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Analysis of parking needs at Kertapati Station

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ABSTRACT

The increasing population, rapid development, increasing number of motorized vehicles and increasing community activities are part of the current transportation problem. These problems can have an impact on improving the need for parking. At Kertapati Station there is a parking space facility. Provision of parking space if not appropriately arranged can be a problem and interfere with the level of comfort in the service process and can result in traffic jams, especially at stations. This study aims to analyze parking needs at Kertapati Station, and project parking needs at Kertapati Station for the next 5 years. The research method used is the observation of parking when vehicles enter and exit the train station. The research was conducted for three days, Thursday to Saturday April 28-30 2022 with an observation time of 07.00-21.30 WIB. From the results of the data analysis, it is known that the largest parking space requirement occurs on Saturday 30 April 2022 for motorcycles of 177.86 SRP, and passenger cars as much as 86.42 SRP. The projection within 5 years is that in 2025 the need for parking space for motorbikes can still accommodate the number of vehicles of 177 SRP while for passenger cars there is a shortage of parking space of 49 SRP.

Keywords: parking, parking capacity; parking space requirement; parking space unit (SRP); vehicle growth rate.

INTRODUCTION

The current transportation problems are the increasing population, rapid development, increasing number of motorized vehicles, and increasing community activities. Based on data from the South Sumatra one data information system, there was an increase in the number of motorized vehicles by district/city and type of unit vehicle in the city of Palembang in 2017-2020.

Table 1. Increase in Number of Motorized Vehicles and Types

Regency/ City	Passenger car	Bus	Truck	Motorcycle	Other	Amount
Palembang 2017	121 593	850	19 160	351 133	18 416	511 152
Palembang 2018	133 890	787	21 034	383 390	19 823	558 924
Palembang 2019	135 127	878	21 275	384 449	20 111	561 840
Palembang 2020	134 715	827	21 783	377 259	19 873	554 457

Source: Department of Communication and Information of South Sumatra Province (2020)

According to Tamim 2008, the increasing number of residents of a city will cause an increase in the need to carry out various activities, by traveling most of the population in big cities use private vehicles so indirectly an adequate parking space or capacity is needed. In addition, increasing vehicle ownership can also have an impact on increasing parking requirements. Kertapati Station is a station in Palembang City that serves several trains for passengers and goods. At Kertapati Station there is a parking space facility. Provision of parking space if not arranged properly can be a problem and interfere with the level of comfort in the service process and can result in traffic jams, especially at stations.

RESEARCH METHODS

The location of this research was conducted at Kertapati Station, which is located in Palembang City. When the research was conducted in April 2022.

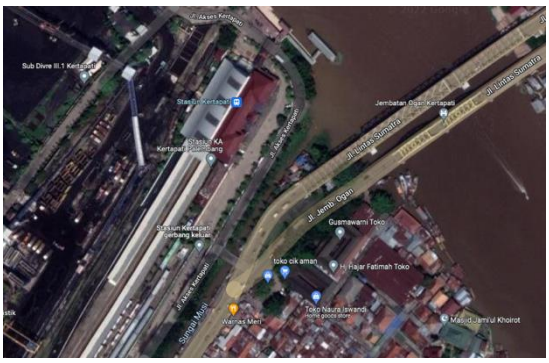

Figure 1. Research sites (Source: Google earth)

In the research method there are stages of research described in the flow chart, namely:

