IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)
e-ISSN: 2278-1684,p-ISSN: 2320-334X, Volume 15, Issue 6 Ver. I (Nov. - Dec. 2018), PP 70-77
www.iosrjournals.org

The Comfortable Level in Using Parking Circulation Space on the Road Side

Nurmaidah[1],Rina Saraswaty[1],Irwan[1], Ida Deliyarti Agustina[2]
[1]*Lecturer in Medan Area University (UMA), Medan, Indonesia*
[2]*Lecturer in Al Azhar University, Medan, Indonesia*
Corresponding Author: Nurmaidah

Abstract: *More of parking area user choose to park their vehicles on street than on the determined parking area that cause the less of road facilities. This research aims to find the parking characteristics and the comfortable using of on street parking in a certain area. The location of research is the area of urban village of Pasar Baru, sub district of Medan Kota, Medan municipality. The method of research is a field survey that enable in collect the required primary data. Survey was conducted in a week in order to collect the secondary data through interview to the parking area management to obtain the information about parking system. The data is processed by data tabulation and correlated to the literature study. The conclusion of the data compilation and results of analysis i.e. the parking characteristics (parallel pattern, perpendicular, in edge and irregular pattern), transportation mode (four wheel vehicles and motorcycle), visiting time, visiting target, parking area (sideroad/on street, any and duration of parking) and duration time to have a parking area has a higher duration. The characteristics of comfortable parking area (the service of parking operator to the retribution tariff and the sanitation of the parking area). The uncomfortable of parking area to the safety during parking, easiness to get parking lot, easiness to get out from parking lot, the easiness to arrive in shopping area, service of parking operator, the parking condition that did not ideal, the available parking pattern, traffic flow, circulation for people walk by foot, maximum accumulation of parking in the day and the parking index number over the normal capacity.*

Keyword: *level of comfortable, parking characteristic; street parking*

Date of Submission: 17-11-2018 Date of acceptance: 04-12-2018

I. Introduction

One of the main roads in Medan city which is part of the road side used for parking vehicles is Pasar Baru area. In the area of *Kelurahan* Pasar Baru is the wholesale and retail trade center, There are processes of rising and falling of goods along the road happened every day. The Sideroad of the Pasar Baru Village area with a 10-meter road benefit area can be traversed by 3 vehicles. Parking area provided is only one line. But, because of the parking space is very limited while the number of parking space is very large so that 2 road lines are used as parking area. There are 5 intersections in Pasar Baru village, where the traffic flow goes to Palangkaraya street. All vehicle flows (one way) enter to Palangkaraya street (except Bogor street and Bandung street). The effect of the accumulated traffic flow on Palangkaraya street and also with the road side used for parking make the chaos of traffic increase, has problems namely how parking characteristics in Pasar Baru village and how the level of comfortableness in using the parking area on the road of Pasar Baru village area, the aim of this study was to find the characteristics of parking in the Pasar Baru area and find the level of comfortableness in using parking spaces on the road side in the area. The data processing method uses SPSS 17.

