Analysis of Recreational Carrying Capacity of Urban Parks and Urban Forests in DKI Jakarta Province

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Abstract

Green Open Space (GOS) in the Capital Special Area (Daerah Khusus Ibu Kota/DKI) Jakarta, both in the form of urban park and urban forest has very important function for recreation or any other greening function. In term of recreation & tourism, one of the most important arrangement aspect in GOS management is the carrying capacity (CC), which is not only important to be acknowledged in order to enforce the aspects of sustainability, but also important to be managed well to reach customer satisfaction aspects. Therefore, by using purposive sampling methode there have been done a series of research about the carrying capacity of three GOS, namely urban park (Taman) Suropati (well established area), urban forest-park (Taman Hutan Kota/THK) Honda-Tebet (established area), and THK Penjaringan (less established area); specifically related to physical carrying capacity aspect and psychologycal carrying capacity aspect. Primary data retrieval is done by direct measuring of recreational space usage (for the physical CC/PCC) and by spreading the closed-ended questionnaires instrument (for the psychology CC/CFp) that data adopted the One Score One Indicator Criteria Scoring System. The result of study shows that at the three GOS's the CFp take an important role to reduce the PCC significantly range from 78% up to 92% to become its real carrying capacity (RCC).

Keywords: carrying capacity; green open space; urban forest; urban park.

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1. Introduction

Green Open Space (GOS) has a very significant role in various benefits for urban communities in the vicinity. Various benefits from GOS (urban parks/urban forests) include recreation, noise control, wind breaking, carbon sinks, and aesthetic value [9]. States that the existence of natural resources in urban environments can provide benefits for recreation, health and relaxation, and for social interaction [32], said that the benefits of urban forests are 1) social benefits 2) architectural and aesthetic benefits 3) micro-climate regulators benefits, and 4) ecological and economic benefits [19]. States that the use of urban forests for recreational purposes is common in Europe. In Sweden, around 55% of tourists visiting the forest choose to visit urban forests for recreational purposes, while in France between ¼ and ½ forest tourists choose to visit urban forest areas in the Greater Paris Region each year.

DKI Jakarta at present, only has 9.98% of green open space from its total area; in the form of urban parks, environmental parks, interactive parks, public parks, recreation parks, green lines, funerals and urban forests, around 9.98% of the total area. Whereas according to Law Number 26 of 2007 concerning Spatial Planning an urban area must have the most GOS a little 30% of the total area. Among the 9.98% of open green space, there are currently more than 8 urban parks [12] also more than 15 urban forests [13].

The existence of green open space, especially urban parks and urban forests in big cities has become a demand for modern life that wants a more fresh and natural atmosphere and for the aesthetics of urban areas. In addition, a urban parks and urban forests is also needed to fulfill various humanitarian needs for urban population; including to spend leisure time or leisure time where they are free to do other activities after various existence and subsistence activies are fulfilled [1]. In line with the very low availability of urban parks and urban forests at this time in DKI Jakarta, the various risks of negative impacts are certainly very potential to occur; including negative impacts due to exceeding the carrying capacity limit [5]. State that utilization of urban forests that exceed their carrying capacity will cause crowding, conflicts between visitors, decrease in environmental quality and ultimately reduce the quality of visitor satisfaction.

Several studies and theories related to carrying capacity [25, 17, 11, 30] prove that the implementation of tourism activities that do not pay attention to the carrying capacity of the environment will have a negative impact. Whereas, from the psychological side, the number of visitors who are uncontrolled can cause overcrowding within objects, causing conflicts of use of space which can reduce the quality of experience from visitors [22]. In addition, the number of visitors who exceed the manager's service capacity can also reduce the quality of tourist experience [33]. So, if the psychological carrying capacity is exceeded, it can cause a negative response that decreases the quality of the environment and produces a new lower carrying capacity [26].

Based on the various things described above, it is considered important to conduct a study of the physical and psychological carrying capacity of recreational activities in green open space located in the DKI Jakarta Province; especially urban parks and urban forests. The research aimed to analyze the carrying capacity of urban parks and urban forests recreation, namely through the process of analysis of physical carrying capacity (PCC) and psychological carrying capacity, to then determine the real carrying capacity (RCC).

2. Methodology

2.1 Location and Time of the Research

The research location has been determined by the Purposive Sampling Method, which represents the criteria: a) well established area: Taman Suropati, b). established area: THK Honda-Tebet), and c) less established area: THK Penjaringan. The researcher determined the location criteria for the study to be carried out by dividing of the study area into 3 area types based on: a) administrative aspects and/or functional aspects and regional systems of spatial structures and spatial patterns that have a range of services at the regional level; b) the city center is considered as an area that has the most expensive land prices with the highest accessibility, c) land value patterns; from the city center to the edge of the city has decreased, d) integrated urban growth spread from the city center to the edge of the city as a complex unity of urban systems with the formation of specialization and differentiation of space in its growth process. With reference to: i) definition of the area according to Article 1 paragraph 17 and paragraph 18, Law No. 26 of 2007 that territory is a space which is a geographical entity along with all related elements whose boundaries and systems are determined based on administrative aspects and/or functional aspects and regional systems are spatial structures and spatial patterns that have a range of services at the regional level, ii) opinions of [24] that based on land use patterns, the city center is considered as an area that has the most expensive land prices with the highest accessibility and according to iii) [7] the pattern of land values from the city center to the suburbs has decreased, meanwhile iv) [16] with the Multiple Nuclei Theory, said that mostly large cities do not grow only as simple areas so that they are only represented by one activity center but continue to develop in an integrated manner spreading from the city center to the edge of the city separately as a complex urban system which is characterized by the formation of specialization and differentiation of space in its growth process.

