Paid Parking Performance Analysis at Depok Lama Station

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ABSTRACT

PT Kereta Api Indonesia (Persero) or PT KAI is a State-Owned Enterprise (BUMN) that provides train transportation services, Depok Lama Station is one of PT KAI's operational facilities which stops on a scheduled basis for passengers to get on and off, Depok Lama Station is in the area One operational area is located in Pancoran Mas District, Depok City. The increase in passengers at Depok Lama Station and the inability to accommodate the parking facilities at Depok Lama Station. Some passengers choose to park their vehicles in private parking lots. Therefore, according to the author, it is necessary to evaluate the performance of the current parking lot as a plan for the future. So it can provide an alternative solution for parking spaces at Depok Lama Station, and also solve it so that train passengers don't find parking spaces anymore. This also aims to provide comfort for train passengers. This research was conducted to evaluate the parking area at Depok Lama Station. This evaluation is an important stage that must be carried out, in order to identify problems that occur in the parking system at Depok Lama Station. This data collection used quantitative methods with direct observation in the field at Depok Lama station, while literature was used as a reference for secondary data. Based on the results of the survey and data analysis that the author obtained for 10 days, namely the condition of the existing parking lot, secondary data was obtained using the survey method to produce data on the existing area of 230m2 of motorbike parking area with a capacity of 100 (parking space units) SRP and a slope angle of 90° at the station. Depok Lama. In this analytical research, the largest accumulated stasis capacity was 143 vehicles with an average parking duration of 08:14 hours on Thursday, June 1 2023. During the ten-day survey carried out, it was discovered that the maximum parking volume was 150 vehicles with accumulated vehicle parking. A maximum of 150 vehicles occurred on June 1, 2023, and the highest motorbike parking turnover at Depok Lama station reached 150.00%, this shows that motorbike parking performance is quite high. The capacity of motorbike parking spaces at the Depok Lama station can meet existing parking needs. This is shown by looking at the parking index exceeding 100%.

Keywords: paid parking performance; Depok Lama; parking space unit (SRP); parking space requirement, parking capacity.

INTRODUCTION

PT Kereta Api Indonesia (Persero) or PT KAI is a State-Owned Enterprise (BUMN) that provides train transportation services. PT KAI services include passenger and goods transportation. Kereta Api Indonesia (KAI) is divided into one business area and four Regional Divisions (Divre). One business area is located in Java (Java business area) and is divided into nine operational areas (DAOP/DAOPS). In the past, KAI also had a division in Java which later separated into PT KAI Commuter Jabodetabek (KCJ), now called KAI Commuter. Previously, the Railway Service Company (PJKA) had an additional special service called the Shipping Service. Depok Lama Station is one of PT KAI's operational facilities which stops on a scheduled basis for boarding and descending passengers. Depok Lama Station is in operational area 1 which is located in Pancoran Mas District, Depok City. The increase in passengers at Depok Lama Station and the inability to accommodate the parking facilities at Depok Lama Station. Some passengers choose to park their vehicles in private parking lots. Therefore, according to the author, it is necessary to evaluate the performance of the current parking lot as a plan for the future. So it can provide an alternative solution for parking spaces at Depok Lama Station, and also solve it so that train passengers don't find parking spaces anymore. This also aims to provide comfort for train passengers.

The effect on traffic speed is that parking on the side of the road is the practice of parking vehicles on the side of the road or sidewalk. This practice can reduce road capacity, result in the narrowing of lanes, and significantly affect traffic speeds. When there are vehicles parked on the side of the road, moving vehicles have to adjust their speed, and often traffic speeds will decrease. Parking on the side of the road can also create traffic conflicts when vehicles attempting to park or leave a parking space must interact with moving traffic (Ganda CF et.al, 2019; Karimah H, Akbardin J, 2019; Syaiful S et.al, 2022). This can lead to reduced speeds and potential traffic incidents. Influence on Traffic Speed is the influence on off-street parking facilities, such as parking in parking buildings or special parking lots, which tend to have a more limited impact on traffic speed on the highway (Syaiful S, et.al, 2022; Syaiful S, Rusfana H, 2022; Syaiful S, Pratama Y, 2019). Vehicles heading to this parking facility are usually already in the stage of searching for a suitable parking space. However, poor access design to off-street parking facilities or increased volumes of vehicles entering or exiting parking facilities can affect traffic around those facilities (Syaiful S, Hariyadi D, 2019; Syaiful S et.al, 2020; Syaiful S et.al, 2021).

Effective parking management can reduce the negative impact of roadside parking on traffic speed. This includes setting parking time limits, enforcing parking rules, and using technology to direct motorists to available parking areas. Municipal policies, such as parking rates that vary based on demand or restructuring of parking zones, can also influence parking behavior and, as a result, traffic speeds (Syaiful S, Fadly A, 2020; Syaiful et.al, 2023; Syaiful et.al, 2023).

RESEARCH METHODS
Parking Definition

Parking is a temporary state of immobility of a vehicle (Directorate General of Land Transportation, 1996). Apart from the definition above, several experts provide their definitions of parking, namely:
1. It is impossible for all vehicles to move continuously at some point they must stop temporarily (unload) or stop for a long time which is called parking.
2. Parking is a condition of not moving a vehicle that is not temporary (Decree of the Director General of Land Transportation Number: 272/Hk.105/DRJD/96).

Based on the definition above, it can be concluded that parking is a condition of not moving a motorized or non-motorized vehicle which can be the start of a journey for a certain period of time in accordance with the circumstances and needs which requires an area as a stopping place organized by either the government or other parties. which can be individuals or business entities.

Definition of park and ride

Park and ride is the activity of parking private vehicles placed near public transportation routes and then continuing the journey using a bus or train. This facility is often found at train stations on the outskirts of the city or busway stations/shelters on the edge of the city (Abubakar, 2011). Park and ride facilities can be classified as intermodal switching facilities. This facility supports travelers to leave their private vehicles and continue their journey with transit transportation, in other words, this facility is a place to change modes from modes with low occupancy to modes with higher occupancy (Spillar, 1997). This is in accordance with Ferguson's (1990) statement in Utami (2016) where Park and ride is one of the instruments in Transport Demand Management (TDM) which aims to shift mode choice from lower-occupancy vehicles to vehicles with higher occupancy. higher-occupancy vehicle (HOV) during a trip.

