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Performance Analysis of Capacity and Parking Room Needs for Basement the Badung Market

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Abstract--- *Badung Market is one of the largest markets in the city of Denpasar, has motorcycle parking in the basement. The purpose of this study was to analyze the performance of motorcycle parking in the basement section. From the analysis it was found: the highest parking volume during 6 hours of observation was for motorbikes of 917 vehicles that occurred on Friday 29 June 2019, the average duration of parking was 1.07 hours/vehicle. Parking changes for each vehicle is 3 vehicles/parking lot. The highest accumulation of 368 vehicles occurred from 09.45 - 10:00 am. Parking capacity of 357 vehicles. The parking space capacity needed is 164 SRP / hour. Parking supply of 1,923 vehicles. Parking index of 84.77% <100%, means in safe conditions. The need for parking spaces is 82 parking lots.*

Keywords--- *Parking, Capacity, Parking Space Unit (SRP), Performance Analysis*.

I. INTRODUCTION

The increase in population and activities has increased the complexity of transportation problems especially in the city of Denpasar. One problem is the need to provide parking at a growing trade center. The trade center as a place of mass accumulation was buying and selling transactions that have various supporting facilities that can attract visitors. The visitors to the shopping center will use a vehicle, so it takes a parking area to park their vehicles.

The problem of parking is a matter of space requirements where the supply of space in urban areas is limited by the area and land use of the city concerned. Parking lot procurement will more or less take up a large portion of the city because it requires a separate space. This can be seen in the parking conditions at the trade center, such as Badung Market.

The trade center has its parking facilities that do not use the road as a parking lot. Considering the number of vehicles entering the shopping center, the shopping center management needs to provide adequate and well-ordered parking areas to increase safety and comfort for visitors.

This will provide the desired service for all parties, both for traders and consumers who will use the parking lot for a certain time following their interests.

To get all the needs above it is necessary to analyze the Badung Market basement parking lot so that the correct results are obtained whether the existing parking facilities can accommodate the needs or not.

Problems

1. What is the performance of motorcycle parking at the Basement building in Pasar Badung?
2. What is the need for motorcycle parking spaces in the Basement building in Pasar Badung?

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Research Aims

1. Know the characteristics of motorcycle parking in the Basement building in Pasar Badung.
2. Knowing the needs of motorcycle parking spaces in the Basement building in Pasar Badung.

Research Benefit

As input and consideration in determining or taking policy in dealing with parking problems that exist in the Badung Market basement building.

II. METHOD

Data Collection Method

The data collection stage plays an important role in the success of the study because the data analysis and processing stage depend on the data collection stage. So to start, you need good techniques and data collection according to the procedure.

1. Primary Data

Data obtained from field survey results such as parking volume, parking duration, and parking stall measurement results.

2. Secondary data

Following the conditions reviewed in the Badung market motorcycle parking basement area, a survey was carried out as follows:

The survey was conducted for 3 days namely on Friday, June 28, 2019, Saturday, June 29, 2019, June 30, 2019, for 6 hours from 6:00 am to 12:00 pm in 15 minutes.

Data Analysis Method

Based on the results of the field survey, data analysis was carried out with the following steps:

1. Calculation of motorcycle parking characteristics. The calculation steps are as follows:
   a. Parking volume, the value of parking volume is obtained by analyzing the data obtained from the results of a survey of entry and exit of a vehicle that is by adding up an existing vehicle with a vehicle that is entering. Then the maximum parking volume time and value are obtained and a parking volume graph is made.
   b. Parking accumulation, the value of parking accumulation is obtained by analyzing the data obtained from the results of a survey of entry and exit of a vehicle that is by adding up an existing vehicle with an incoming vehicle and subtracting the exit vehicle. Then the parking accumulation value is obtained and a parking accumulation graph is made.
   c. The average length of parking, to get the average length of parking by analyzing the data from the parking duration survey results, namely by dividing the amount of parking duration by the number of vehicles during the survey. Then the average length of parking is obtained.