This research was conducted for 5 months, which included: 1) initial survey, 2) data collection for 2 (two) weeks in October 2018 to November 2018, sampling of respondents (visitors) was carried out in 2 (two) types of visit days, namely weekdays (between Monday to Friday) and week-ends (Saturday and Sunday), 3) processing and analysis of data.

2.2 Data Collection

The stages of the study consisted of: 1) analyzing the needs of the activity space in the urban parks and urban forests, 2) analyzing the physical carrying capacity (PCC), 3) calculating the psychological correction factor (CFp), 4) analyzing the real carrying capacity (RCC). The psychological correction factor is obtained from the intersection between the curve of the number of visitors and the level of visitor satisfaction calculated from the CSI value (Customer Satisfaction Index). Retrieving data on the intensity of visitor satisfaction at various levels of density is done through the distribution of questionnaires designed to determine visitor perceptions of the influence of the density of visitors with satisfaction scores. The questionnaire used was close-ended which was designed by adopting the One Score One Scoring System Method [1] which has a range of scores from 1-7 which are ascendent.

The number of sample size of respondents per period of visit refers to Roscoe's suggestion (1982) in [29] which states that if the sample is divided into categories, then the number of sample members in each category is at least 30 respondents. Sampling of respondents (visitors) was carried out in 2 (two) types of visit days, namely weekdays (between Monday to Friday) and week-ends (Saturday and Sunday). Calculations are carried out in 4 periods of time sharing, namely period 1 (at 04.00 WIB - 10.00 WIB), period 2 (10.00 WIB - 16.00 WIB), period 3 (16.00 WIB - 22.00 WIB), and period 4 (22.00 WIB - 04.00 WIB). The number of sampling periods is adjusted to the operational time of 3 research sites, where Taman Suropati operates for 24 hours while THK Honda - Tebet and THK Penjaringan operate at 04.00 WIB - 22.00 WIB. Thus the total number of respondents taken was 600 respondents.

2.3 Data Analysis

Analysis of recreational carrying capacity includes: a) physical carrying capacity (PCC), b) psychological carrying capacity, c) real carrying capacity (RCC). The dynamics of visitor behavior include: a) visit pattern, b) variety of activities, and c) satisfaction level.

2.3.1 Physical Carrying Capacity

Determination of PCC is done through measuring the wide availability of space for activities, space requirements per person in each type of activity, and turn over factors. The equation for calculating PCC according to the modified [10] as seen in Formula (1).

Formula 1. Physical Carrying Capacity Calculation Formula

$$PCC = A \times 1\!/\!B \times C \qquad (1)$$

PCC   : Physical Carrying Capacity

A   : Effective area

B   : Space requirements per person in each type of activity (m^2/person)

C   : Turn Over Factor

Effective area of site (A) is obtained from the reduction of the total area with an area that is not used for tourism activities (management offices, toilets, etc.). Space requirements per activity (B) are obtained from direct measurements when observing the use of space by visitors when engaging in related sites activities. Value of Turn Over Factor (TOF) or often referred to as Rotation Factor, is obtained from the results of overlaying graphs of the dynamics of incoming and outgoing visitors.

2.3.2 Psychological Carrying Capacity

Determination of Psychological Carrying Capacity is calculated by determining the meeting point of the curve

of the number of visitors with a visitor satisfaction curve; where the meeting of the two curves is to illustrate the coefficient of influence of visitor density on visitor psychology [2]. The coefficient then becomes a correction factor from the calculation of the real carrying capacity (RCC). The level of visitor satisfaction was obtained from distributing questionnaires designed to determine visitor perceptions of 10 (ten) aspects of important values that influence the level of visitor satisfaction. The level of visitor satisfaction is then calculated using the Customer Satisfaction Index (CSI) method which is useful to determine the level of overall visitor satisfaction by looking at the importance of the attributes of the product or service.

2.3.3 Real Carrying Capacity

Real carrying capacity is determined by using formulas as seen in Formula (2). The formula is a refinement of the Cifuentes Formula [10]. The CFp is measured through a formula as seen in Formula (3).

Formula 2. Real Carrying Capacity Calculation Formula

$$RCC = PCC - (PCC (1 - CFp)) \qquad (2)$$

PCC   : Physical Carrying Capacity

CFp   : Psychological Correction Factor

Formula 3. Correction Factor Psychology Calculation Formula

$$CFp = \frac{ML}{MT} \times 100\% \qquad (3)$$

ML   : Magnitude limitation

MT   : Total Magnitude

3. Results and Discussion

3.1 General Profile of Three Research Locations

Taman Suropati, an urban park located at Taman Suropati Street, Neighborhood Association (RT) 5/ Citizens Association (RW) 5, Menteng, Central Jakarta 10310, DKI Jakarta Province . It has a total area of 16,570.16 m^2, area of grass 9,153.09 m^2 (not allowed to be stepped on), plant area ornamental 906.88 m^2, the number of trees 308 trees, the majority of them are Trembesi (*Samanea saman*) and Mahogany (*Swietenia macrophylla*). The area of plaza/pavement is 3,371.44 m^2, the area of the Security and Management Office and the bathroom (there are 2 rooms) 50 m^2. Administratively, as GOS Taman Suropati is an urban park that is open to the public for 24 hours and without an entrance ticket/unpaid.