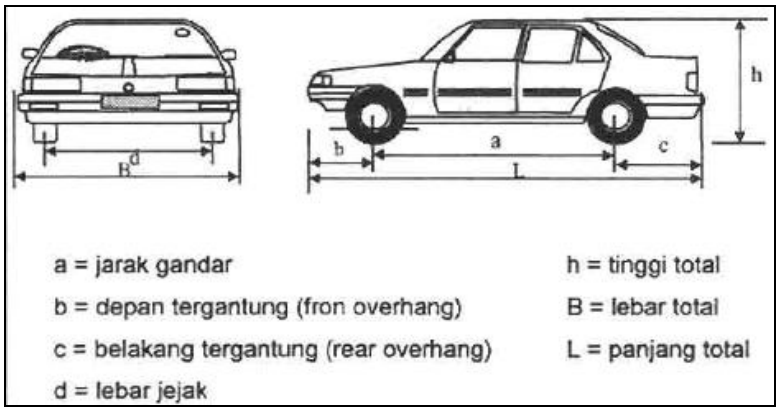
II. Review Of Literature

2.1 Definition of Parking

Definition of parking according to Warpani (1990), parking is a temporary stopping of the vehicle at the end of the destination. Parking space is a place that has enough space to place one vehicle when the vehicle is not being used for a while, and the area includes circulation and the maneuver. Vehicle stopping places are temporary and in relatively short time such as to raise and lower the passengers, or to unpack goods. However, there are also vehicles that stop for a relatively long time, for example for shopping activities, to the office, to school and other activities, so that parking is needed for vehicles that will stop.

2.2 Parking Facility Standard

To design a parking facility, information is needed about the dimensions of vehicle and behavior of the driver (forward or backward parking maneuvers) relating to the SRP layout which includes: parking angle, stall width, aisle width, and vehicle circulation direction.



Source: Directorate General of Land Transportation (1998)

Figure 1. Dimension variable of vehicles that affect the layout of parking spaces.

Table 1. Parking Space Unit Standards

Type of Space Unit Vehicle	Parking (m2)
Passenger Car for Group I	2,30 x 5,00
Passenger Cars for Group II	2,50 x 5,00
Passenger Cars for Group III	3,00 x 5,00
Bus / Truck	3,40 x 12,50
Motorcycle	0,75 x 2,00

Source: Directorate General of Land Transportation (1996)

Based on rough calculations, each vehicle is considered to be at home for 10 hours/day, work place 5 hours/day, on the road 6 hours/day, in a parking lot 3 hours/day (Warpani, 1990). If the vehicle is parked on a road, then it has wasted about 20 m2 of road surface and disrupted the smooth traffic.

2.3 Provision of Parking

Parking problems are a matter of space requirements. Provision of space in the city is limited to the area of the existing city and land use. Procurement of parking lots confiscates a large part of the city area because the parking lot requires a large space. The use of itself is not necessarily full but depends on crowded hours (Warpani S. 1985). Market activity is uncontrolled due to lack of parking area for visitors whose needs are not expected. If the necessary is unfulfilled, the easiest target is the roadside.

2.4 Parking Placement

Based on the method of placement and in daily operations according to Pignataro (1979), parking facilities are distinguished such as on-street parking and off-street parking.

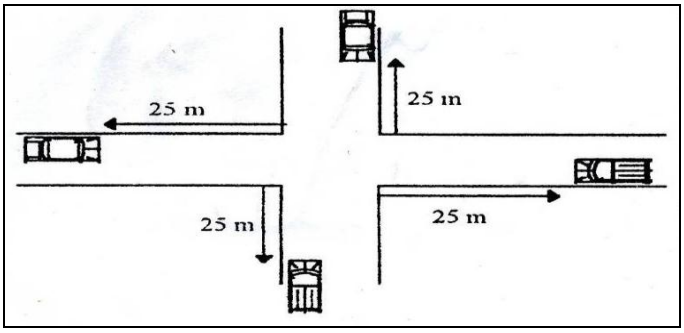
Desire for parking facilities

Traffic Agent	Wishes
Individual (parker)	Free, easily reach their destination
Store owner (parking)	Easy packing and unpacking
Public transportation	Satisfied the buyer
Good Vehicle	Dedicated, separate to be safe
Moving vehicle	to go up and down the passengers
Employer park (Parkers)	Easy to get in and out to keep travel schedule
Experts in traffic	Easy pack and unpack
	Can park lined up if necessary
	Free parking without obstacles
	Free parking
	Parking lots are always full
	High parking frequency
	Serving every road user
	Seek smooth traffic

Source : Warpani (1990)

2.5 On-Street Parking

This type of parking is often also called curb parking. On-street parking is on-street parking facilities (Guidelines and Parking Planning and Operations, BSLLAK Directorate, 1999). Basically this type of parking utilizes part of the road body (generally the local road subsystem walk) both on the sides and on both sides. The extent of the need for parking lots depends on a number of key things, namely the number of vehicles expected to park at that time (capacity of the yard) and parking angle.