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d. Parking changes, to get the value of parking changes by analyzing the volume of data and survey data on the size of the parking area, that is the number of vehicles available during the survey divided by the number of parking plots. Then the value of parker turnover is obtained
e. Parking capacity, to get the value of parking capacity by analyzing the survey duration data and survey data on the measurement of the parking area, by adding the existing stalls divided by the average parking time. Then the value of available parking capacity is obtained.
f. Parking space capacity, to get the value of parking space capacity by analyzing the data obtained from the results of surveys of vehicle entrances and average parking time data, ie by multiplying the parked vehicle by the average parking time, then divided by the length of time the survey. Obtained the value of parking space capacity in the basung parking market Badung.
g. Parking supply, to get the value of parking supply by analyzing the average parking length data and the number of stalls, ie the number of stalls multiplied by the survey time, the number is divided by the average parking time and multiplied by the insulator client. Obtained parking supply value.
h. Parking index, to get the value of the parking index by analyzing the accumulation of parking data and the number of stalls, namely the maximum accumulation divided by the number of existing vehicle stalls and multiplied by 100%, to get the percentage value of the parking index in the basung parking market Badung whether problematic or not.

2. Calculation of parking space requirements

The calculation is used to find out the number of parking lots needed at this time. To find out the value of parking space requirements by analyzing parking volume data, average parking duration data and reduction factors due to parking changes.

The number of vehicles during the survey multiplied by the average length of time parked there is a value of x, then the length of time the survey is multiplied by the reduction factor due to the change of parking obtained value of y, then the value of x divided by the value of y is obtained stall needs that are needed at this time.

Research Site

The research location was in the basement section of the Badung market building, on Jalan Raya Sulawesi No.1 Denpasar.

III. DISCUSSION

Parking Volume

Parking volume is the number of vehicles parked at a place for a certain period for 6 hours from 06.00 am to 12.00 pm calculated per 15 minutes.

Based on data from the survey - the entry and exit of vehicles. The results of the calculation of the motorcycle parking volume can be described in Table 1 and the graph in Figure 1.

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Table 1: Data Calculated by the Number of Vehicles and the Volume of Motorcycle Parking in the Basement Area, Saturday 29 June 2019

Survey Time	Enter	Exit	Parking volume
Vehicle previous	228		
06.00 - 06.15 am	35	38	263
06.15 - 06.30 am	25	32	288
06.30 - 06.45 am	40	28	328
06.45 - 07.00 am	38	25	366
07.00 - 07.15 am	30	30	396
07.15 - 07.30 am	45	33	441
07.30 - 07.45 am	32	26	473
07.45 - 08.00 am	22	22	495
08.00 - 08.15 am	54	20	549
08.15 - 08.30 am	44	23	593
08.30 - 08.45 am	25	18	618
08.45 - 09.00 am	24	24	642
09.00 - 09.15 am	25	16	667
09.15 - 09.30 am	31	17	698
09.30 - 09.45 am	38	19	736
09.45 - 10.00 am	30	27	766
10.00 - 10.15 am	27	33	793
10.15 - 10.30 am	25	26	818
10.30 - 10.45 am	14	17	832
10.45 - 11.00 am	25	27	857
11.00 - 11.15 am	23	27	880
11.15 - 11.30 am	14	23	894
11.30 - 11.45 am	11	21	905
11.45 - 12.00 pm	12	22	917
Total	917	594	

In Table 1 explains the total volume of motorcycles that enter the basung area of Saturday Badung market, 29 June 2019 is 917 vehicles. Following is an example calculation to get the parking volume table above:

Volume = Ei + X (Vehicle)

where: Ei = Entry (vehicles entering the parking location)