According to Abubakar (2011), park and ride is a traffic management tool. Parking in certain places and taking mass transportation is one of the management tools for limiting traffic in busy city centers. Park and ride is attractive to commuters with cheap or even free parking rates, then they can take the bus/busway or train to the city center. From the definitions above, it can be concluded that park-and-ride facilities are one of the facilities that provide space. parking for private vehicles to leave their vehicles and continue their journey using public transportation.

Benefits of providing park-and-ride

The benefits of developing park and ride facilities according to Abubakar (2011) are as follows:

1. Reduce travel costs and time, especially more pronounced if private vehicle traffic congestion is high while public transportation is smooth (busway/city train)

2. Helps reduce traffic congestion in activity centers and it also functions as a tool in traffic restriction management

3. Encourage the public to increase their use of public transport

4. Reduce fuel consumption and thereby also reduce greenhouse gas emissions because public transport produces lower greenhouse gas emissions per passenger/km than using private vehicles

5. Reducing the need for parking spaces at travel destinations in the city center area.

According to Ginn (2009), park-and-ride has the benefit of supporting public transportation with good interchange facilities. Park and ride works by diverting trips to the city center to parking lots on the edge of the city or around the route so that people can continue their journey by public transportation (Rye, 2011). This is in line with what Aragon (2004) stated that park and ride has the benefit of reducing congestion by increasing vehicle occupancy, in this case, park and ride is able to shift the use of transportation modes from private vehicles to alternative modes such as transit modes. The provision or development of parks and rides in suburban areas will increase the productivity of public transportation so that its use is more efficient (Niles & Pogodzinski, 2016).

Distribution of Parking Types

Every trip that reaches its destination definitely requires parking space. Parking is a necessity for vehicle owners who want their vehicle to be parked in a place where it is easy to reach. Based on what is explained in the definition of parking above according to the attachment to the decision of the Director General of Land Parking Transportation Number 272/HK.105 1996.

Place and time of research

The location of research was carried out at Depok Lama Station over a period of 5 months starting from February to June 2023. A technical description of the research location in the following image can be seen in Figure 1 of the research location.
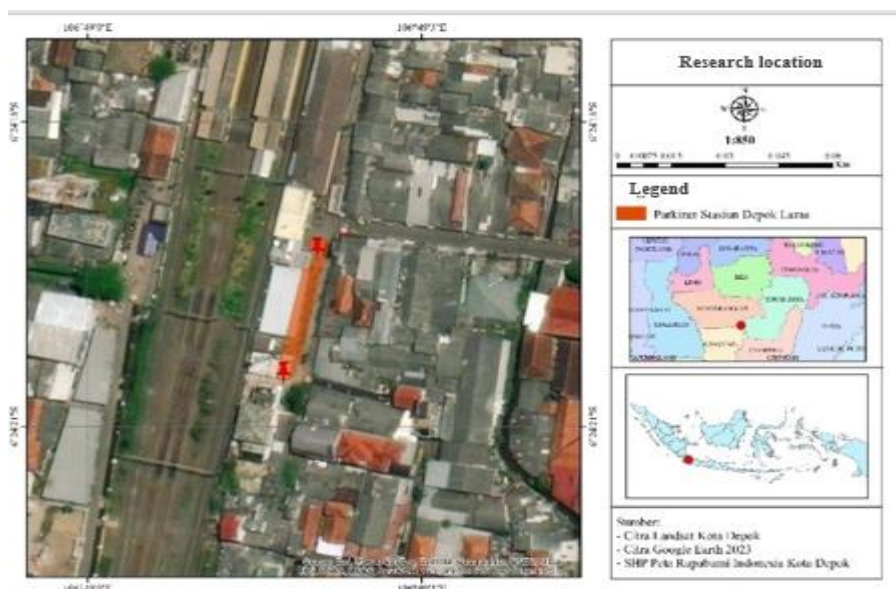
Figure 1. Map of research locations (Source: ArcGIS).

Data processing

When conducting research, you will need to arrange the research steps first to make the analysis easier. In this research, it is necessary to plan the steps taken so that the research process can be carried out effectively. The following are the steps in the research:

1. Primary data in the form of vehicle number plate data and matching times between vehicle entry and exit using an equation formula approach will obtain results of parking characteristics and parking space requirements. The data is then grouped into time unit groups, namely 30 minutes, the number of vehicles according to the time interval group and to obtain the correct figure for parking space requirements for the Andi Hakim Nasution Building, look for the long parking time interval group that has the largest number of parked motorbikes. The selected and appropriate figures for parking space requirements are used to calculate the need for Parking Space Units (SRP) using a formula approach from the Technical Guidelines for the Implementation of Parking at the Directorate General of Land Transportation Number 272/KH105 1996.

2. Primary data is the number of vehicles in a day and the number of parking spaces available and secondary data is the area of parking spaces in the Andi Hakim Nasution Building calculated using the equation and the Directorate General of Land Transportation Number 272/KH.105 1996 produces parking problems and capacity.
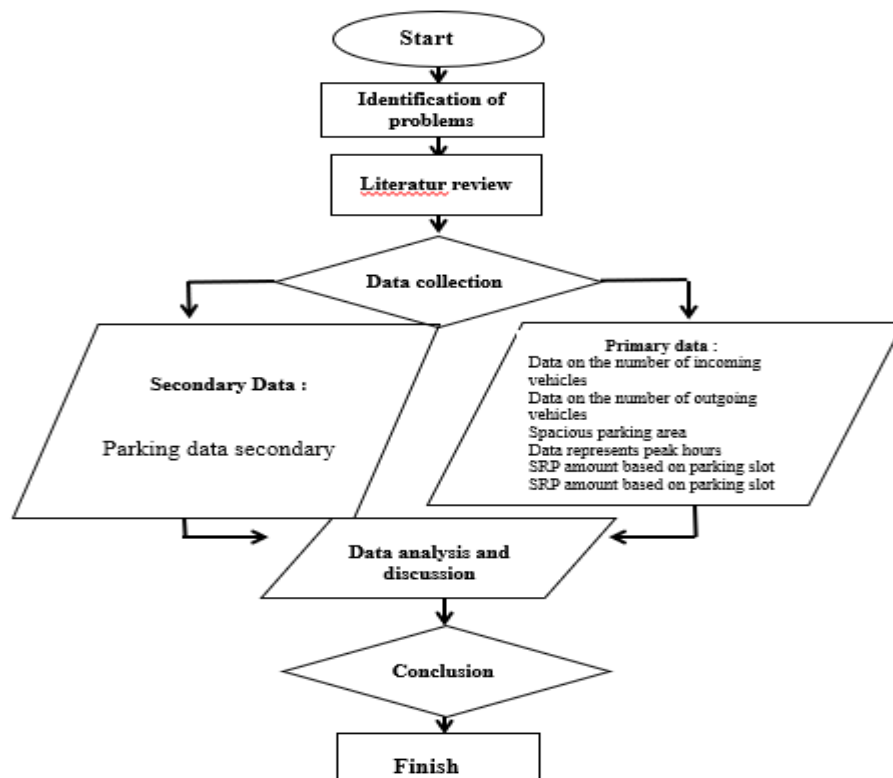
3. Data processing with the Microsoft Excel program.

