilities can attract visitors. The visitors to go to the shopping center will use a vehicle. So a parking area is needed to park the vehicle. The parking area as an infrastructure in the transportation system must be able to support the activities that occur because parking problems are closely related to traffic regulation.

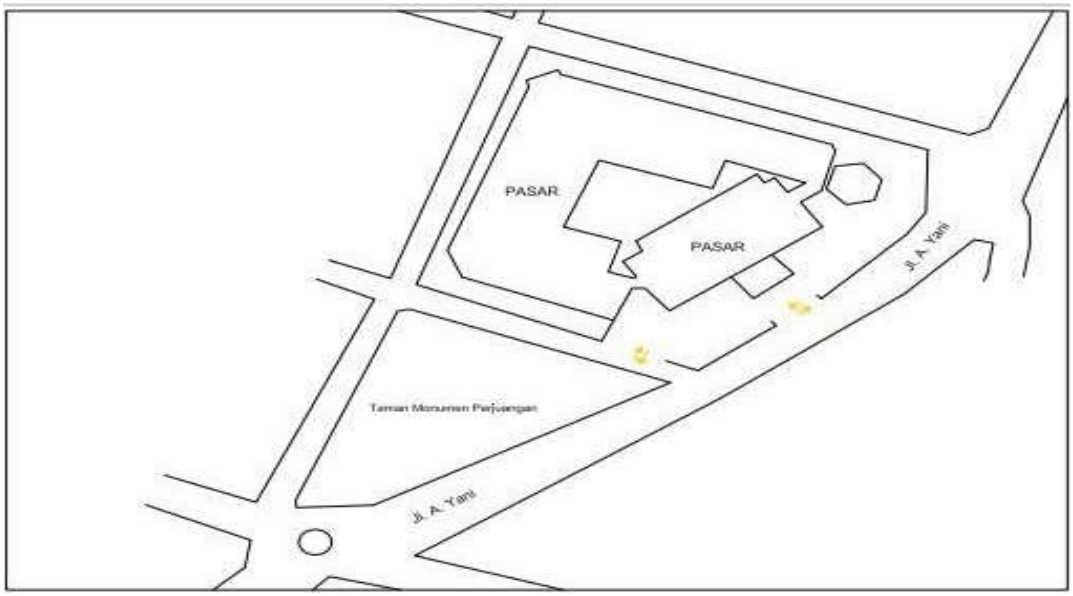

Figure 1. Research Locations

The parking problem is a problem of space requirements where the provision of space in urban areas is limited by the area and land use of the city concerned. The provision of a parking lot will more or less take up a large part of the city area because it requires a separate space.

Given the large number of vehicles entering the market, market management needs to provide adequate and well-organized parking areas to avoid confusion in arranging vehicles in the parking area and to avoid traffic problems around the market.

So that by knowing the characteristics of parking at the Paringin market in Balangan Regency, it can be seen the need for parking spaces for the market and provide alternative solutions to these problems. So that it can be used as input in efforts to provide adequate parking facilities. This is very important to remember, because with good use of parking in these shopping centers, it will support the security and smoothness of traffic that is nearby.

II. LITERATURE REVIEW

Vehicles cannot move continuously, there are times when the vehicle must stop, whether it is temporary or long term or called parking. Many traffic problems are caused by parking. If used properly with certain policies that have been carefully planned, parking can be used as a tool to manage traffic (Warpani, 2002).

Warpani (1980: 160) argues that every traffic actor has different needs and wants parking facilities according to their needs. In addition, the location of the parking lot with the destination must be within a distance that can be reached on foot, because the need for a parking space is a function of the parking area.

Putu Alit Suthaya (2010:11) argues that parking characteristics are basic properties that provide an assessment of parking services and parking problems that occur at the study location.

Volume is the number of vehicles included in the parking load (ie the number of vehicles per period of time, usually per day), (Hobbs, 1979).