Source: Abu bakar (1998), Parking procedures for the intersection

Minimum width of one-way secondary local roads for parking on the road side

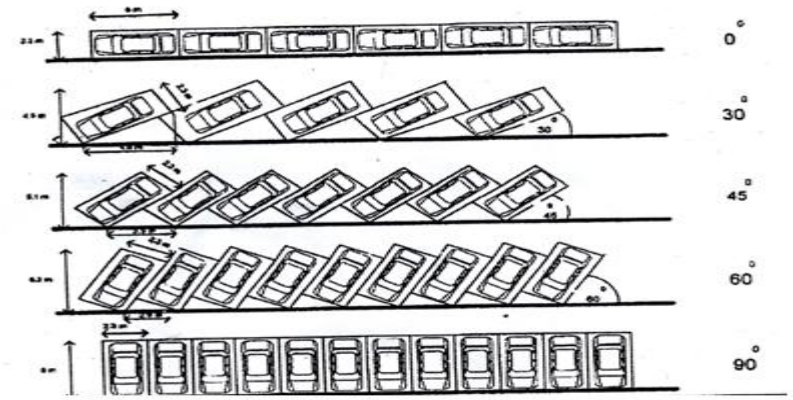
Parking Criteria					One Way		Two Ways	
Parking angle	Wide parking space A (m)	Effective Parking Space D (m)	Manuver's room M (m)	D+M-J (m)	Effective road width (m)	The total of road width (m)	Effective road width (m)	The total of road width (m)
0	2,3	2,3	3,0	2,8	2,5	5,3	5,0	7,8
30	2,5	4,5	2,9	4,9	2,5	7,4	5,0	9,9
45	2,5	5,1	3,7	6,3	2,5	8,8	5,0	11,3
60	2,5	5,3	4,6	7,4	2,5	9,9	5,0	12,4
90	2,5	5,0	5,8	8,3	2,5	10,8	5,0	13,3

Description J = width reduction in maneuvering space (2.5 m)
Source: Directorate General of Land Transportation, 1998

Parking pattern

a. Parallel parking pattern
b. Angled parking pattern

1. Width of parking space, effective parking space and maneuvering space apply to collector roads and local roads.
   2. Width of parking space, effective parking space and different maneuvering space based on the large parking angle as presented 300.45o, 60o, 90o and parallel to the road body.



2.6 Parking Comfort Level

According to Warpani (1985), the desire of individual traffic players (parking users) is free parking facilities and easily reach the destination. Safe and comfortable in this case also safe from accident, free from disturbances both external and internal, manifest calm and enjoyment on the way. Following are the criteria to be used (Warpani, 1985):

a. Signage: Information for parking users starting from an empty parking space information board, a direction symbol to a map.
b. Ease of parking users: access from parking locations to shopping centers and vice versa in the form of roads, stairs, sidewalks to umbrella borrowing to reach the parking lot when it rains.
c. Aesthetics: the attraction of supporting parking facilities, such as material selection, landscape, design to art patterns.
d. Cleanliness: maintained parking facilities.
e. Ease of parking of vehicles: Ease of obtaining a parking space and ease of parking parking design in maneuvering vehicles.
f. Security: design of parking building facilities with natural supervision, supporting lighting, patrol and emergency alarms.
g. Access for people with disabilities: the application of parking standards and pedestrian facilities for people with disabilities.
h. Rates and length of parking: the effect of parking rates on user convenience and the tendency of parking

According to Cutler (1982) there are several things that become direction in determining the level of comfort for designing the activity of parking space users also for pedestrian activity, namely:

a. Ease of circulation in the trade center
b. Ease of dealing with the trade center
c. Safety and security both day and night with good lighting and supervision

2.7 Regional Characteristics

The streets in Pasar Baru Village area have generally been paved with good conditions. The width of the road with a two-way current is greater than the width of the road that has a direct current. All roads that encircle the main road have currents that accumulate towards one road, namely Jalan Palangkaraya. Only Jalan Bandung and Jalan Bogor are two-way flows.