Figure 2. Research flow chart

Calculation of Parking Characteristics
Parking area plan data
Condition of existing parking at the Depok Lama station

Based on research conducted at the Depok Lama station, the parking requirements at the Depok Lama station are not able to accommodate vehicles that will be parked. The number of parking spaces for motorbikes is 100 SRP, so many motorbike users prefer to park haphazardly and irregularly in this area. The existing condition of parking at the Depok Lama station is presented in Figure 3 below.

Figure 3. The existing condition of parking at Depok Lama station

1. Research data

   The research carried out at the Depok Lama station was carried out from 27 February 2023 to 20 July 2023, while the collection of vehicle volume data was carried out for ten days, namely Monday 29 May 2023 to Friday 9 June 2023. The data obtained can be seen in the attachment 1-1.

   Research variable

2. In order to meet the need for parking space, there are several variables that can influence the need for parking space, including:

   Number of vehicles

   - Based on research results and calculations of vehicle accumulation, it was found that the highest average number of motorbikes parked occurred on Fridays at 07:00–07:30 with a total of 30 vehicles.

   Parking area

   - Based on the results of measurements of the parking area at the Depok Lama station, it is 230m2.

Vehicle recording when entering and leaving
Parking volume

Parking volume is the number of vehicles parked at the study location during a certain time period, in this case the calculation is grouped at every 30 minutes. By knowing the volume of parked vehicles from a parking facility, you can determine the size of the parking space needed to accommodate the volume of parked vehicles that occur. The larger the vehicle volume, the greater the need for parking space. Next, an analysis of the survey data was carried out to obtain the parking volume at the study location during the 12 hours and 30 minutes of observation as presented in Table 1 and Figure 4 below:

Table 1. Motorcycle Parking Volume

No	Date and time	Time	Number of vehicles
1	Monday, May 29, 2023	06:00 - 18:30	135
2	Tuesday, May 30 2023	06:00 - 18:30	135
3	Wednesday, May 31, 2023	06:00 - 18:30	141
4	Thursday, 01 June 2023	06:00 - 18:30	150
5	Friday, 02 June 2023	06:00 - 18:30	135
6	Monday, 05 June 2023	06:00 - 18:30	135
7	Tuesday, 06 June 2023	06:00 - 18:30	135
8	Wednesday, 07 June 2023	06:00 - 18:30	143
9	Thursday, 08 June 2023	06:00 - 18:30	140
10	Friday, 09 June 2023	06:00 - 18:30	143
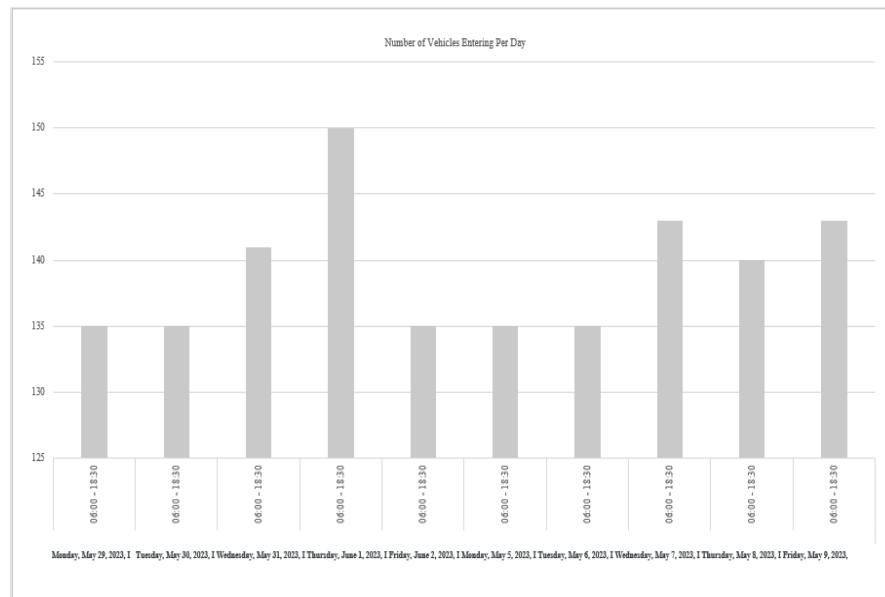
Figure 4. Motorcycle parking volume

Based on Table 1 and Figure 4, it can be seen that the maximum volume of motorbike parking occurred on Thursday, June 1, 2023 with a total of 150 vehicles.
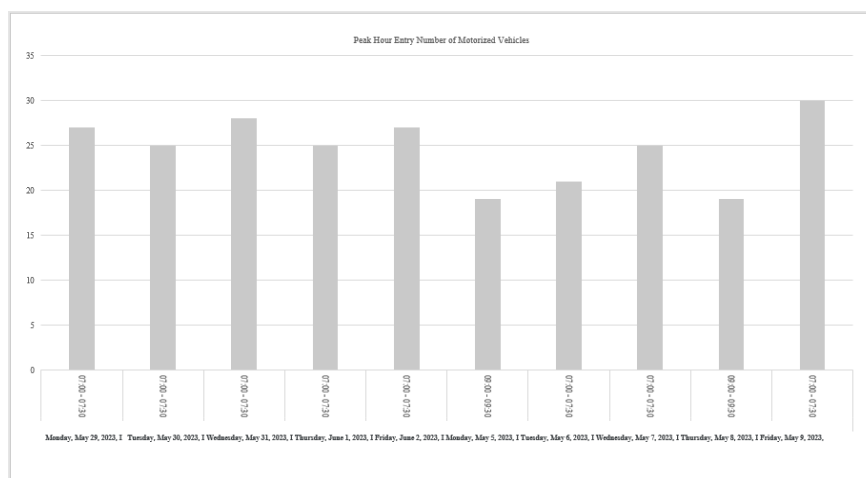
Peak vehicle entry time

Peak vehicle entry hours are the largest time period when motorists enter the parking area. In this case, peak vehicle entry times are grouped based on the largest number in the period per day as presented in Table 2 and Figure 5 below:

Table 2. Peak vehicle entry hours

| No	Date and time	Time	Number of vehicles
1	Monday, May 29, 2023	07:00 - 07:30	27
2	Tuesday, May 30 2023	07:00 - 07:30	25
3	Wednesday, May 31, 2023	07:00 - 07:30	28
4	Thursday, 01 June 2023	07:00 - 07:30	25
5	Friday, 02 June 2023	07:00 - 07:30	27
6	Monday, 05 June 2023	09:00 - 09:30	19
7	Tuesday, 06 June 2023	07:00 - 07:30	21
8	Wednesday, 07 June 2023	07:00 - 07:30	25
9	Thursday, 08 June 2023	09:00 - 09:30	19
10	Friday, 09 June 2023	07:00 - 07:30	30

Figure 5. Peak vehicle entry hours

Based on Table 2 and Figure 5 above, it can be seen that the highest peak vehicle entry period occurred on Friday, June 9 2023 with a total of 30 vehicles.

Peak time for vehicles to leave

Peak vehicle exit hours are the largest period of time when drivers leave the parking area. In this case, peak vehicle exit hours are grouped based on the highest number in the period per day as presented in Table 3 and Figure 6 below:

Table 3. Peak vehicle exit hours

No	Date and time	Time	Number of vehicles
1	Monday, May 29, 2023	17:00 - 17:30	43
2	Tuesday, May 30 2023	17:00 - 17:30	48
3	Wednesday, May 31, 2023	17:00 - 17:30	48
4	Thursday, 01 June 2023	17:30 - 18:00	34
5	Friday, 02 June 2023	17:00 - 17:30	38
6	Monday, 05 June 2023	17:00 - 17:30	34
7	Tuesday, 06 June 2023	17:00 - 17:30	39
8	Wednesday, 07 June 2023	17:00 - 17:30	50
9	Thursday, 08 June 2023	17:00 - 17:30	39
10	Friday, 09 June 2023	17:00 - 17:30	32
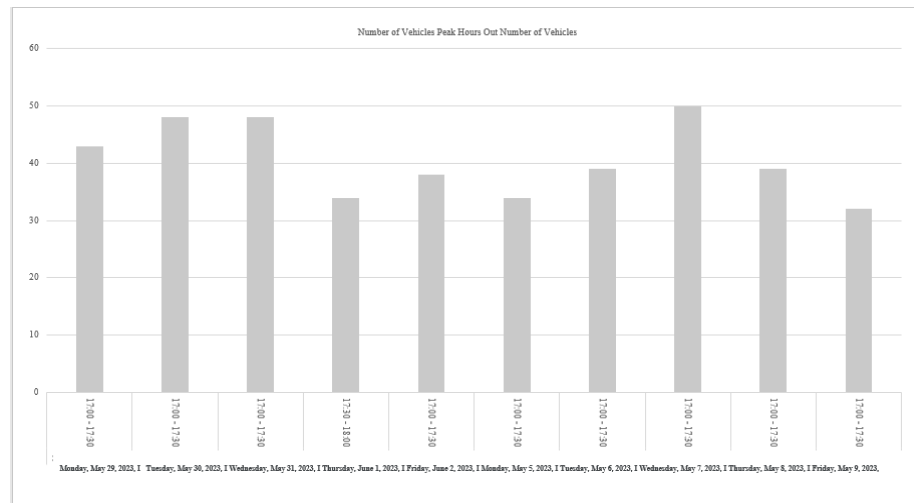
Figure 6. Peak vehicle entry hours

Based on Table 3 and Figure 6 above, it can be seen that the peak hour period for the highest number of vehicles occurred on Wednesday 07 June 2023 with a total of 50 vehicles.

Matching incoming and outgoing vehicle data
Parking accumulation

Parking accumulation is the number of vehicles parked in a place at a certain time and can be divided according to the type and purpose of travel. Peak parking times and the number of parked vehicles can be obtained from the parking accumulation results. The data obtained for ten days was recorded by recording the number of vehicles entering and leaving and then grouped into 30-minute time intervals, to obtain the percentage distribution of vehicles entering and exiting and parking accumulation figures. Based on the parking accumulation table and the number of motorbike riders entering and leaving at Depok Lama station, it can be seen that the distribution of the number of vehicles available is large for each 30minute survey interval. The following maximum accumulated parking is presented in Table 4 and Figure 7.

Table 4. Maximum accumulation

No	Date and time	Maximum Accumulation (Vehicle)	Peak Hours (WIB)
1	Monday, May 29, 2023	134	11:00 - 11:30
2	Tuesday, May 30 2023	132	11:00 - 11:30
3	Wednesday, May 31, 2023	140	11:00 - 11:30
4	Thursday, 01 June 2023	143	12:30 - 13:00
5	Friday, 02 June 2023	135	11:30 - 12:00
6	Monday, 05 June 2023	118	13:30 - 14:00
7	Tuesday, 06 June 2023	120	14:30 - 15:00
8	Wednesday, 07 June 2023	143	12:30 - 13:00
9	Thursday, 08 June 2023	130	12:30 - 13:00
10	Friday, 09 June 2023	137	11:00 - 11:30
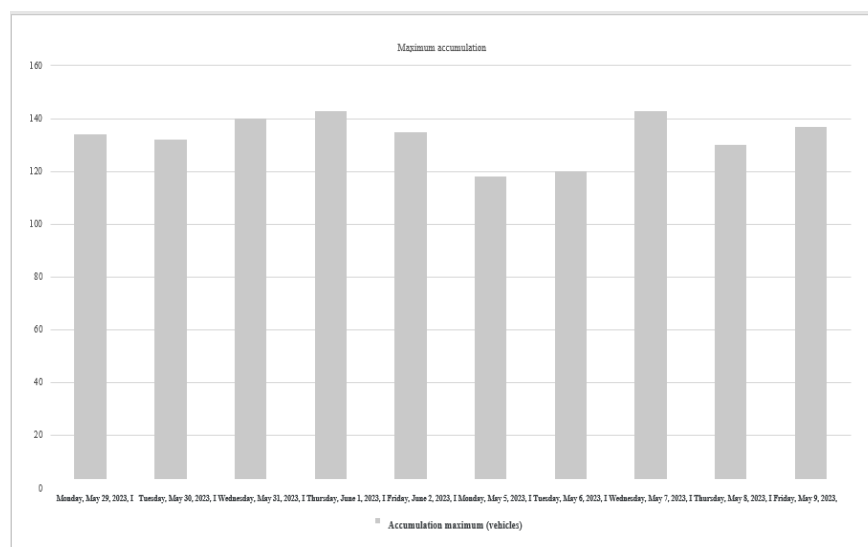
Figure 7. Maximum parking accumulation

The maximum number of motorbikes entering and leaving on Monday 29 May 2023 can be seen in Table 4 and Figure 7, parking accumulation, for the number of motorbike vehicles leaving can be seen in Table 3 and Figure 6 peak vehicle exit hours, as for the number of bicycle vehicles entering motorbikes can be seen in Table 2 and Figure 5 peak vehicle entry hours. The maximum number of motorbikes entering the parking lot is 27 vehicles occurring at 07:00-07:30. The maximum number of motorbikes leaving the parking lot was 43 vehicles occurring at 17:00-17:30. Maximum parking accumulation of 132 vehicles is from 11:00-11:30.