X = Existing vehicle

Volume: previous / existing vehicle + incoming vehicle

: 228 + 35 = 263, 263 + 25 = 228 and so on

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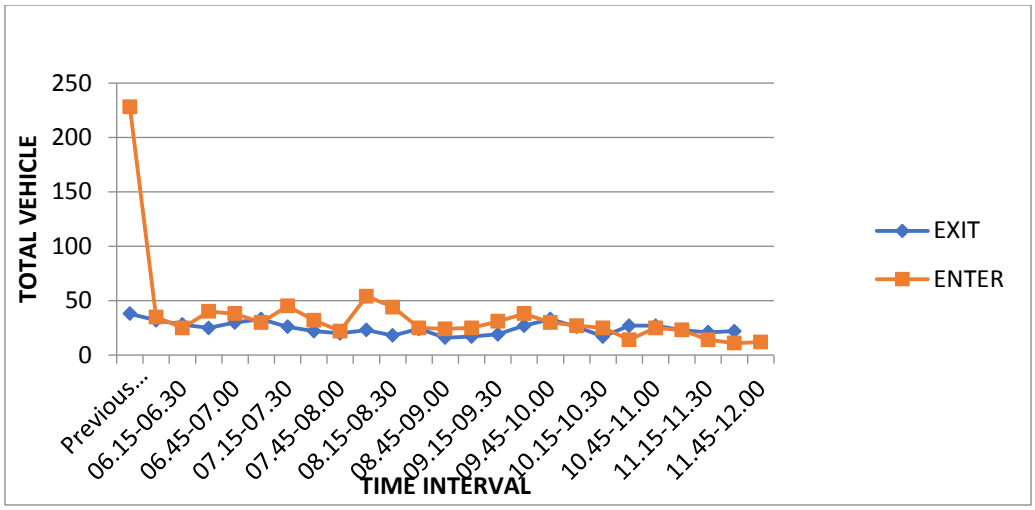

Figure 1: Graph of Motorcycle Parking Volume in the Basement Parking Area, Saturday 29 June 2019

From the picture Graph 1 explains the peak volume of motor vehicles entering the basement area occurred in the morning at 08.00 - 08.15 wita as many as 54 vehicles and the peak volume of motor vehicles leaving the basement area occurred in the morning at 06.00 - 06.15 wita as many as 38 vehicles.

Parking Accumulation

Based on survey data of peak parking volume on Saturday, June 29, 2019, the calculation of the accumulation of motorcycle drivers can be seen in Table 2 and Figure 2.

Table 2: Data from the Calculation of Motorcycle Parking Accumulation in the Area Basement, Saturday 29 June 2019

Survey Time	Parking 15 Menit		Accumulation
	Enter	Exit	
Previous Vehicle	228		228
06.00 - 06.15 am	35	38	225
06.15 - 06.30 am	25	32	218
06.30 - 06.45 am	40	28	230
06.45 - 07.00 am	38	25	243
07.00 - 07.15 am	30	30	243
07.15 - 07.30 am	45	33	255
07.30 - 07.45 am	32	26	261
07.45 - 08.00 am	22	22	261
08.00 - 08.15 am	54	20	295
08.15 - 08.30 am	44	23	316
08.30 - 08.45 am	25	18	323
08.45 - 09.00 am	24	24	323
09.00 - 09.15 am	25	16	332
09.15 - 09.30 am	31	17	346
09.30 - 09.45 am	38	19	365
09.45 - 10.00 am	30	27	368
10.00 - 10.15 am	27	33	362
10.15 - 10.30 am	25	26	361
10.30 - 10.45 am	14	17	358
10.45 - 11.00 am	25	27	356
11.00 - 11.15 am	23	27	352
11.15 - 11.30 am	14	23	343
11.30 - 11.45 am	11	21	333
11.45 - 12.00 pm	12	22	323
Total	917	594	

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In Table 2 describes the latest accumulation of motorcycles that entered the basung area of Saturday badung market, June 29, 2019 was 323 vehicles. Following is an example calculation to get the parking accumulation table above:

Accumulation = X + Ei - Ex (Vehicle)

Where : Ei = Entry (Vehicle entering the parking location)

Ex = Exit (vehicle leaving the parking location)