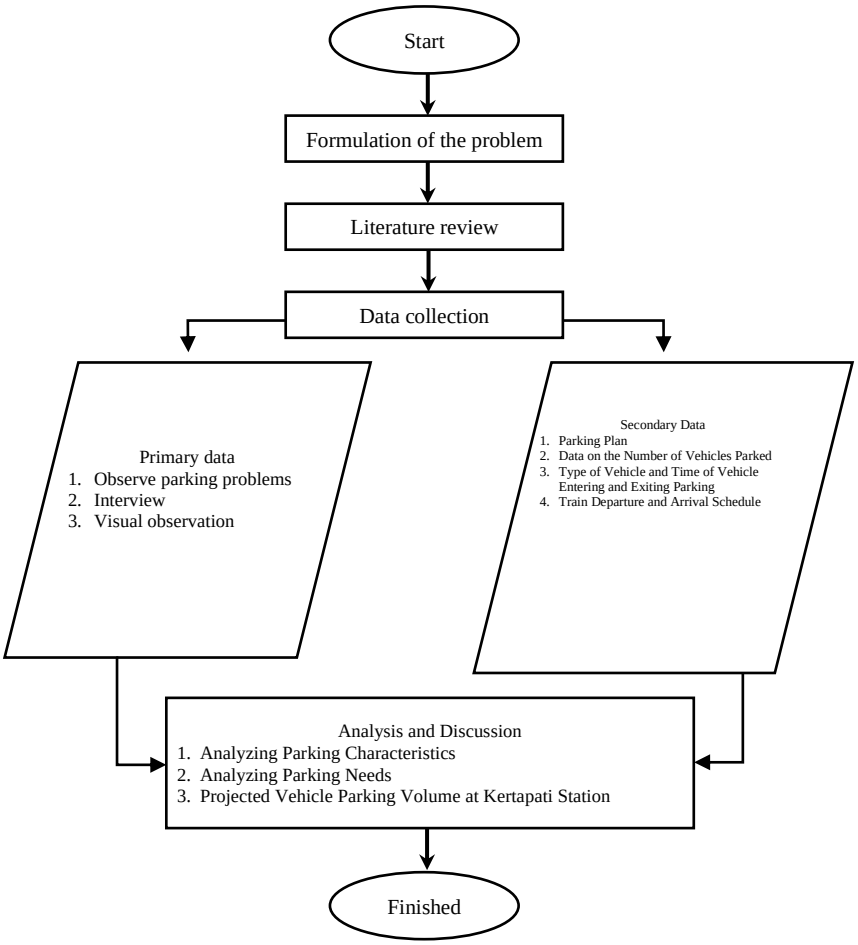

Figure 2. Research flow chart

This research uses quantitative descriptive research. Quantitative research is a process of finding knowledge that uses data in the form of numbers as a tool to analyze information about what you want to know (Kasiram, 2008). The descriptive method in this study is an analytical method that aims to describe and is a solution to the problem under study. Each stage of this research consists of data in the form of numbers that will be interpreted descriptively. The quantitative descriptive method is used to analyze the need for parking space at Kertapati station which is presented in the form of numbers, and these numbers will be interpreted descriptively so that it can find out whether

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the parking lot has met the standards of the regulations that have been determined. Data collection techniques carried out by researchers are useful for collecting data related to the problems of the research they take so that the research data obtained are appropriate. Data retrieval Data obtained from PT Kereta Api Indonesia in this case from the DIVRE III Palembang and Kertapati Station, which includes: parking space plans, parking space capacity data, types of vehicles entering and leaving the station and train departure and arrival schedules.

RESULTS AND DISCUSSIONS

Kertapati Station is a type A large class train station located in Palembang City, precisely at Kemas Rindo, Kertapati KM 400+102 with a height of +2 m and is the main train station for PT Kereta Api Indonesia Regional Division III Palembang. The railway line from this station has rails measuring 1.067 mm. Kertapati station is the main stopping place for all passenger trains from the direction of Bandar Lampung (Tanjungkarang) and the direction of Lubuklinggau. Kertapati Station has general information and the departure and arrival times of trains. The following table provides general information and the departure and arrival times of trains at Kertapati Station, which are presented in Table 2.