The maximum number of motorbikes entering and leaving on Tuesday 30 May 2023 can be seen in Table 4 and Figure 7, parking accumulation, for the number of motorbike vehicles leaving can be seen in Table 3 and Figure 6 peak vehicle exit hours, as for the number of bicycle vehicles entering motorbikes can be seen in Table 2 and Figure 5 peak vehicle entry hours. The maximum number of motorbikes entering the parking lot is 25 vehicles occurring at 07:40-08:00. The maximum number of motorbikes leaving the parking lot is 48 vehicles occurring at 17:00-17:30. Maximum parking accumulation of 132 vehicles is from 11:00-11:30.

The maximum number of motorbikes entering and leaving on Wednesday 31 May 2023 can be seen in Table 4 and Figure 7 parking accumulation, for the number of motorbike vehicles leaving can be seen in Table 3 and Figure 6 peak vehicle exit hours, as for the number of bicycle vehicles entering motorbikes can be seen in Table 2 and Figure 5 peak vehicle entry hours. The maximum number of motorbikes entering the parking lot is 28 vehicles occurring at 07:00-07:30. The maximum number of motorbikes leaving the parking lot is 48 vehicles occurring at 17:00-17:30. Maximum parking accumulation of 140 vehicles is from 11:00-11:30.

The maximum number of motorbikes entering and leaving on Thursday 1 June 2023 can be seen in Table 4 and Figure 7, parking accumulation, for the number of outgoing motorbikes can be seen in Table 3 and Figure 6, peak vehicle exit hours, for the number of incoming Motorcycle vehicles can be seen in Table 2 and Figure 5, peak vehicle entry hours. The maximum number of motorbikes entering the parking lot is 25 vehicles occurring at 07:00-07:30. The maximum number of motorbikes leaving the parking lot is 34 vehicles occurring at 17:20-18:00. Maximum parking accumulation of 143 vehicles is from 12:30-13:00.

The maximum number of motorbikes entering and leaving on Friday 2 June 2023 can be seen in Table 4 and Figure 7, parking accumulation, for the number of outgoing motorbikes can be seen in Table 3 and Figure 6, peak vehicle exit hours, for The number of motorbike vehicle entries can be seen in Table 2 and Figure 5, peak vehicle entry hours. The maximum number of motorbikes entering the parking lot is 27 vehicles occurring at 07:00-08:20. The maximum number of

motorbikes leaving the parking lot is 38 vehicles occurring at 17:00-17:30. Maximum parking accumulation of 135 vehicles is from 11:30-12:00.

The maximum number of motorbikes entering and leaving on Monday 5 June 2023 can be seen in Table 4 and Figure 7, parking accumulation, for the number of outgoing motorbikes can be seen in Table 3 and Figure 6, peak vehicle exit hours, for the number of incoming Motorcycle vehicles can be seen in Table 2 and Figure 5, peak vehicle entry hours. The maximum number of motorbikes entering the parking lot is 19 vehicles occurring at 09:00-09:30. The maximum number of motorbikes leaving the parking lot is 34 vehicles occurring at 17:00-17:30. Maximum parking accumulation of 351 vehicles is from 13:30-14:00.

The maximum number of motorbikes entering and leaving on Tuesday 6 June 2023 can be seen in Table 4 and Figure 7, parking accumulation, for the number of outgoing motorbikes can be seen in Table 3 and Figure 6, peak vehicle exit hours, as for the number of incoming Motorcycle vehicles can be seen in Table 2 and Figure 5, peak vehicle entry hours. The maximum number of motorbikes entering the parking lot is 21 vehicles occurring at 07:00-07:30. The maximum number of motorbikes leaving the parking lot was 39 vehicles occurring at 17:00-17:30. Maximum parking accumulation of 120 vehicles is from 14:30-15:00.

The maximum number of motorbikes entering and leaving on Wednesday 7 June 2023 can be seen in Table 4 and Figure 7, parking accumulation, for the number of outgoing motorbikes can be seen in Table 3 and Figure 6, peak vehicle exit times, as for the number of incoming Motorcycle vehicles can be seen in table 2 and figure 5, peak vehicle entry hours. The maximum number of motorbikes entering the parking lot is 25 vehicles occurring at 07:00-07:30. The maximum number of motorbikes leaving the parking lot is 50 vehicles occurring at 17:00-17:30. Maximum parking accumulation of 143 vehicles is from 12:30-13:00.

The maximum number of motorbikes entering and leaving on Thursday 8 June 2023 can be seen in Table 4 and Figure 7, parking accumulation, for the number of outgoing motorbikes can be seen in Table 3 and Figure 6, peak vehicle exit hours, for the number of incoming Motorcycle vehicles can be seen in Table 2 and Figure 5, peak vehicle entry hours. The maximum number of motorbikes entering the parking lot is 19 vehicles occurring at 07:00-07:30. The maximum number of motorbikes leaving the parking lot was 39 vehicles occurring at 17:00-17:30. Maximum parking accumulation of 130 vehicles is from 12:30-13:00.

The maximum number of motorbikes entering and leaving on Friday 9 June 2023 can be seen in Table 4 and Figure 7, parking accumulation, for the number of outgoing motorbikes can be seen in Table 3 and Figure 6, peak vehicle exit hours, as for The number of motorbike vehicle entries can be seen in Table 2 and Figure 5, peak vehicle entry hours. The maximum number of motorbikes entering the parking lot is 30 vehicles occurring at 07:00-07:30. The maximum number of motorbikes leaving the parking lot is 32 vehicles occurring at 17:00-17:30. Maximum parking accumulation of 137 vehicles is from 11:00-11:30.