Road conditions of the research area

No	Street's name	Road length (m)	Road shoulder (m)		Width road (m)
			Left	Right	
1	Palangkaraya	350	1,5	1,5	9
2	Palangkaraya Baru	60	1,0	1,0	6
3	Bandung	60	2,0	2,0	8
4	Jember	60	2,0	2,0	5
5	Jalan Natal	80	1,0	1,0	5
6	Bogor	60	1,5	1,5	7
7	Kotanopan 1	60	1,0	2,0	5
8	Kotanopan 2	60	1,0	1,0	5
9	Pakantan	30	1,0	1,0	5

III. Discussion

3.1 Characteristics of parked comfort level

For the comfort level of the research location, look at aspects such as security, convenience, parking attendant service when entering and exiting parking locations, parking space standards, cleanliness of parking spaces, parking restriction, parking patterns and traffic comfort. The results obtained are as follows:

Parking level comfort characteristics

No	Statement	Answer					Total
		Very good	Good enough	Good	Not good	Bad	
1	Security during parking	3	15	16	45	21	100
2	Ease of getting parking	1	2	15	39	43	100
3	Ease of getting in and out for parking	0	27	15	52	6	100
4	Ease of reaching a shopping place	0	5	15	45	35	100
5	Parking Space Standards	0	13	16	69	2	100
6	Parking space cleanliness	16	18	30	28	8	100
7	Parking attendant service at the	8	15	20	39	18	100

	beginning of parking						
8	Parking attendant at the end of the parking service	18	17	52	8	5	100
9	Parking restriction	19	17	40	19	5	100
10	Parking patterns provided	1	8	34	27	30	100
11	Traffic comfort	0	0	15	62	23	100
12	Pedestrian space	0	0	17	38	45	100

Source: Survey results

3.2 Analysis of the level of comfort of parking

No	Statement	Answer (%)	
		Pessimists	Optimistic
1	Security during parking	34	66
2	Ease of getting parking	18	82
3	Ease of entry and parking	42	58
4	Ease of reaching shopping place	20	80
5	Parking Space Standards	29	71
6	Cleanliness of parking space	64	36
7	Parking attendant service at the beginning of parking	43	57
8	Parking attendant service at the end of parking	87	13
9	Parking restriction	76	24
10	Parking patterns provided	43	57
11	Traffic comfort	15	85
12	Pedestrian space	17	83

Source: Survey results,

Accumulated parking on Palangkaraya street

Time	Passenger Car	Box car	Motorcycle	Number
07.00-08.00	48	10	55	113
08.00-09.00	57	11	89	157
09.00-10.00	65	15	101	181
10.00-11.00	68	15	130	213
11.00-12.00	69	11	122	202
12.00-13.00	79	11	132	222
13.00-14.00	85	17	155	257
14.00-15.00	81	8	145	234
15.00-16.00	53	7	129	189
16.00-17.00	43	8	86	137
17.00-18.00	56	9	71	136
18.00-19.00	32	11	65	108