X = Existing vehicle

Accumulation = X + Ei - Ex

= 228 + 35 - 38 = 225

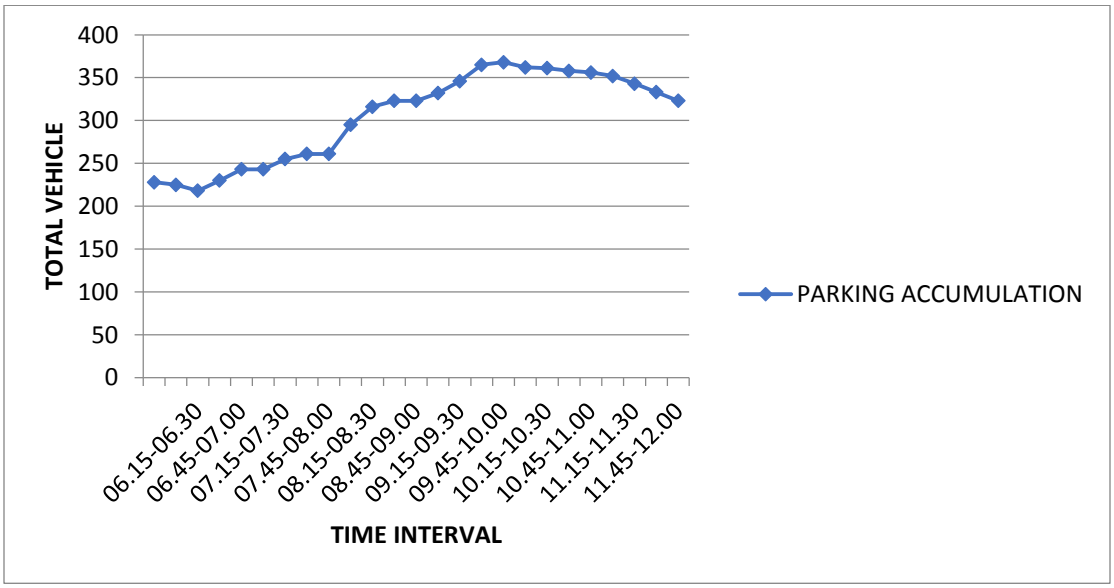

Figure 2: Graph of Accumulation of Motorcycle Parking in the Basement Area, Saturday, June 29, 2019

From Figure 2, explaining the most accumulation of vehicles entering the basement parking market Badung Friday occurred at intervals 09.45 - 10.00 Wita as many as 368 vehicles

Average Parking Duration

Based on motorcycle parking duration data, the average motorcycle parking duration is 1.07 hours, with calculations:

Obtained $\sum$di = 32:14 hour

N = 30

Then: D = (32:14 hours) / 30 = 1.07 hours.

Parking Duration

Parking duration is a time vulnerable to a vehicle parked somewhere (in units of minutes or hours), which can be

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seen in Table 3.

Table 3: Data on Motorcycle Parking Duration in the Basement Area, Saturday 29 June 2019

No	Police Number	Time		Parking Duration
		Enter	Exit	
1	DK 5188 ZE	06:05	07:20	01:15
2	DK 3927 DS	06:37	07:47	01:10
3	DK 5261 BG	06:57	08:12	01:15
4	DK 7384 CQ	07:07	08:10	01:03
5	DK 2074 UAH	07:26	08:10	00:44
6	DK 6097 BA	07:26	08:11	00:45
7	DK 4187 CS	07:28	08:10	00:42
8	DK 8048 DDD	07:28	08:26	00:58
9	DK 5440 OO	07:28	08:47	01:19
10	DK 3871 ABK	07:39	09:12	01:33
11	DK 8928 GJ	07:39	08:47	01:08
12	DK 2169 LP	07:43	09:10	01:27
13	DK 4653 ABP	07:46	09:10	01:24
14	DK 2573 AG	07:54	08:54	01:00
15	DK 4535 IW	07:58	08:43	00:45
16	DK 5444 OX	07:59	09:10	01:11
17	DK 7398 HE	08:04	09:20	01:16
18	DK 3136 DP	08:14	09:46	01:32
19	DK 4640 AAH	08:18	09:12	00:54
20	DK 6752 AD	08:22	09:47	01:25
21	DK 2331 IP	08:24	09:12	00:48
22	DK 6680 ABD	08:25	09:50	01:25
23	DK 6624 SU	08:26	09:18	00:52
24	DK 3639 ZD	08:27	09:12	00:45
25	DK 2397 ZE	08:28	09:56	01:28
26	DK 3735 AU	08:34	09:25	00:51
27	DK 7951 AL	08:35	09:43	01:08
28	DK 4301 OC	09:11	09:55	00:44
29	DK 8686 BO	09:18	09:55	00:37
30	DK 3134 IY	09:25	10:15	00:50
Total				32:14