From the information on vehicle accumulation above, it can be explained in Table 4 and Figure 7.

Parking duration

Parking duration is the time span for a vehicle to park in a place (in hours). Based on the research results above, it was found that the average parking duration was 30 minutes, as presented in Table 5 and Figure 8 as follows:

Table 5. Parking duration

No	Date and time	Observation time (WIB)	Maximum Duration hours	Minimum Duration hours	Average Duration hours
1	Monday, May 29, 2023	06:00 - 18:30	10:41	3:07	8:00
2	Tuesday, May 30 2023	06:00 - 18:30	6:40	2:55	9:39

| No	Date and time	Observation time (WIB)	Maximum Duration hours	Minimum Duration hours	Average Duration hours
3	Wednesday, May 31, 2023	06:00 - 18:30	11:21	3:43	8:03
4	Thursday, 01 June 2023	06:00 - 18:30	4:58	4:05	8:14
5	Friday, 02 June 2023	06:00 - 18:30	6:43	4:50	9:33
6	Monday, 05 June 2023	06:00 - 18:30	10:55	2:00	7:15
7	Tuesday, 06 June 2023	06:00 - 18:30	10:19	1:40	7:06
8	Wednesday, 07 June 2023	06:00 - 18:30	11:38	2:37	8:20
9	Thursday, 08 June 2023	06:00 - 18:30	10:14	3:30	6:52
10	Friday, 09 June 2023	06:00 - 18:30	9:59	2:37	7:00
			Max		6:43
			Average		8:00
			Min		1:40
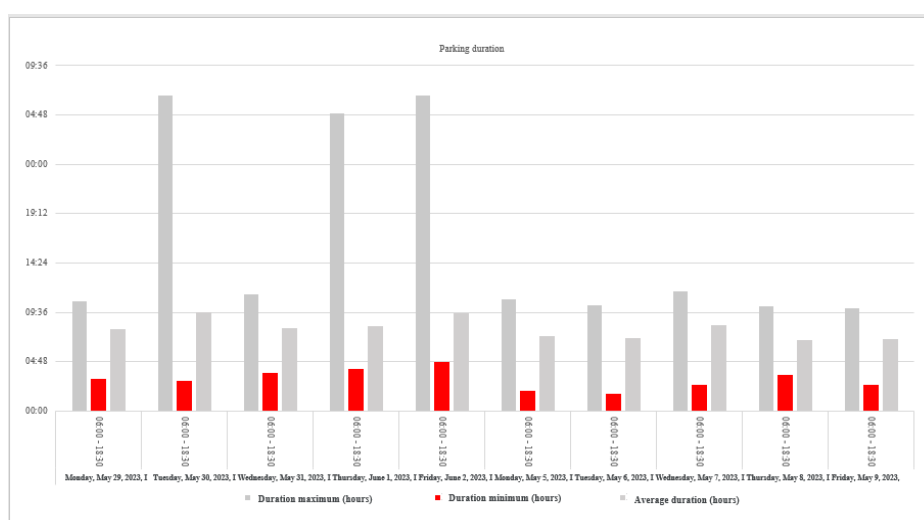
**Figure 8.** Parking duration

Based on Table 5 and Figure 8 above, it is found that the greatest maximum duration occurred on Friday 2 June 2023 at 6:43 hours. The maximum average duration occurs on Monday 29 May 2023 at 08:00 hours, and the minimum duration occurs on Tuesday 06 June 2023 at 01:40 hours.

Turn over the parking lot

Parking turnover is the level of use of parking spaces and is obtained by dividing the parking volume by the number of parking spaces for a certain period. By knowing the parking turnover value, you can determine the level of parking space usage as presented in Table 6 and Figure 9 below:

Table 6. Parking turnover turnover

No	Date and time	Parking Capacity (SRP)	Parking Volume (Vehicle)	Turn over the parking lot
1	Monday, May 29, 2023	100	135	135,00
2	Tuesday, May 30 2023	100	135	135,00
3	Wednesday, May 31, 2023	100	141	141,00
4	Thursday, 01 June 2023	100	150	150,00
5	Friday, 02 June 2023	100	135	135,00
6	Monday, 05 June 2023	100	135	135,00
7	Tuesday, 06 June 2023	100	135	135,00
8	Wednesday, 07 June 2023	100	143	143,00
9	Thursday, 08 June 2023	100	140	140,00
10	Friday, 09 June 2023	100	143	143,00
			Max	150,00
			Average	140,18
			Min	135,00
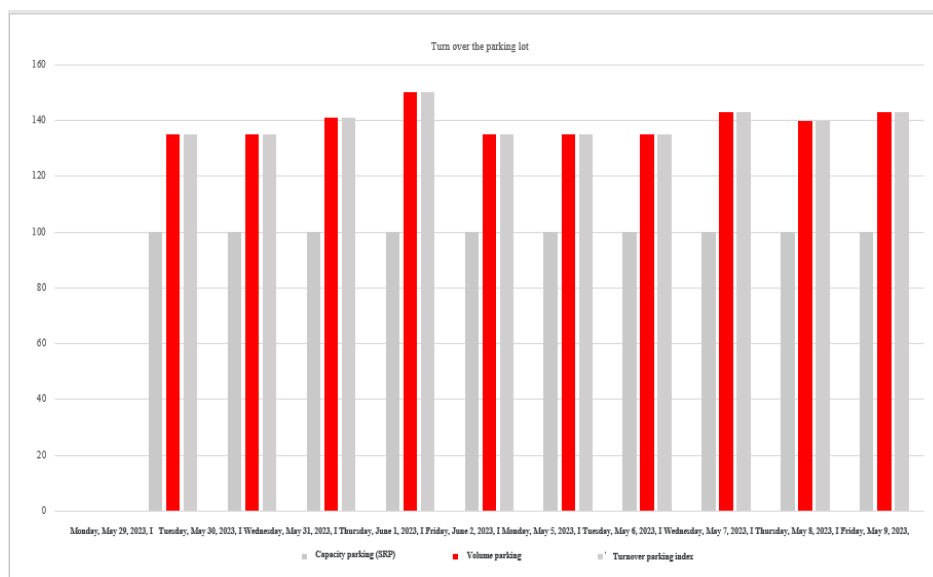
Figure 9. Parking turnover

Based on Table 6 and Figure 9 above, it can be seen that the motorbike parking turnover rate with the highest value is 150.00%, the average value is 140.18%, and the minimum value is 135.00%. This shows that the parking performance of motorbikes is quite high, exceeding 100% lift.