THK Honda - Tebet has a total area of 22,518,00 m^2, the area of grass is 7,385.60 m^2 (may be trampled), the number of trees is 1,180 trees with the dominant species consists of Trembesi (*Samanea saman*), Spathodea

(*Spathodea campanulata*), Flamboyan (*Delonix regia*), Cemara (*Casuarina spp*), Mahogany (*Swietenia macrophylla*), the area of ornamental plants 2,318.14 m^2, the width of the pavement/plaza 2,035.05 m^2, the area of the the Security and Management Office, the Mosque and the Bathroom (there are 2 booths) 100 m^2. Located at Tebet Timur Raya Street, No. 10 RT 10 / RW 10, Tebet Timur, South Jakarta, DKI Jakarta Province. Inaugurated by Governor Fauzi Bowo in 2013. As GOS, THK Honda-Tebet administratively is an urban park that is open to the public for 24 hours and without an entrance ticket/unpaid. However, in its operations this urban forest has been emptied/sterilized from visitors starting at 22.00 WIB - 4.00 WIB by reason of maintaining the location of criminal acts and immorality. THK Honda - Tebet is restricted from highways with iron fences overgrown with vines and has 2 gates 24-hour guarded entrances which are locked at 22.00 WIB and reopened at 4.00 WIB.

THK Penjaringan has a total area of 30,587.34 m2, the area of grass is 28,209.92 m^2 (may be trampled), the number of trees is 4,000 trees consisting of the species of Leda (*Eucalyptus deglupta)*, Trembesi (*Samanea saman*), Spathodea (*Spathodea campanulata*), Flamboyan (*Delonix regia*), Yang Liu *(Salix babylonica)*, Mahogany (*Swietenia macrophyla*), Wine sea (C*ocoloba uvifera)*, Thevetia (*Thevetia ahouai*) the area of pavement/plaza is 1,859.42 m^2, the area of the the Security and Management Office, Terrace, Mosque along with the bathroom (there are 4 booths) 118 m^2. The THK Penjaringan is located in Penjaringan, North Jakarta (adjacent to Kali Jodo), DKI Jakarta Province.

As GOS, administratively THK Penjaringan is an urban forest that is opened to the public for 24 hours and without an entrance ticket/no fee. In its operations, this urban forest was opened only for 18 hours/day because it was emptied/sterilized from visitors starting at 22.00 WIB - 4.00 WIB, to guard the location from criminal and immoral. The THK Penjaringan location has 2 entrances which are locked at 22.00 WIB and reopened at 4.00 WIB and is maintained for 24 hours and is limited by a high iron fence overgrown with vines as a barrier to the surrounding area. The three GOS locations above are managed by DKI Jakarta Provincial Forestry Service.

3.2 Profile and Activities of Respondents

Respondents who visited urban parks and urban forests in DKI Jakarta in general,were balanced between visitors who were male and female.

Most of the respondents are single (not married), which is around 67.32%. Respondent education was dominated by visitors with a high school level of 51.13% followed by undergraduate and diploma levels. Meanwhile, the type of work is dominated by students and private workers with 37.92% and 38.98% respectively. Respondents who visited the urban parks/urban forests on their own were only around 20%, the rest, around 80% came with friends or in groups (Table 1).

The results of field observations show there are 5 main activities carried out by visitors to the urban parks and urban forests in DKI Jakarta, namely: a) sitting (maximum two people), b) playing, c) sports, d) gathering (minimum three people), and e) photography. The sports activities they do are classified as recreational sports, namely badminton, jogging, gymnastics, and taekwondo.

Gathering activities are the dominant activities, which is around 59%, while the activities that are rarely performed are playing, which is only about 4.4%. Gathering activities are social interaction activities in the form of mutual discussion and conversation. The gathering activities were carried out by visitors who came from more than 3 people.

Social activities are the great demand beside recreational sports activities by visitors, especially during weekends. The most common type of exercise is jogging. The variety of activities of visitors to the urban park and urban forests at the study location can be seen in Table 2.