Table 2. Train Departure and Arrival Times at Kertapati Station

KA name	Departure time	Time of arrival	Destination
Rajabasa 1	08:30	17:57	Kertapati - Cape Coral
Rajabasa 2	08:30	17:57	Tanjung Karang- Kertapati
Serelo 1	09:00	16:15	Kertapati-Lubuk Linggau
Serelo 2	10:15	17:32	Lubuk Linggau-Kertapati
Sindang Marga 1	20:15	03:10	Kertapati-Lubuk Linggau
Sindang Marga 2	19:45	02:44	Lubuk Linggau-Kertapati

Source: Divre III Palembang (2022)

Parking Accumulation

Parking accumulation is intended to find the number of vehicles parked at the location at the time of observation. Observations were made on Thursday to Saturday, April 28-30 2022, the time for observations was carried out at 07:00-21:00 WIB. The number of vehicles entering and leaving a certain period affects the amount of parking accumulation. From the data processing, it was obtained a recapitulation in 15-minute intervals, the number of vehicles entering and leaving the Kertapati Station.

In Figure 3, the maximum number of motorcycles parked on Thursday 28 April 2022 occurred at 09:00-09:15 as many as 182 vehicles while the maximum number of passenger cars took place at 08:30-08:45 with many vehicles being 45 vehicles. The maximum accumulation of motorcycles parked on Friday 29 April 2022 takes place at 09:00-09:15 as many as 207 vehicles while the maximum number of passenger cars takes place at 08:30-08:45 with a lot of vehicles is 52 vehicles. The maximum accumulation data for motorcycle parking on Saturday 30 April 2022 at 08:45-09:00 is 215 vehicles while the maximum number of passenger cars takes place at 08:15-08:30 with many vehicles is 53 vehicles.

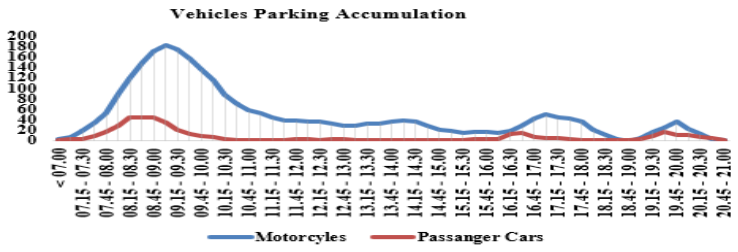

Figure 3. Accumulated Motorcycle and Passenger Car Parking, 28 April 2022 (Source: Analysis Results)

Parking Volume

Parking volume to determine the total number of vehicles occupying the parking space per unit of time which is usually calculated per day in 15-minute intervals. The amount of parking volume is described in the table below, namely:

Table 3. Parking Volume

No	Day	Date	Observation	Vehicle Volume	
				Motorcycle	Passenger car
1	Thursday	April 28, 2022		636	272
2	Friday	April 29, 2022	07.00-21.00	657	288
3	Saturday	April 30, 2022		673	298

Source: Research Results (2022)

Table 3 describes the highest maximum parking volume on Saturday, April 30, 2022 for motorcycles totaling 673 vehicles/day and for passenger cars 298 vehicles/day.

Parking Duration

Parking duration to determine the amount of time a vehicle occupies a parking space in minutes or hours without changing places.

Table 4. Duration of Parking for Motorcycles and Passenger Cars Thursday 28 April 2022

No	Long Parking	Number of Vehicles		Percentage	
		Motorcycle	Passenger car	Motorcycle	Passenger car
1	30	26	11	4.09	4.04
2	60	42	21	6.60	7.72
3	90	80	36	12.58	13.24
4	120	60	27	9.43	9.93
5	150	28	11	4.40	4.04
6	180	10	4	1.57	1.47
7	210	13	4	2.04	1.47
8	240	14	3	2.20	1.10
9	270	6	3	0.94	1.10
10	300	6	4	0.94	1.47
11	>300	351	148	55.19	54.41
Amount		636	272	100	100

Source: Research Results (2022)