3.3 Comfort Relationship During Parking With Parking Patterns And Parking Space

Analyze Crosstab comfort during parking with parking patterns and parking spaces

Space for parking area				Parking Pattern				Total
				Parallel	Straight up	Angular,	Insignificant	
Parking space	Comfort during parking	Very good	Count	5	0			5
			% of Total	17.2%	.0%			17.2%
		Good enough	Count	7	0			7
			% of Total	24.1%	.0%			24.1%
		Good	Count	7	10			17
			% of Total	24.1%	34.5%			58.6%
	Total		Count	19	10			29
			% of Total	65.5%	34.5%			100.0%
Sidewalk/ roadside	Comfort during parking	Good	Count		2	0		2
			% of Total		14.3%	.0%		14.3%
		Not good	Count		6	6		12
			% of Total		42.9%	42.9%		85.7%
	Total		Count		8	6		14
			% of Total		57.1%	42.9%		100.0%
Road side	Comfort during parking	Not good	Count			30	0	30
			% of Total			75.0%	.0%	75.0%
		Bad	Count			6	4	10

			% of Total	15.0%	10.0%	25.0%
	Total		Count	36	4	40
			% of Total	90.0%	10.0%	100.0%
Any place	Comfort during parking	Bad	Count		17	17
			% of Total		100.0%	100.0%
	Total		Count		17	17
			% of Total		100.0%	100.0%

Source: SPSS 17 analysis results

3.4 Analyze Chi-square comfort during parking with parking patterns and parking space

Space for parking area		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Parking lot	Pearson Chi-Square	10.774[a]	2	.005		
	Likelihood Ratio	14.328	2	.001		
	Linear-by-Linear Ass.	8.621	1	.003		
	N of Valid Cases	29				
Sidewalk / shoulder road	Pearson Chi-Square	1.750[b]	1	.186		
	Continuity Correction[c]	.304	1	.581		
	Likelihood Ratio	2.486	1	.115		
	Fisher's Exact Test				.473	.308
	Linear-by-Linear Ass.	1.625	1	.202		
	N of Valid Cases	14				
Road side	Pearson Chi-Square	13.333[d]	1	.000		
	Continuity Correction[c]	9.259	1	.002		
	Likelihood Ratio	12.546	1	.000		
	Fisher's Exact Test				.002	.002
	Linear-by-Linear Ass.	13.000	1	.000		
	N of Valid Cases	40				
Any place	Pearson Chi-Square	.[e]				
	N of Valid Cases	17				

a. 4 cells (66,7%) have expected count less than 5. The minimum expected count is 1,72.

b. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,86.

c. Computed only for a 2x2 table

d. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 1,00.

e. No statistics are computed.

3.4 Comfort Relationship During Parking With Parking Patterns And Parking Length

Analyze Crosstab comfort during parking with parking patterns and later use parking

The duration of using parking				Parking Pattern				Total
				Parallel	Perpendicular	Corner	Careless	
< 30 minutes	Comfort during parking	Very good	Count	4				4
			% of Total	100.0%				100.0%
	Total		Count	4				4
			% of Total	100.0%				100.0%
30 - 60 minutes	Comfort during parking	Very good	Count	1	0			1
			% of Total	6.3%	.0%			6.3%
		Good enough	Count	7	0			7
			% of Total	43.8%	.0%			43.8%
		Good	Count	7	1			8
			% of Total	43.8%	6.3%			50.0%
	Total		Count	15	1			16
			% of Total	93.8%	6.3%			100.0%
60 - 90 minutes	Comfort during parking	Good	Count		11	0		11
			% of Total		40.7%	.0%		40.7%
		Good enough	Count		6	10		16
			% of Total		22.2%	37.0%		59.3%

	Total		Count	17	10	27
			% of Total	63.0%	37.0%	100.0%
> 90 minutes	Comfort during parking	Good enough	Count	26	0	26
			% of Total	49.1%	.0%	49.1%
		Bad	Count	6	21	27
			% of Total	11.3%	39.6%	50.9%
	Total		Count	32	21	53
			% of Total	60.4%	39.6%	100.0%