Table 1: Profile of visitor respondents

Atribut	Variabel	Taman Suropati (n = 240)	THK Honda - Tebet (n = 180)	THK Penjaringan (n = 180)	Average
Gender	L, n = 312	50.00	49.44	57.22	52.22
	P , n = 288	50.00	50.56	42.78	47.78
Marital Status	(a) Single, n = 401	62.50	73.89	65.56	67.32
	(b) Married, n = 199	37.50	26.11	34.44	32.68
Education	(a) Elementary	0.00	1.11	2.78	1.30
	(b) Junior High School	1.68	18.89	5.00	8.52
	(c) Senior High school	41.18	50.00	62.22	51.13
	(d) Diploma	16.39	11.11	8.33	11.94
	(e) Bachelor	39.92	18.89	21.67	26.83
	(f) Others	0.84	0.00	0.00	0.28
Occupation	(a) Student	27.08	45.56	41.11	37.92
	(b)Government Employees	10.42	4.44	3.89	6.25
	(c) Private Employees	42.50	33.89	40.56	38.98
	(d) TNI/Polri	1.25	0.00	0.00	0.42
	(e) Teacher/Lecturer	4.17	3.89	2.22	3.43
	(f) BUMN/BUMD	7.50	1.67	2.78	3.98
	(g) Others/Unemployeed	7.08	10.56	9.44	9.03
Monthly Income	(a) < 1 million	12.93	39.89	22.91	25.24
	(b) 1-2,5 million	21.12	15.17	26.82	21.04
	(c) 2,5-5 million	40.09	33.15	37.99	37.08
	(d) 5-7,5 million	20.26	8.99	9.50	12.92
	(e) 7,5-10 million	4.31	1.69	2.79	2.93
	(f) > 10 million	1.29	1.12	0.00	0.80
Visit Pattern A. Weekday	(1) Come alone	18.94	17.26	25.13	20.44
	(2) With friends	22.46	25.36	24.83	24.22
	(3) With family	15.73	16.26	14.70	15.56
	(4) 3-5 persons	15.89	16.12	12.11	14.71
	(5) 6-10 persons	13.53	12.86	11.42	12.60
	(6) >10 persons	13.45	12.14	11.81	12.47
B. Weekend	(1) Come alone	16.34	16.61	20.03	17.66
	(2) With friends	23.28	23.77	24.08	23.71
	(3) With family	15.95	15.85	16.09	15.96
	(4) 3-5 persons	16.76	16.46	15.71	16.31
	(5) 6-10 persons	14.50	13.86	13.12	13.83
	(6) >10 persons	13.17	13.46	10.96	12.53

Table 2: Types of activities in the three research sites

Activity	Taman Suropati		THK Honda - Tebet		THK Penjaringan		Average of Percentage (%)
	Number	Percentage (%)	Number	Percentage (%)	Number	Percentage (%)	
Social Activity							
• Sitting	992	23.78%	638	26.56%	66	30.41%	26.92%
• Playing	556	13.33%	0	0.00%	0	0.00%	4.44%
• Gathering	2,145	51.43%	1,651	68.73%	129	59.45%	59.87%
• Photographed	478	11.46%	113	4.70%	22	10.14%	8.77%
Recreational Sports							
• Badminton	290	9.57%	118	11.71%	10	7.53%	7.53%
• Jogging	1,545	50.99%	735	72.92%	688	71.48%	71.48%
• Taekwondo	160	5.28%	110	10.91%	0	5.40%	5.40%
• Gymnastics	1,035	34.16%	45	4.46%	62	15.59%	15.59%

Reference [4] States that the purpose of visitors visiting city forests in Lobau City, Vienna, Austria and Nopporo City, Japan is to: 1) sports and health, 2) enjoy natural scenery and 3) for recreation. For city forests in Nopporo, visitor motivation tends to be in the context of family gatherings or family and relations activities. Whereas the aspects of sports and health and recreation are less dominant in the urban forests of Nopporo.

Activities in urban forests in terms of the form of tourism visiting, Reference [4] states that the majority of visitors in the Lobau City Forest of Vienna, Austria, use bicycles (47%), and pedestrians (40%). Whereas in Nopporo city forests, Japan, almost 80% of visitors are pedestrians, then cyclists, joggers and dog carriers. The end comes to the city forest alone or together with his partner in the urban forest the city of Nopporo, Japan is found by group.

The mode of transportation of visitors to urban forests is generally 4-wheeled vehicles or cars. The use of bicycles to get to the urban forest is more prevalent in the forests of Austrian Vienna, while in Nopporo Japan visitors generally come by foot.

3.3 Physical Carrying Capacity

Reference [1] Explains that in addition to specific space and time, determining the value of a carrying capacity must also be specific to the type of activity carried out, so that the approach to assessing carrying capacity on a site cannot be equated with other sites. Details of the pattern of space requirements observed during the study are shown in **Table 3** and **Table 4**.

Table 3: Patterns of Space Needs per Recreational Activity

No	Activity	Taman Suropati		THK Honda -Tebet		THK Penjaringan	
		Number of people	Area of use (m^2/person)	Number of people	Area of use (m^2/person)	Number of people	Area of use (m^2/person)
1	Sitting	638	0.7871	992	1.1660	66	1.1903
2	Playing	0	-	556	1.7102	0	-
3	Gathering	1,651	0.9311	2,145	1.4585	129	2.5082
4	Photography	113	0.9615	478	1.8982	22	1.9585
Average			0.8943		1.4729		2.0516

Several communities are that regularly hold meetings or gathering at Taman Surapati such as the keepers of Snake Boa, Squirrel keepers, community of artists//film/book readers). The similar conditions at THK Honda - Tebet also THK Penjaringan, in these sites are also several communities that regularly come here for gathering.