Accumulation of parking is the total number of vehicles parked in one place at a certain time and can be divided according to the category and type of purpose trips, where the integration of parking accumulation over a certain period shows the parking load (number of parking vehicles) in vehicle hours per certain time period (Source: FD Hobbs, 1979 in Rickson C, 2014).

Duration is the length of time the parker spends in the parking space. Parking duration is expressed in hours. The formula used to calculate the average length of parking is (Oppenlander,1976).

A number which indicates the level of use of the parking spaces are obtained by dividing the total number of parked vehicles with the number of parking spaces for a certain period of time is a *Parking Turn Over* (PTO) or

parking turnover rate.

Capacity is the maximum capacity of a parking space to accommodate vehicles, in this casethe volume of vehicles using parking facilities.

Limits on the size of the number of vehicles that can be accommodated during a certain period of time is the provision of parking (*parking supply*). Calculating parking availability according to Oppenlander, 1976.

Index is the ratio between parking accumulation and parking capacity. If the parking index value> 100% means that the demand for parking spaces is greater than the existing capacity.

Forecasting or forecasting is a method for estimating predictive information in determining the direction in the future by using historical data as a reference.

III. Research Methodology

In this study, a survey was conducted with a total of 4 people, each each point is 2 people, this research was conducted for 3 days by conductingsurvey *a number plate* in the form of recording the number of vehicles entering and leaving per fifteen minutes or called parking accumulation and recording the parking volume for 8 hours, from 06.00-10.00 WITA, namely Saturday, Sunday and Monday. The data obtained are in the form of parking volume data, parking accumulation and parking duration. The data is used to analyze and calculate the next parking characteristic data such as parking turnover rate (*parking turnover)*, parking capacity, parking space provision (*parking supply)*, parking index, and parking demand data. After the data on the characteristics and needs of parking can be obtained, then an analysis of parking needs for the next 5 years is carried out and calculates the design for the use of parking gates in the Paringin market. Analysis of parking needs for 5 years which will then be calculated using a traffic

growth rate table based on the road pavement manual of the Ministry of Public Works and Public Housing Directorate General of Bina Marga for the South Kalimantan region as follows:

Table 3.1 Traffic Growth Rate (i) (%)

	Jawa	Sumatera	Kalimantan	Rata-rata Indonesia
Arteri dan perkotaan	4,80	4,83	5,14	4,75
Kolektor rural	3,50	3,50	3,50	3,50
Jalan desa	1,00	1,00	1,00	1,00

Traffic growth rate is used to take the value of traffic growth rate (i) to calculateparking demand for the next 5 years or *forecasting*.

IV. DATA ANALYSIS AND RESULTS

4.1 Parking Volume

Table 4.1 shows the parking volume at the paringin market on Jalan Ahmad Yani, Balangan. The highest volume of motorcycle parking occurred at parking location B, which was 109 vehicles on Saturday, 94 vehicles on Sunday and 208 vehicles on Monday. While the lowest occurred at parking location A, there were 95 vehicles on Saturday, 114 vehicles on Sunday and 179 vehicles on Monday.

Table 4.1 Parking Volume

Lokasi Studi	**Hari**		
	Sabtu	**Minggu**	**Senin**
Lokasi A	95	114	179
Lokasi B	109	94	208

4.2 Parking Accumulation

Table 4.2 describes the maximum parking accumulation for three days at the survey location. The highest peak parking accumulation is on Monday at parking

location A at 10:30-10:45 with 49 motorbikes per hour.

Table 4.2 Maximum Parking Accumulation (vehicle) parking location A

No	Hari/Tanggal Survey	Akumulasi Parkir Maksimum (Kendaraan)	Jam Puncak Akumulasi (WITA)
1	Sabtu, 02 Oktober 2021	18	10:00 - 10:15
2	Minggu, 03 Oktober 2021	19	10:30 - 10:45
3	Senin, 04 Oktober 2021	49	10:30 - 10:45

In table 4.3 describes the maximum parking accumulation for three days at the survey location. The highest peak parking accumulation is on Monday at parking location B at 09:30-09:45 with 50 motorbikes per hour.