Parking index

Parking performance can also be seen based on parking index numbers. The motorbike parking index value at Depok Lama station which is based on the maximum parking accumulation obtained. The parking index after going through the calculation stage is presented in Table 7 and Figure 10 as follows:

945

Table 7. Parking index

| No	Date and time	Parking Capacity (SRP)	Parking Capacity (SRP)	Parking Index (%)
1	Monday, May 29, 2023	100	134	134,00
2	Tuesday, May 30 2023	100	132	132,00
3	Wednesday, May 31, 2023	100	140	140,00
4	Thursday, 01 June 2023	100	143	143,00
5	Friday, 02 June 2023	100	135	135,00
6	Monday, 05 June 2023	100	118	118,00
7	Tuesday, 06 June 2023	100	120	120,00
8	Wednesday, 07 June 2023	100	143	143,00
9	Thursday, 08 June 2023	100	130	130,00
10	Friday, 09 June 2023	100	137	137,00
			Max	143,00
			Rata-rata	133,20
			Min	118,00
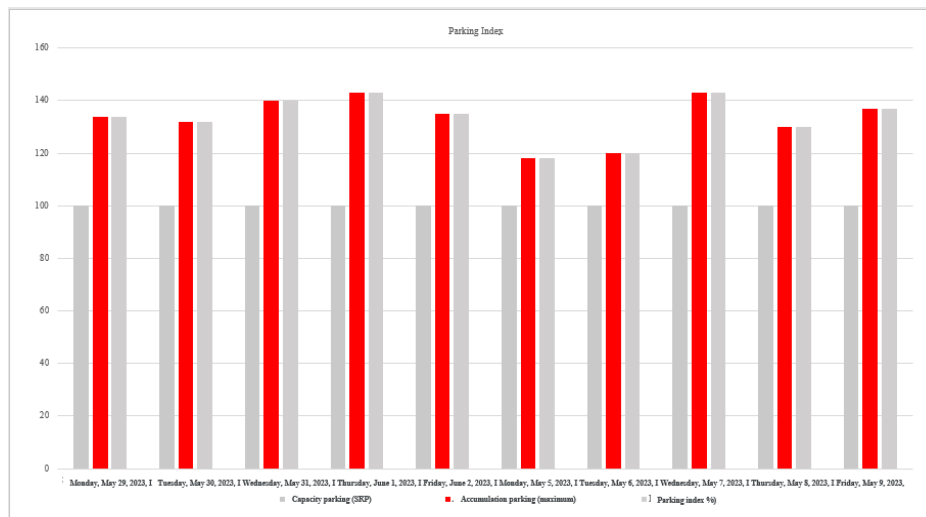
Figure 10. Parking index

Based on Table 7 and Figure 10 above, the motorbike parking index that occurs at the maximum value is 143.00%, the average value is 133.20%, and the minimum value is 118.00% (based on maximum accumulation). From the parking index value obtained, it is stated that the demand for parking spaces is greater than the parking capacity because it has an index value of more than 100%.

Analysis of Parking Space Needs
Parking space requirements

From the calculation results, a recapitulation of parking space requirements at the Depok Lama Station is obtained as presented in Table 8 and Figure 11 as follows:

Table 8. Parking space requirements

No	Date and time	Survey Length hours	Parking Volume (Vehicle)	Average Duration hours	Parking Space Requirements
1	Monday, May 29, 2023	6:30	135	8:00	108,00
2	Tuesday, May 30 2023	6:30	135	9:39	130,28
3	Wednesday, May 31, 2023	6:30	141	8:03	113,51
4	Thursday, 01 June 2023	6:30	150	8:14	123,50
5	Friday, 02 June 2023	6:30	135	9:33	128,93
6	Monday, 05 June 2023	6:30	135	7:15	97,88
7	Tuesday, 06 June 2023	6:30	135	7:06	95,85
8	Wednesday, 07 June 2023	6:30	143	8:20	119,17
9	Thursday, 08 June 2023	6:30	140	6:52	96,13
10	Friday, 09 June 2023	6:30	143	7:00	100,10
				Max	130,28
				Average	111,33
				Min	95,85
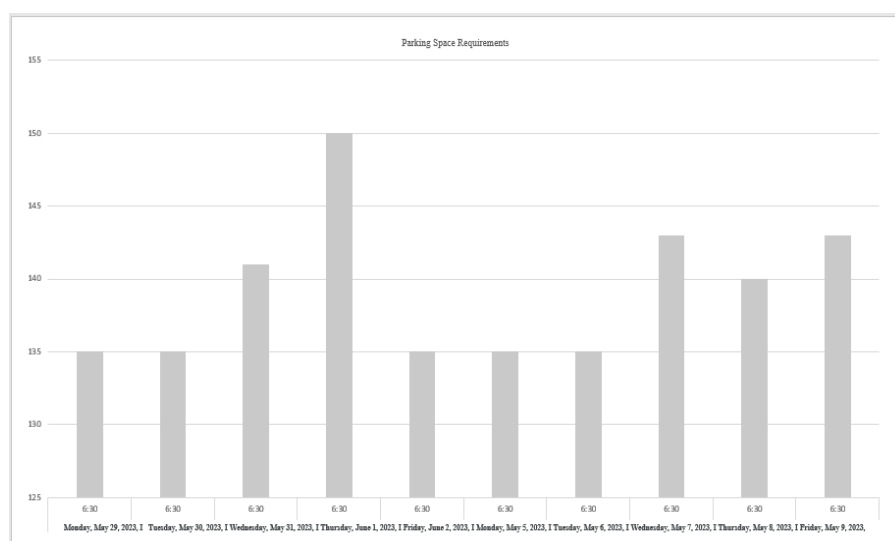
Figure 11. Parking space requirements

Based on Table 8 and Figure 11 above, show that the greatest need for parking space for motorbikes at Depok Lama station occurs on Thursday, June 1, 2023, at 150 SRP.