Table 4: Patterns of Space Needs Per Recreational Sport Activity

Research Locations	Recreational Sport Activity	A	B	1/B	C			PCC
					OperationalTime	Length of visit	TOF	
Taman Suropati	Badminton	82	20.5	0.049	24	1	24	96
	Jogging	600	3	0.333	24	2	12	2,400
	Taekwondo	120	3	0.333	24	2	12	480
	Gymnastics	120	4	0.250	24	1	24	720
								3,696
THK Honda – Tebet	Badminton	82	20.5	0.049	18	1	18	72
	Jogging	1,000	3	0.333	18	2	9	3,000
	Taekwondo	150	3	0.333	18	2	9	450
	Gymnastics	3,600	4	0.250	18	1	18	16,200
								19,722
THK Penjaringan	Badminton	82	20.5	0.049	18	1	18	72
	Jogging	1,620	3	0.333	18	2	9	4,860
	Taekwondo	105	3	0.333	18	2	9	315
	Gymnastics	210	4	0.250	18	1	18	945
								6,192

Description: A = effective area of site; B = area of use (m^2/person); C = how to determine TOF

The pattern of activity space on average, needs obtained above can be said to be at least 1.47 times greater than the assumption that space requirements are widely used by other researchers in various places. The researchers used the assumptions of the Cifuentes formula [10], which stated that the need for space for outdoor recreation is 1 m^2 per person. In Indonesia, Reference [18,27] use the assumption that activity space needs are 1 m^2 per person, whereas in other countries namely Honduras, [20] also uses the assumption of space requirements of 1 m^2 per person. However, in the study of outdoor recreational carrying capacity, Reference [34] used the assumptions of 5 m^2 and 10 m^2 and [23] use the assumption of space requirements of 4 m^2 per person [2]. States that the simplification process is valid, but it is very biased and ends up not implementable.

TOF or often referred to as RF, show the results of the study that the size of TOF in the three study sites was different, namely 8 hours in Taman Suropati, 5.5 hours in THK Honda - Tebet, and 5.5 hours in THK Penjaringan. The pattern of dynamics of incoming - outgoing of visitors that underlies the determination of the TOF value can be seen in **Figure 1**.
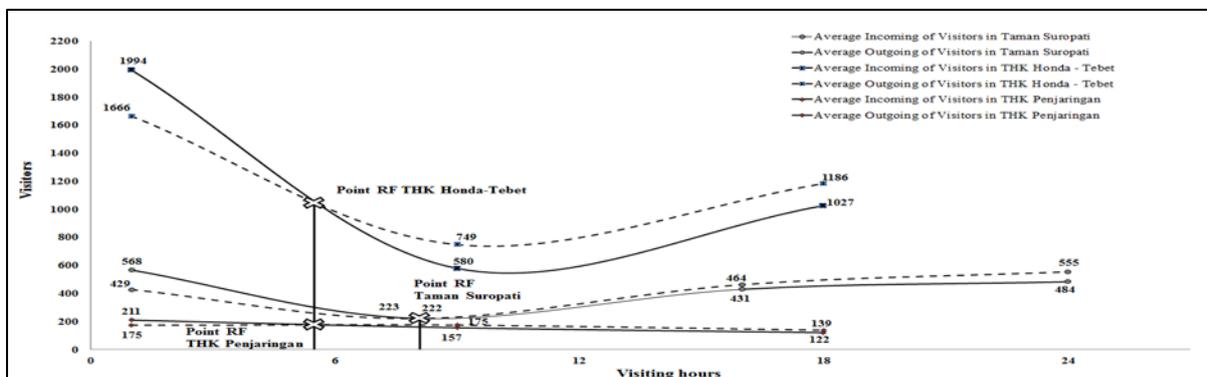

Figure 1: Incoming & Outgoing of Visitors in 3 Research Locations

See **Tabel 5**, in there we can see the results of calculation for effective area. For all of that, the results of physical carrying capacity calculation are as can be seen in **Table 6.** If the values in **Table 6** are added to the physical carrying capacity of recreational sports (**Table 4**), the physical carrying capacity of Taman Suropati will be as many as 24,335 people/day, at THK Honda Tebet as many as 61,762 people/day, and at THK Penjaringan as many as 37,249 people/day.

Tabel 5: The Results of Calculation for Effective Area

Research Locations	Taman Suropati	THK Honda - Tebet	THK Penjaringan
Total area	16,570.00	22,518.00	30,587.00
Tree area	308.00	1,180.00	4,000.00
Building area	50.00	100.00	118.00
Area that is not used	10,060.00	2,318.14	7,000.00
Effetive Area	6,152.00	18,920.00	19,469.00

Area of grass at Taman Suropati is not allowed to be stepped on. There are different conditions at THK Honda – Tebet and THK Penjaringan, in these sites area of grass is allowed to be stepped on. Here, The visitors sit and gather on the area of grass freely.

Table 6: The Results of Calculation of Physical Carrying Capacity

No	Research Locations	A	B	C			PCC
				Length of Operational	RF points	C	
1	Taman Suropati	6,152	0.8943	24	8	3,0000	20,639
2	THK Honda - Tebet	18,920	1.4729	18	5.5	3,2727	42,040
3	THK Penjaringan	19,469	2.0516	18	5.5	3,2727	31,057

Description: A = effective area of site; B = area of use (m^2/person); C = how to determine TOF

3.4 Real Carrying Capacity Recreational

CFp are obtained by knowing the Importance Performance Analysis (IPA). Table 7 below shows in Taman Suropati there are 2 criteria which have the highest satisfaction value and the most important are atmospheric aspects of activities (5.33 & 5.60) and aspects of microclimate (5.21 & 5.56). Whereas in THK Honda - Tebet and THK Penjaringan there are only 1 criteria that has the highest satisfaction value and the most important is the atmospheric aspects of activities (5.10 & 5.62).