Table 4.3 Maximum Parking Accumulation (vehicle) parking location B

No	Hari/Tanggal Survey	Akumulasi Parkir Maksimum (Kendaraan)	Jam Puncak Akumulasi (WITA)
1	Sabtu, 02 Oktober 2021	17	14: 15 - 14:30
2	Minggu, 03 Oktober 2021	14	10:15 - 10:30
3	Senin, 04 Oktober 2021	50	09:30 - 09:45

4.3 Parking duration

In Table 4.4 it can be seen that the calculation results produce parking duration (hours/vehicle). The highest average motorcycle parking duration occurred at parking location B on Monday at 2,083 hours/vehicle and the lowest at parking location A was on Saturday at 0.951hours/vehicle.

Table 4.4 Duration of Parking

Lokasi Parkir	Hari		
	Rata-Rata lama Parkir Hari Sabtu (Jam/Kend)	Rata-Rata lama Parkir Hari Minggu (Jam/Kend)	Rata-Rata lama Parkir Hari Sabtu (Jam/Kend)
Parkir A	0.951188986	1.141426783	1.7922403
Parkir B	1.091364205	0.941176471	2.082603254

4.4 Rate of*Parking Turn Over*

In table 4.5 the rate of parking turnover is shown in the 3 days of the study where the results for motorcycles are less than 1 vehicle/SRP/hour or every hour one motorbike parking plot serves less than 1 vehicle in the market parking area. The highest turnover rate for motorbikes is on Monday at parking locations A and B of 0.253 vehicles/SRP/hour and the lowest is on Sunday at parking locations B of 0.114 vehicles/SRP/hour.

Table 4.5 Motor Vehicle Parking Change Rate Parking

Lokasi Parkir	Tingkat Pergantain Parkir		
	Hari Sabtu (kend/SRP/jam)	Hari Minggu (kend/SRP/jam)	Hari Senin (kend/SRP/jam)
Parkir A	0.134	0.161	0.253
Parkir B	0.133	0.114	0.253

4.5 Capacity

Table 4.6 shows the parking capacity for the research location. The highest parking capacity for motorbikes is on Sunday at parking location B, which is 110 petak.kend/hour, and the lowest parking capacity for motorbikes occurs on Monday at parking locations A and B, which is 50 petak.kend/hour.

Table 4.6 Motorcycle Parking

Lokasi Studi	Hari		
	Sabtu (petak.kend/jam)	Minggu (petak.kend/jam)	Senin (petak.kend/jam)
Parkir A	93	77	50
Parkir B	94	110	50

4.6 Capacity Static Capacity Static

Capacity can be directly obtained by calculating the existing parking slots in the parking area. In this study, the static capacity in the Paringin market, for parking location A as many as 88 parking lots, and for parking location B as many as 103 parking lots.

4.7 Provision of Parking Space *(Parking*Supply)

In Table 4.7 it can be seen that the magnitude of *parkirng supply* during the survey period of 8 hours at the study site Paringin market ie A parking area with 88 plots the number of parking plots on average get *supply parking* for 525 vehicles. On Sunday, parking location A with a total of 88 parking lots has a *parking supply* of 667 vehicles. On Monday, parking location A with a total of 88 parking lots has a *parking supply* of 354 vehicles.