The percentage of the maximum duration of parking for motorcycles and passenger cars at Kertapati Station on Thursday, April 28, 2022, for vehicles parked for more than 300 minutes is 55.19% for motorcycles and 54.41% for passenger cars. In observations on Friday 29 April 2022, the percentage of the maximum duration of parking for motorbikes and passenger cars is seen in vehicles parked for more than 300 minutes, namely motorbikes at 51.90% and passenger cars as much as 52.08%. Observations on Saturday 30 April 2022, the percentage of the maximum duration of parking for motorcycles and passenger cars is known for vehicles parked for more than 300 minutes, namely motorcycles amounting to 50.37% and passenger cars valued at 56.38%.

Static Capacity

Static capacity is obtained directly from the details of the parking lot/plot under observation. Visual observations for the static capacity of passenger cars are 200 SRP and motorcycles 40 SRP.

Parking Turnover

The parking turnover shows the value of the use of vehicle parking spaces in a certain period of time or the division between the parking volume and the number of parking spaces used in a certain period.

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Table 5. Parking Turnover

No	Day	Date	Static Capacity		Vehicle Volume		Vehicle Volume	
			Motorcycle	Passenger car	Motor cycle	Passenger car	Motor cycle	Passenger car
1	Thursday	April 28, 2022	200	40	636	272	3.18	6.80
2	Friday	April 29, 2022	200	40	657	288	3.29	7.20
3	Saturday	April 30, 2022	200	40	673	298	3.37	7.45

Source: Research Results (2022)

Based on the table above, it can be seen that the highest motorcycle parking turnover on Saturday 30 April 2022 was 3.37 vehicles/day/space and the largest passenger car occurred on the same day with a value of 7.45 vehicles/day/space. It can be concluded that the greater the parking turnover value, the higher the flow of vehicles entering and leaving the parking space.

Parking Index

The parking index shows the percentage of accumulated parking available in the parking space. The parking index is obtained from the maximum accumulation (peak time of observation for 3 days).

Table 6. Parking Index

No	Day	Date	Static Capacity		Vehicle Volume		Vehicle Volume	
			Motor cycle	Passenger car	Motor cycle	Passenger car	Motor cycle	Passenger car
1	Thursday	April 28, 2022	200	40	182	45	91	112.5
2	Friday	April 29, 2022	200	40	207	52	103.5	130
3	Saturday	April 30, 2022	200	40	215	53	107.5	132.5

Source: Research Results (2022)

The results of the above calculation show that the percentage of parking space on Saturday 30 April 2022 is 107.5% for motorcyles and 132.5% for passenger cars, this indicates that the parking area cannot accommodate motorcyles and passenger cars.

Dynamic Capacity

The size of the average parking duration or the length of parking vehicles affects the dynamic capacity of parking spaces. If the parking duration is short, it indicates that the dynamic capacity of the parking space is large and if the parking duration is long, it indicates that the dynamic capacity of the parking space is small. To find out the amount of dynamic parking capacity of motorcycles and passenger cars can be seen in the table below:

Table 7. Dynamic Capacity

No	Day	Date	Static Capacity		Obser vation	Average Duration		Dynamic Capacity	
			Motor cycle	Passenger car		Motor cycle	Passenger car	Motor cycle	Passenger car
1	Thursday	April 28, 2022	200	40	07.00-21.00	3.21	3.32	872.27	168.67
2	Friday	April 29, 2022	200	40		3.54	3.76	790.96	148.94
3	Saturday	April 30, 2022	200	40		3.7	4.06	756.76	137.93

Source: Research Results (2022)

Parking Space Needs

Determination of parking space requirements is intended to determine the number of parking spaces needed in a parking lot. Fulfilling the need for available parking space can be done by observing the length of the observation, the volume of vehicles and the average parking duration. The need for parking space is determined from the number of parking vehicles in a unit of time multiplied by the average duration of parking vehicles then divided by the length of observation.