Standard parking space capacity requirements

Based on the data analysis that has been carried out, the available parking capacity and parking space requirements can be determined by analyzing the number of parked vehicles against the number of available parking spaces. If the parking space requirement is greater than the available parking capacity then the number of available parking spaces is insufficient. If the parking space requirement is smaller than the available parking capacity, then the number of available parking spaces is still able to accommodate vehicles that will park in that parking area. The largest parking space requirement is determined as the value of the parking space requirement that must be met by the Depok Lama station. If the parking space requirement is determined based on the results of research in the field, then the value of the parking space requirement taken is at the time of maximum accumulation. The following is a comparison of parking space requirements versus parking space capacity which is presented in Table 9 and Figure 12.
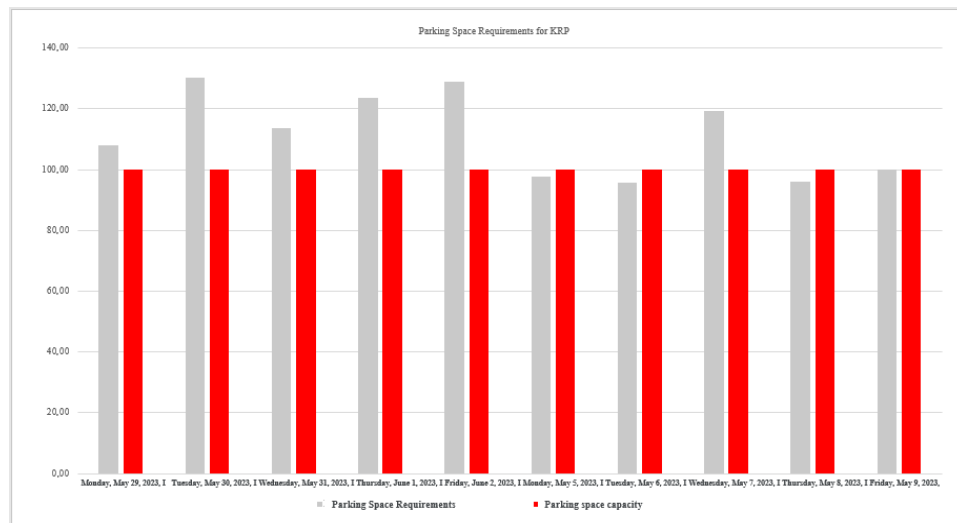
Table 9. Parking space capacity requirements

No	Date and time	Parking Space Requirements	Parking Space Capacity	Parking Space Requirements Difference (+/-)
1	Monday, May 29, 2023	108,00	100	-8,00
2	Tuesday, May 30 2023	130,28	100	-30,28
3	Wednesday, May 31, 2023	113,51	100	-13,51
4	Thursday, 01 June 2023	123,50	100	-23,50
5	Friday, 02 June 2023	128,93	100	-28,93
6	Monday, 05 June 2023	97,88	100	2,13
7	Tuesday, 06 June 2023	95,85	100	4,15
8	Wednesday, 07 June 2023	119,17	100	-19,17
9	Thursday, 08 June 2023	96,13	100	3,87
10	Friday, 09 June 2023	100,10	100	-0,10

Note: (+)   = Parking space capacity is still sufficient

       (-)   = Parking space capacity does not meet

Figure 12. Parking space capacity requirements

Based on Table 9 and Figure 12, the parking space capacity requirement shows that on Monday, May 29, 2023, the parking space requirement was 108 SRP, while the parking capacity available at the research location is 100 SRP, so the difference between parking space requirements and parking capacity is -8. 00 SRP.

Based on Table 9 and Figure 12, the parking space capacity requirement shows that on Tuesday, 30 May 2023, the parking space requirement is 130.28 SRP, while the parking capacity available at the research location is 100 SRP, so the difference between parking space requirements and parking capacity is - 30.28 SRP.

Based on Table 9 and Figure 12, the parking space capacity requirement shows that on Wednesday, May 31, 2023, the parking space requirement is 113.51 SRP, while the parking capacity available at the research location is 100 SRP, so the difference between parking space requirements and parking capacity is - 13.51 SRP.

Based on Table 9 and Figure 12, the parking space capacity requirement shows that on Thursday, June 1, 2023. The parking space requirement is 123.50 SRP, while the parking capacity available at the research location is 100 SRP, so the difference between parking space requirements and parking capacity is - 23.50 SRP.

Based on Table 9 and Figure 12, the parking space capacity requirement shows that on Friday, June 2, 2023, the parking space requirement was 128.93 SRP, while the parking capacity available at the research location is 100 SRP, so the difference between parking space requirements and parking capacity of -28.93 SRP.

Based on Table 9 and Figure 12, the parking space capacity requirement is shown on Monday, June 5, 2023. The parking space requirement is 97.88 SRP, while the available parking capacity at the research location is 100 SRP, so the difference between parking space requirements and parking capacity is 2.13 SRP.

Based on Table 9 and Figure 12, the parking space capacity requirement shows that on Tuesday, June 6, 2023, the parking space requirement was 95.85 SRP, while the parking capacity available at the research location is 100 SRP, so the difference between parking space requirements and parking capacity is 4 .15 SRP.

Based on Table 9 and Figure 12, the parking space capacity requirement shows that on Wednesday, June 7, 2023, the parking space requirement is 119.17 SRP, while the parking capacity available at the research location is 100 SRP, so the difference between parking space requirements and parking capacity is - 19.17 SRP.

Based on Table 9 and Figure 12, the parking space capacity requirement shows that on Thursday, June 8, 2023, the parking space requirement is 96.13 SRP, while the parking capacity available at the research location is 100 SRP, so the difference between parking space requirements and parking capacity is 3 .87 SRP.

Based on Table 9 and Figure 12, the parking space capacity requirement shows that on Friday, June 9, 2023, the parking space requirement was 100.10 SRP, while the parking capacity available at the research location is 100 SRP, so the difference between parking space requirements and parking capacity of -0.10 SRP.

Based on the explanation above, it shows that the value of the parking space requirement is greater than the static capacity. If the value of parking space requirements is determined based on the maximum accumulation that occurs (field survey results), then the parking space requirements for static capacity require additional space for the parking area.

CONCLUSION

Based on the results of the survey and data analysis that the author obtained for 10 days, namely the condition of the existing parking lot, secondary data was obtained using the survey method to produce data on the existing area of 230m2 of motorbike parking area with a capacity of 100 (parking space units) SRP and a slope angle of 90° at the station. Depok Lama. In this analytical research, the largest accumulated stasis capacity was 143 vehicles with an average parking duration of 08:14 hours on Thursday, June 1, 2023. During the ten-day survey carried out, it was discovered that the maximum parking volume was 150 vehicles with accumulated vehicle parking. A maximum of 150 vehicles occurred on June 1, 2023, the highest motorbike parking turnover at Depok Lama station reached 150.00%, this shows that motorbike parking performance is quite high. The capacity of motorbike parking spaces at the Depok Lama station can meet existing parking needs. This is shown by looking at the parking index exceeding 100%.

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