Table 4.7 Amount of *Parking Supply* Motors at Parking Location A

Hari/ Tanggal	Lokasi Parkir	Lamanya Survey (Ts)(jam)	Rata-rata Lama Parkir (D)(jam)	Jumlah Petak	Parking Supply [(S).(Ts).(0.9)]/ (D)(kend)
Sabtu, 02 Oktober 2021	A	8	0.951188986	88	667
Minggu, 03 Oktober 2021		8	1.141426783	88	556
Senin, 04 Oktober 2021		8	1.7922403	88	354
Rata-Rata					525

In Table 4.8 it can be seen that the amount of *parking supply* during the survey time of 8 hours at the research location of the Paringin market, namely parking location B with a total of 103 parking lots, got an average *parking supply* of 608 vehicles. On Sunday, parking location B with a total of 103 parking lots has a *parking supply* of 788. On Monday, parking location B with a total of 103 parking lots has a *parking supply* of 357 vehicles.

Table 4.8 Amount of *Parking Supply* Motors at Parking Location B Parking

Hari/ Tanggal	Lokasi Parkir	Lamanya Survey (Ts) (jam)	Rata-rata Lama Parkir (D)(jam)	Jumlah Petak	Parking Supply [(S).(Ts).(0.9)]/ (D)(kend)
Sabtu, 02 Oktober 2021	B	8	1.091364205	103	680
Minggu, 03 Oktober 2021		8	0.941176471	103	788
Senin, 04 Oktober 2021		8	2.0826033	103	357
Rata-Rata					608

4.8 Parking Index

In Table 4.9 it can be seen that the highest parking index at parking location A is on Monday at 55.68% and the lowest parking index is on Saturday at 20.45%. For parking location A, the IP value (parking index) is less than 1 or less than 100%, meaning that there is no problem with parking facilities, where parking requirements do not exceed normal capacity data. Meanwhile, for parking location B, the highest parking index is on Monday at 48.54% and the lowest parking index is on Sunday at 14%. For parking location B the IP value (parking index) on Saturday is 17% and Sunday is 14%, less than 1 or less than 100%, meaning that parking facilities are not problematic, where parking needs

do not exceed normal capacity data, and Monday the IP value (parking index) at parking location B is 48.54% less than 1 or less than 100%, meaning that parking capacity does not matter where parking needs do not exceed normal capacity or capacity.

Table 4.9 Parking Index of Parking

Hari	Lokasi	Indeks Parkir (100%)
Sabtu	A	20.45
Minggu		21.59
Senin		55.68
Sabtu	B	17.00
Minggu		14.00
Senin		48.54

4.9 Parking Needs

From table 4.10 it can be seen that parking requirements at each parking location are different during the 3 days of the survey. For location A, the lowest parking requirement is on Saturday, which is 10,166 SRP/hour and the highest parking requirement is on Monday, which is 44,557 SRP/hour. For location B, the lowest parking requirement is on Sunday, which is 12,288 SRP/hour and the highest parking requirement is on Monday, which is 60,164 SRP/hour. The highest parking needs of both locations are Monday, this is because their regular weekly marketsare held every Monday at the Paringin markets

Table 4.10 parking needs

Hari	Lokasi	Kebutuhan Parkir (SRP/Jam)
Sabtu	A	10.166
Minggu		18.073
Senin		44.557
Sabtu	B	15.309
Minggu		12.288
Senin		60.164

4.10 Forecasting

In this discussion will analyze the needs of parking for 5 years to come. Parking needs are calculated every year, in order to determine the ability of the parking capacity to accommodate vehicles for the next few years. The traffic growth rate factor (i) is 3.50 (%). The traffic growth rate is based on the road pavement manual of the Ministry of Public Works and Public Housing, Directorate General of Bina Marga.