Turn Over Parking

To get the value of the turnover of motorcycle parking by analyzing the volume data and survey data on the measurement of the parking area, a value of 3 vehicles/parking lot is obtained, with calculations

Obtained: $\sum n = 917$ vehicles

R = 381 parking lots

Then: To = 917/381 = 2.40 ~ 3 vehicles / parking lots

Parking Capacity

Parking capacity by analyzing survey data duration and survey data on parking area measurements, amounting to 357 vehicles with calculations

Obtained: D = 1.07 hours

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S = 381 parking lot

Then: Kp = 381 / 1.07 = 356.07 ~ 357 vehicles

Parking Space Capacity

Parking space capacity by analyzing the data obtained from the survey results of the entry and exit of vehicles and the average parking length data, with calculations:

Data: Y = 917 vehicles

T = 6 hours

D = 1.07 hours

Then Z = (917 x 1.07) / 6 = 163.53 ~ 164 SRP / hour

So the motorcycle parking space capacity of 164 SRP / hour

Parking Supply

Parking supply by analyzing the average parking length data and the number of parking stalls available can be calculated:

Data: S = 381 parking lots

Ts = 6 hours

D = 1.07 hours

F = 0.85 - 0.95 used 0.90

Then: PS = ((381 x 6) / 1.07) x 0.90 = 1,922.80 ~ 1,923 Vehicles

So the supply of motorcycle parking is 1,923 vehicles

Parking Index

Parking index by analyzing the parking accumulation data and the number of stalls available, i.e. the maximum accumulation divided by the number of vehicle stalls available and multiplied by 100%, with calculations

Data: Max accumulation = 323 vehicles

R = 381 Motor

Then: IP = (323/381) X 100% = 84.77% <100% (Safe)

So the motorcycle parking index is 84.77% <100% (Safe)

Parking Space Needs

Parking space requirements by analyzing parking volume data, average parking length data and reduction factors due to parking changes, with the calculation:

Data: N = 917 vehicles

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T = 6 hours

D = 1.07 hours

F = 0.85 - 0.95 used 0.90

Then: S = (917 x 1.07) / (6 x 0.90) = 181.70 ~ 182 parking lots

IV. CONCLUSION

Based on the data analysis, it is found how the conditions and problems that occur in the motorcycle parking area in the Badung Market basement, namely:

1. The peak volume of motorcycle parking on Saturdays from 06.00 - 12.00 wita totaling 917 vehicles.
2. Maximum parking accumulation for motorbikes is 368 from 09.45 - 10:00
3. Parking Duration and Average Parking Duration for Motorbikes is 32.14 hours, with an average parking time of 1.07 hours.
4. Substitution of parking for motorbikes is 20 minutes per 1 (parking lot) of 3 vehicles/parking lot/hour,
5. Parking capacity for motorbikes as many as 357 vehicles, there are 381 parking lots turned out to have a capacity of 357 vehicles per hour.
6. The capacity of motorcycle parking spaces is 164 SRP / hour, but in the Badung market basement parking area, there are 381 motorcycle parking lots. This states the condition of the parking space has not experienced problems
7. The supply of motorcycle parking was 1,923 vehicles.
8. Motorcycle parking index: 84.77% <100% (Safe). Indicates the condition of the Badung market basement area is still safe and has not experienced problems.
9. The need for motorcycle parking for 182 parking lots

SUGGESTION

1. Provide parking attendants at each parking location to help tidy up the parked vehicles so that the provision of parking spaces becomes more effective.
2. It is best to have clear parking signs so that no vehicles are parked at an improper location.

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