Table 8. Parking Space Needs

No	Day	Date	Observation	Vehicle Volume		Average Duration		Parking Space Needs	
				Motorcycle	Passenger car	Motorcycle	Passenger car	Motorcycle	Passenger car
1	Thursday	28 April 2022	07.00-21.00	636	272	3.21	3.32	145.83	64.50
2	Friday	April 29, 2022		657	288	3.54	3.76	166.13	77.35
3	Saturday	April 30, 2022		673	298	3.7	4.06	177.86	86.42

Source: Research Results (2022)

From the analysis of Table 8, it was found that the largest parking space requirement occurred on Saturday, April 30, 2022, for motorcycles of 177.86 SRP and passenger cars of 86.42 SRP.

Projected Vehicle Volume for the Next 5 Years

Estimating the volume of parking using parking spaces at Kertapati Station is based on the number of motorized vehicle data in 2015-2021 using the growth method.

Table 9. Vehicle Potential Growth

No	Year	Vehicle Potential	
		Motorcycle	Passenger car
1	2015	397747	150693
2	2016	458805	183014
3	2017	351133	121593
4	2018	383390	133890
5	2019	384449	135127
6	2020	377259	1347`5
7	2021	377908	141189

Source: Central Statistics Agency of South Sumatra (2022)

Based on the formula for the growth method, namely the number of vehicles in the previous year minus the number of vehicles in the year after divided by the number of vehicles in the previous year multiplied by one hundred percent then the vehicle growth rate is 21.45%.

Table 10. Growth Percentage of Motorcycles and Passenger Cars

No	Year	Potency Vehicle		Growth Rate/year		Average Growth Rate	
		Motorcycle	Passenger car	Motorcycle	Passenger car	Motorcycle	Passenger car
1	2015 2016	397747 458805	150693 183014	15.35	21.45	-0.06	0.57
2	2016 2017	458805 351133	183014 121593	-23.47	-33.56		
3	2017 2018	351133 383390	121593 133890	9.19	10,11		
4	2018 2019	383390 384449	133890 135127	0.28	0.92		
5	2019 2020	384449 377259	135127 1347`5	-1.87	-0.30		
6	2020 2021	377259 377908	1347`5 141189	0.17	4.81		

Source: Research Results (2022)

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The vehicle growth rate at Kertapati Station in 2022 is -0.06 for motorcycles and 0.57 for passenger cars. The number of motorized vehicles each year is presented in the table below:

Table 11. Prediction of the Next 5 Years of Parking Vehicle Volume

No	Year	Parking Needs		Static Capacity		Difference	
		Motorcycle	Passenger car	Motorcycle	Passenger car	Motorcycle	Passenger car
1	2022	178	86	200	40	22	-46
2	2023	178	87	200	40	22	-47
3	2024	178	88	200	40	22	-48
4	2025	178	88	200	40	22	-48
5	2026	178	89	200	40	22	-49

Source: Research Results (2022)

From the analysis of the calculation of Table 11, data obtained from the need for parking spaces is always increasing every year. The projection for the next 5 years is that in 2023 motorcycles can still accommodate 178 SRP parked vehicles and 47 SRP for passenger cars. From these data, it is recommended to add new parking spaces where the existing parking spaces cannot accommodate the number of vehicles.

CONCLUSION

Based on the results of the analysis and discussion of the data, several conclusions were obtained, namely the observation of motorized vehicles, namely motorcycles and passenger cars, carried out on Thursday to Saturday 28-30 April 2022 with the observation time carried out at 07:00-21:00 WIB. From the calculation, it is known that the largest parking space requirement occurs on Saturday, April 30, 2022 for motorcycles of 177.86 SRP and passenger cars of 86.42 SRP. To find out the existing state in the future, it is projected that vehicles parked at Kertapati Station are projected. The picture of the projection for 5 years by looking at the growth of motorized vehicles will increase every year.

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