Table 7: Research Importance Performance Analysis

No	Criteria/Aspects	Taman Suropati		THK Honda – Tebet		THK Penjaringan		Average	
		Satisfied	Important	Satisfied	Important	Satisfied	Important	Satisfied	Important
1	Ecological	4.89	5.39	4.68	5.42	4.44	5.63	4.67	5.48
2	Social Contact	4.86	5.25	4.70	5.22	4.46	5.48	4.67	5.32
3	Atmospheric Activities	5.33	5.60	5.21	5.59	4.75	5.66	5.10	5.62
4	Micro Climate	5.21	5.56	4.88	5.62	4.62	5.67	4.90	5.62
5	Recreational Activities	4.91	5.42	4.99	5.54	4.47	5.54	4.79	5.50
6	Security and Safetyness	4.62	5.45	4.85	5.68	4.17	5.59	4.55	5.57
7	Supporting Facilities	4.93	5.44	4.81	5.59	4.63	5.72	4.79	5.58
8	Suppoting Economic	4.51	5.23	4.16	5.21	3.38	5.46	4.02	5.30
9	Comfortness	4.99	5.37	4.93	5.50	4.70	5.73	4.88	5.53
10	The Sensitivity of Activities	5.00	5.44	4.89	5.53	4.63	5.73	4.84	5.57

The results of CSI calculations on weekdays in Taman Suropati are 69.72%; which turned out to be smaller than the weekends value of 71% (**Table 8**). This indicates that visitors feel more satisfied if the park is more crowded. According to [35], these dynamics are an indicator of the presence of social contact motivation in Taman Suropati; where in this study it was also seen from the high motivation of visitors to get social contact during recreation, about 4.78. The same conditions are also found in THK Penjaringan which have CSI values 61.70% on weekday and CSI worth 64.75%, on weekends, with motivation scores 4.98. This is in line with the value of respondents' motivation in terms of social contact. According to [22] tourist satisfaction is closely related to the density of visitors who are psychologically interpreted by tourists as the greater the chance of social contact. Details of the CSI values obtained in the three research sites can be seen in **Table 8**.

Table 8: Research Customer Satisfaction Index

No	Location	*Weekdays*	*Weekends*
1	Taman Suropati	69.72%	71.00%
2	THK Honda – Tebet	69.82%	67.75%
3	THK Penjaringan	61.70%	64.75%

Reference [3] Revealed that visitor groups that are tolerant of crowded conditions generally have the motivation to visit urban forests for recreational purposes, not for the purpose of being calm in a quiet place. Furthermore, visitors who come in groups or at least more than two people will be more tolerant of the crowd conditions [6]. Reported that the density of visitors in the Austrian forest of Austria and Nopporo Japan generally occurs on holidays (holidays), for conditions of weekdays or weekends not too crowded. Whereas [14,4] state that the condition of visitor density in Central European urban forests on Sunday (Sunday) is the condition with the highest density compared to normal days (working days). This is due to the high busyness of the working day while on Saturdays the condition of visitor density is between weekdays and Sundays [5]. State that visitor activity in urban forests on a typical day is in order to jogging and healthy walk (with dogs). Visitors to urban forest on weekdays in general are those who have the habit of walking healthy every day and have more knowledge about the conditions of the surrounding environment.

The CSI value at THK Honda - Tebet at weekdays (69.82%) is more than the weekend CSI value (67.75%); which means the value of visitor satisfaction is higher if the urban forest is not too crowded. The value of visitors' motivation to get social contacts during recreation, about 4.6 [15]. States that urban forests can function as a place to isolate themselves from the hustle and bustle of city life and feel tired after work. It was stated that the urban forest was able to provide a relatively less crowded atmosphere but on the other hand was also a medium for mutual social contact with fellow visitors. The challenge faced by managers is how to provide a condition of memorable and comfortable recreational experiences for users of urban forest areas or visitors. On this basis, information is needed about how much the area is used for visitors and the variety of behavior of visitors.

The problem of the social conditions of visitors to urban parks/urban forests that are often of concern to researchers is the problem of overcrowding of visitors in urban parks/urban forests area, causing crowding. Crowding conditions will reduce the satisfaction of visitors who are motivated to visit the urban parks/urban forests in order to find peace. As for the visitors whose motivation is to increase social interaction, looking at people and family gathering activities actually want the situation of visitors to busy urban forests [6]. The level of recreational satisfaction in the forest besides being influenced by the level of intensity of space use is also influenced by conflicts between visitors, visitor behavior, the size of visitors who come in groups, the direction of visitor movements, and the distance between visitors in the urban forest [6,3].

The various CSI values mentioned above can be said to be no different from the CSI values found by several other researchers in Indonesia [28]. Obtained a CSI value of 71.9% in the type of low visits, 70.3% in the type of visit condensed visits, and 69.3% in the type of visit peak visits at the Cimanggu TWA [21]. Obtained a CSI score of 71.2% for low visits, 69.6% for condensed visits, and 71.4% for peak visits in Matahari Tourism Park, Cisarua, Bogor. Although the various CSI values are generally comparable, but in line with the recreational activities in the various research locations related to being unpaid like the research locations of the 2 other academics mentioned above, it should be realized that the CSI value in this study is not influenced by the cost-risk aspect [8, 31]. stated that visitor satisfaction will be influenced by the amount of the cost that must be spent to access a recreational site. The various CSI values described above can be said that the carrying capacity of psychology analysis process is carried out as shown in **Figure 2** below. The carrying capacity of psychology is calculated by determining the meeting point of the curve of the number of visitors with a visitor satisfaction curve; where the meeting of the two curves is to illustrate the coefficient of influence of visitor density on visitor psychology [2]. The calculation of all the variables needed in determining RCC, furthermore in line with this study the RCC value obtained is as shown in **Table 9**. For that matter, it can be said also that overall the three real carrying capacity of the research locations is 13,256 visitors/day.