The number of vehicle growth for 2022 is as follows:Pn = Po x (1 r)^t

= 93 x (1 +3.50%) ^1

= 96,255 vehicles/hour

Remarks:

Pn = number of motorcycle parking users in year t

Po = number of motorbike parking users in the base year

r = growth rate of motorbike parking users

n = time period between base years

Table 4.11 Paringin Market Parking Needs per year

Tahun	Kebutuhan Parkir (kend/jam)
2022	96.255
2023	99.624
2024	103.111
2025	105.720
2026	110.455

So, based on table 4.11 above paringin market parking needs per year, the estimated spacerequirements parking for the next 1 year (in 2022) is 96,255 vehicles/hour, so the parking requirement for the next 5 years (2026) is 110,455 vehicles/hour. Meanwhile, in the current condition, the total available parking space is 191 SRP for motorbikes. So that the parking situationfor the next 5 years is still quite adequate and there is no need for the development of parking lots,this is in accordance with the traffic growth rate (i) in the Paringin area of Balangan Regency which is relatively low at 3.50% per year.

4.11 Assuming Design Using Parking Gate at Paringin Market Paringin

Inmarket, vehicles entering and leaving occur at one location and do not have parking doors. Planning for the design of the parking gate/gate at the Paringin market is carried out. There is a queue at the door if there are too few doors available compared to the flow of vehicles, it can occur that the total vehicle service time for unit time is smaller than the vehicle flow.

4.12 Alternative handling that is suitable for use at the Paringin market

Based on the analysis obtained the required parking area at parking location A for the highest

motorcycle vehicle is 40,925 m^2, after analysis it is found that the available parking area for motorcycles is 132 m^2. As for the parking location B for motorcycles, the highest parking area is 36,405 m^2, after analyzing the parking area available for motorcycles is 155 m^2. Thus, there is a reserve of motorbike parking lots for parking locations A and B. Parking for motorbikes is located in front of the market area. Parking lots for motorbikes are made with an angle of 90° and some are irregular, where the number of plots at parking location A is 88 plots. The motorcycle parking location B is located in front of the market area right to the right of the main steps of the market. Parking lots for motorbikes are made with an angle of 90° and some are irregular, where the number of plots at parking location B is 103 plots.

V. CONCLUSIONS AND SUGGESTIONS

5.1 Conclusion

Based on the results of the analysis that has been obtained at the Paringin market parking location, Balangan district, the following conclusions can be drawn:

1. The largest parking volume on Monday is 208 motorcycles in the parking location B.parking ison Monday.
2. The highest accumulation of motorcycleMonday at parking location B at 09:30–09:45 for 50 vehicles.
3. The largest average length of parking for motorcycles on Mondays at parking location B is 2,083 hours/vehicle.
4. The *Parking Turn Over rate* largest for motorcycles is found on Mondays at parking locations A and B, which is 0.253 vehicles/SRP/hour, which means less than 1 vehicle/SRP/hour or one motorbike parking plot every hour. serve less than 1 vehicle in the market parking area.
5. The highest parking capacity for motorcycles is found on Sundays at parking location A, whichis 110 petak.kend/hour.

6. The largest parking *supply* for motorcycles is 788 vehicles at parking location B on Sundays. The highest parking index for motorbikes is found at parking location A on Monday at 55.68%,meaning that the parking space capacity of the Paringin market is still sufficient toaccommodate parked vehicles, the parking index value (IP < 100%).
7. The highest level of parking demand for motorcycles is 60 SRP/hour at parking location B on Mondays.
8. The need for parking space for the next 5 years (2026) is 111 SRP/hour. So there is no needto develop parking space requirements for the next 5 years (2026).

5.2 Suggestions

Based on the conclusions that have been obtained from the results of the research above, some suggestions can be given. The suggestions include:

1. So that drivers do not park haphazardly so that parking is more organized and does not interfere with activities around the market, it is necessary to make parking plot markings inaccordance with the SRP.
2. It is necessary to add official signs from the agency, for example parking is prohibited for important areas, so that motorbikes that do not get a parking space do not position them arbitrarily.
3. Two lanes are used between motorbikes to enter and exit so that the circulation of motorbikesentering and leaving can be regular.
4. A policy is needed from the Paringin market manager so that the distribution of visitors who come does not accumulate at a certain time, so that the existing parking capacity is still adequate for visitors.