3.5 Analyze Chi-square comfort during parking with parking patterns and the length of time using parking

The duration of using parking		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
< 30 minutes	Pearson Chi-Square	.[a]				
	N of Valid Cases	4				
30 - 60 minutes	Pearson Chi-Square	1.067[b]	2	.587		
	Likelihood Ratio	1.453	2	.484		
	Linear-by-Linear Association	.853	1	.356		
	N of Valid Cases	16				
60 - 90 minutes	Pearson Chi-Square	10.919[c]	1	.001		
	Continuity Correction[d]	8.403	1	.004		
	Likelihood Ratio	14.424	1	.000		
	Fisher's Exact Test				.001	.001
	Linear-by-Linear Association	10.515	1	.001		
	N of Valid Cases	27				
> 90 minutes	Pearson Chi-Square	33.493[e]	1	.000		
	Continuity Correction[d]	30.321	1	.000		
	Likelihood Ratio	42.570	1	.000		
	Fisher's Exact Test				.000	.000
	Linear-by-Linear Association	32.861	1	.000		
	N of Valid Cases	53				

a. No statistics are computed because comfortableness during parking are constants.

b. 4 cells (66,7%) have expected count less than 5. The minimum expected count is ,06.

c. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 4,07.

d. Computed only for a 2x2 table

e. 0 cells (,0%) have expected count less than 5. The minimum expected count is 10,30.

Analyze Chi-square comfort during parking with parking patterns and later get parking

The length of time to get parking		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
< 2 minutes	Pearson Chi-Square	.[a]				
	N of Valid Cases	5				
2 - 5 minutes	Pearson Chi-Square	5.250[b]	1	.022		
	Continuity Correction[c]	3.241	1	.072		
	Likelihood Ratio	7.325	1	.007		
	Fisher's Exact Test				.047	.030
	Linear-by-Linear Association	5.000	1	.025		
	N of Valid Cases	21				
5 - 10 minutes	Pearson Chi-Square	18.312[d]	1	.000		
	Continuity Correction[c]	13.842	1	.000		
	Likelihood Ratio	16.697	1	.000		
	Fisher's Exact Test				.000	.000
	Linear-by-Linear Association	17.922	1	.000		
	N of Valid Cases	47				
> 10 minutes	Pearson Chi-Square	.[e]				
	N of Valid Cases	27				

a. No statistics are computed because convenience during parking and parking pattern are constants.

b. 3 cells (75,0%) have expected count less than 5. The minimum expected count is 2,33.

c. Computed only for a 2x2 table

d. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 1,17.

e. No statistics are computed because comfort during parking is a constant.

IV. Conclusion

The comfort relationship during parking with parking patterns and parking space by parking the vehicle takes a long time (5-10 minutes), there is no circulation space due to crowded parking placement. Convenience relationship during parking with parking patterns and length of parking is obtained, there is no accessibility to circulation and there is no circulation space due to crowded parking placement

REFERENCES

[1]. Abubakar, Iskandar., dkk, 1998, *Pedoman Perencanaan dan Pengoperasian Fasilitas Parkir, Direktorat Bina Sistem Lalu Lintas dan Angkutan Kota*, Dirjen PerhubunganDarat, Jakarta\

[2]. American Association of State Highway and Transportation Officials, 1992, *Guide or The Design Of Park And Ride Facilities*

[3]. Dirjen Perhubungan Darat, 1998, Pedoman Perencanaan dan Pengoperasian Fasilitas Parkir. Direktorat Perhubungan Darat, Departemen Perhubungan, 1998

[4]. Tamin, O. Z., dkk, 1999, *Pengaruh Kegiatan Perparkiran di Badan Jalan terhadap Kinerja Ruas Jalan*. Studi kasus di DKI Jakarta. Jurnal Transportasi, FSTPT, No 1 Tahun 1.

[5]. Warpani, S., 1985, *Rekayasa Lalu Lintas*, Bharata Karya Aksara, Jakarta

[6]. Warpani, S., 1990, *Merencanakan system Perangkutan*, Bharata karya Aksara, Jakarta

Nurmaidah. "The Comfortable Level in Using Parking Circulation Space on the Road Side." IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) , vol. 15, no. 6, 2018, pp. 70-77.