Table 9: Real Carrying Capacity at Taman Suropati, THK Honda - Tebet and THK Penjaringan

No	Locations	PCC	Phsycological Carrying Capacity					RCC
			MT	ML			CFp	
				Optimum Value	(5)-(4)			
(1)	(2)	(3)	(4)	(5)	(6)		(7)	(8)
1	Taman Suropati	24,335	5,100	5,548	448		8.78%	2,138
2	THK Honda –Tebet	61,762	5,900	6,578	678		11.49%	7,097
3	THK Penjaringan	37,249	2,566	2,843	277		10.80%	4,021

Source: Processed results of researchers

MT: Total Magnitude (number of variable sizes / ideal size)

ML: Magnitude limitation (limiting the size of the variable, namely the difference between the conditions of the field with the ideal size)
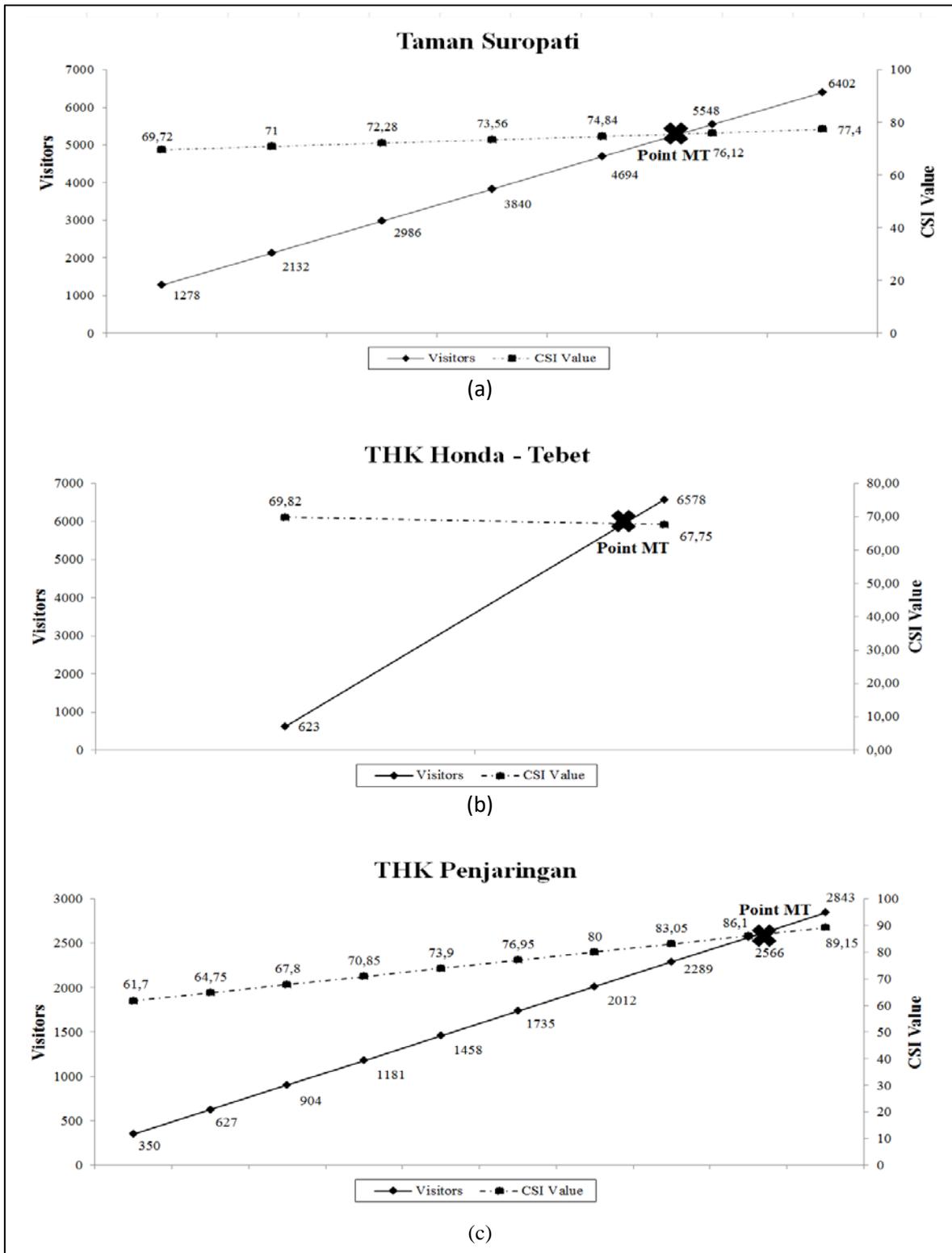
Figure 2: Psychological Correction Factors in Three Research locations: (a) Taman Suropati; (b) THK Honda - Tebet; (c) THK Penjaringan

The value of the correction factor of Psychological Support (CFp) to determine the final value of Real Carrying Capacity on the three research locations on average is 10.35% [34] uses the value of the social-cultural supporting Correction Factor in determining the final value of the real carrying capacity of coastal attractions at Praia de Faro Potugal. The value of the correction factor in the study at the beach tourism object uses an analysis of the perception of the density of visitors to the photography method, with the results of a very small correction factor which is around 0.42% - 1.69%. The very small condition of the correction factor will eventually reduce the physical carrying capacity which is very significant. This condition is in accordance with the allegations of [1] which states that the more correction factors used and expressed in percent it will not give a correction effect at all. Recognizing that a carrying capacity value is very specific to the space, time, type of activity and intensity of management applied, the magnitude of the value of the different carrying capacity of the three research sites is inadequate and/or not comparable to one another. However, on the one hand it can generally be said that currently the number of visits that occur at THK Honda Tebet and THK Penjaringan is still below the RCC value generated in this study; whereas the number of visits that took place in Taman Suropati had exceeded the RCC value obtained in this study.

The method of determining Real Carrying Capacity by means of direct calculation in the field gives results that are close to reality compared to using the method of analyzing the use of space using photo media. The number of visitors who exceed the limits of their carrying capacity will certainly reduce the level of visitor satisfaction. The relationship between the number of visitors and the level of satisfaction can be used to predict the optimal point of the ability of a space to accommodate a number of visitors which can then be used to determine the real carrying capacity of its real capabilities.

The novetly in this research is the finding of the actual value of space requirements per person in each type of activity (m^2/person) that determined not by the assumption, yet by direct measurement. Some studies that use the assumption of 1 m^2 for basic activities in recreation are considered still very low. The average number of space requirements per person for recreational in urban park and urban forest was 1.46 (m^2/person) that more wider with the assumptions.

The various results described above are multiplied by the range of visitors' motivation in recreation on the three research sites as seen in **Table 10.**

It can be said that: a) the scheme for managing the three GOSs is necessary to be further enhanced in a more massive manner so as to meet the various motivations of visitors. For the record, various facilities and facilities currently available in the three research sites must be said to be classified as not yet optimal in terms of sensitivity, as well as security and safety; b) almost the homogeneity of the intensity of motivation will tend to give rise to the value of carrying capacity that is very dynamic over time.

For this reason, research on carrying capacity in various urban parks/urban forests needs to be repeated regularly; that is at least 3 years.

Table 10: Intensity of Motivation of Visitors in all three research sites

	Taman Suropati	THK Honda – Tebet	THK Penjaringan
Ecological aspects of the park	9.85%	9.67%	9.86%
Aspects of social contact	9.99%	9.66%	10.09%
Asmopheric aspects of activities	10.21%	10.32%	10.07%
Aspects of micro climate	10.03%	10.00%	9.97%
Aspects of recreational activities- carried out	10.04%	10.06%	10.14%
Security and safety aspects	10.01%	9.96%	10.17%
Aspects of supporting facilities	9.99%	10.03%	9.87%
Supporting economic aspects	9.71%	9.95%	9.74%
Comfort Aspects	10.26%	10.29%	10.07%
Sensitivity aspects	9.90%	10.05%	10.02%

Considering the various observations during the research for further is considered necessary to be raised is the need to organize the urban parks/urban forests as a daily recreation place for the elderly and persons with disabilities. During the study, almost no visible population of elderly and disabled people seemed to participate in the recreation of the three sites.

4. Conclusion and Suggestion

4.1 Conclusion

The characteristics of visitors and recreational activities in Taman Suropati, show the results of the study that the carrying capacity of psychology this urban park has reduced its PCC by 91.22%, which is from 24,335 people/day to 2,138 people/day. As for THK Honda-Tebet, the PCC value has been reduced by the carrying capacity of psychology by 88.51%, which is from 61,762 people/day to 7,097 people/day; where for the THK Selection of PCC has been reduced by 89.20% (from 37,249 people/day to 4,021 people/day). The intensity of the reduction value that occurs from the carrying capacity of psychology in each associated green open space can be used as an important indicator of the high quality of recreational needs of the visitor population. Overall, the RCC of the three GOSs is 13,256 people/day; where the value is equivalent to 2,976 people/day/ha-sites. In

general, it can be said that currently the number of visits that occur at THK Honda Tebet and THK Penjaringan are still below the RCC value generated in this study; while the number of visits that took place in Taman Suropati had exceeded the RCC value obtained in this study.

4.2 Suggestion

This study, is still limited to Taman Suropati, THK Honda -Tebet and THK Penjaringan, so a similar study should be conducted in other urban parks/urban forests around DKI Jakarta. This is not only necessary as a form of management performance evaluation, but also necessary for the planning process of improving urban parks recreational services and urban forests for the people of DKI Jakarta in the future. In addition, it is also important to study the distribution pattern and acreage of urban forest and parks, which are sufficient to fullfil the wider community's demand for the parks.

5. Constraints/Limitation

The constraints that encountered during the research was the measurement of space requirements per person in each type of activity (m^2/person). It is underlined that the space requirements per person did not based on assumtion as Cifuentes mentioned, but was determined by direct measurenment. Furthermore, It was difficult to distinguish visitors that were incoming and outgoing in the urban park and urban forest. The study of recreational carrying capacity at the urban forest in DKI Jakarta Province did not conducted in national holiday (only in weekday and weekend), whereas it is possible that at that time the carrying capacity is absolutely over capacity.

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