Review of the rising and attaching movement at subdistrict of Kemang, Parung and Ciseeng in Bogor district

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Received February 5, 2021 | Accepted April 3, 2021 | Published September 20, 2022

ABSTRACT

The average level of vehicle ownership, number of students, working population, number of schools and the average family income can cause an increase in movement in the form of generation and attraction. The rise and pull of traffic on land use, especially in the Districts of Kemang, Parung and Ciseeng is one of the problems that often causes traffic jams during busy times in the morning and afternoon. To overcome these problems, the author opens an analysis of the generation and pull of the movement of traffic flow. The land use that will be analyzed to predict trip generation and attraction, namely the Hospital, Housing, Shopping Center, Office, Industry and Education Areas (SD, SMP and SMA/SMK/Private and Non-Private), while the classification of roads used are Arterial and Collectors located in Parung Subdistrict, Kemang Subdistrict and Ciseeng Subdistrict. Analysis of roads using 2017 MKJI and prediction of generation with ITE (Trip Generation Manual) and modeling with Saturn applications. Looking at the Existing Conditions at the study site for road network data, it can be concluded that the level of service at each entrance in the categories C and D, which means the value of C is a stable current and D is an unstable starting flow. The large number of trip generation and attraction at the study sites in three sub-districts namely Ciseeng, Parung and Kemang Subdistricts which included the education area, trading center or market, parks, and hospitals had a generation of 9,140 trip/hour and a Tug of 29,404 trip/hour. The design equation for transportation modeling in Ciseeng sub-district, Parung and Kemang is Y = 94,565 + 1,015 (X).

Keywords: generation and attraction; land use; service of level; existing; unstable.

INTRODUCTION

Ciseeng District has 10 villages with a population of 151,674 people / km2 and Parung District has 9 villages with a population of 54,696 people / km2 is a sub-district of Bogor Regency which is directly connected to Bogor City by being crossed by a main road that connects West Java Province with Banten Province and the province. DKI Jakarta. The sub-district is also an area with a fairly rapid development development, this is marked by the existence of development in all fields, such as the development of modern markets, construction of regional buildings, construction of shops and improvements in other facilities.

The average level of vehicle ownership, the number of students / students, the working population, the number of schools and the average family income can cause an increase in movement in the form of generation and attraction. The generation and attraction of traffic in land use, especially in the Districts of Kemang, Parung and Ciseeng, is one of the problems that often causes traffic jams at busy times in the morning and afternoon. To solve this problem, the writer needs an analysis of the generation and attraction of traffic flow movements.

Travel facilities carried out in the study area, allow vehicles and people to always move. The movement of people and goods along with the consequences of the pattern of travel of people and goods as well. Someone will move according to the planning that is done so that the planning will be successful according to the context that is carried out (Syaiful S, Rusfana H, 2022; Syaiful S et.al, 2022; Syaiful S, Pratama Y, 2019).

Understanding the movement of people will have a big influence on a person's behavior. This behavior depends on the form adapted to the current situation. People will travel with a clear purpose. The purpose of the trip must be carried out as planned. The destination area must also

pISSN 2302-4240
eISSN 2655-2086
Volume 11, Issue 3, October 2022, pp.490-496
DOI: http://dx.doi.org/10.32832/astonjadro.v11i3 http://ejournal.uika-bogor.ac.id/index.php/ASTONJADRO

have been determined in advance, so that the trip takes place without significant obstacles (Syaiful S, Hariyadi D, 2019; Syaiful S et.al, 2020; Syaiful, Fadly A, 2020).

The movement of people will affect future travel. So it will demand a clear and directed path. This path affects the surface hardness and clear shape in terms of the surface traversed. The journey of people and goods is determined by how much influence is significant. This influence is related to the road conditions above. So that the better the path traversed, the faster people will reach their destination. On the other hand, the more uneven the road, the longer the journey (Syaiful S et.al, 2021; Syaiful S et.al, 2022; Syaiful S, Lasmana L, 2020).

Flow and Traffic Volume

The value of traffic flow (Q) reflects the composition of traffic by expressing the flow in units of light vehicles (SKR). All traffic flow values are converted into light vehicle units (SKR) using the empirically derived light vehicle equivalent (EKR) for the following vehicle types (MKJI, 2017):

1. Light vehicles (KR), including passenger cars, minibuses, pick-up trucks and jeeps,

2. Heavy vehicles (KB), including trucks and buses, and

3. Motorcycle (SM).

The traffic volume shows the number of vehicles that pass through one observation point in one time unit (days, hours, minutes). The amount of traffic volume is shown in equations (1) and (2).

V (vehicle/hour) = KR + KB + SM.....(1)

V (smphour) = (KR x ekr) + (KB x ekr) + (SM x ekr)……...(2)

with:

V = raffic Volume

KR = light vehicle,

KB = heavy vehicles, motorized vehicles with more than 4 wheels (including buses, 2 axles trucks, 3 axles trucks and combination trucks), and

SM = motorcycles, motorized vehicles with 2 or 3 wheels (including motorbikes and 3-wheeled vehicles).

The ekr size for undivided urban roads is shown in Table 1. Source: MKJI (2017)

Table 1. The amount of EKR in urban roads

Road type One way road and divided road	Traffic flow per lane	EKR	EKR
	(vehicle/hour)	KB	SM
(2/1)	0	1,3	0,40
(4/2T)	1050	1,2	0,25
(6/2T)	1100	1,2	0,25

Service of Level

Service level is a quantitative and qualitative measure that describes traffic operational conditions (MKJI, 2017). Can be seen in table 2.

Table 2. Road service levels

Level of Service	FVBUK City Size Factor	V / C Scope Limits
A	Free traffic flow conditions with high speed and low traffic volume.	0,00 – 0,20
B	The flow is stable, but the operating speed is starting to be limited by traffic conditions	0,20 – 0,44
C	The current is stable, but the speed and motion of the vehicle are controlled	0,45 – 0,74
D	The current is close to stable, the speed can be controlled, V / C can still be tolerated	0,75 – 0.84
E	Flow unstable speed sometimes stops, demand is close to capacity	0,85 – 1,00
F	Forced flow, low speed, volume over capacity, long queue (jammed)	≥ 1,00

Source: MKJI, (2017)

RESEARCH METHODS

This research was conducted on arterial and collector roads in the districts of Kemang, Parung and Ciseeng, namely Jl. Jakarta - Bogor (kemang), Jl. Jakarta - Bogor (parung), Jl. Serpong - Parung (gunung sindur), Jl.Semplak-kemang (salabenda), Jl. Mad Nur, Jl. Ciseeng Market, Jl. Pahlawan, Jl. H. Usa, and Jl. H. Mawi.

Done at peak hours as seen based on daily traffic habits via Google Maps.

Research Flowchart

The following is a flowchart of the stages of the research which is outlined below:

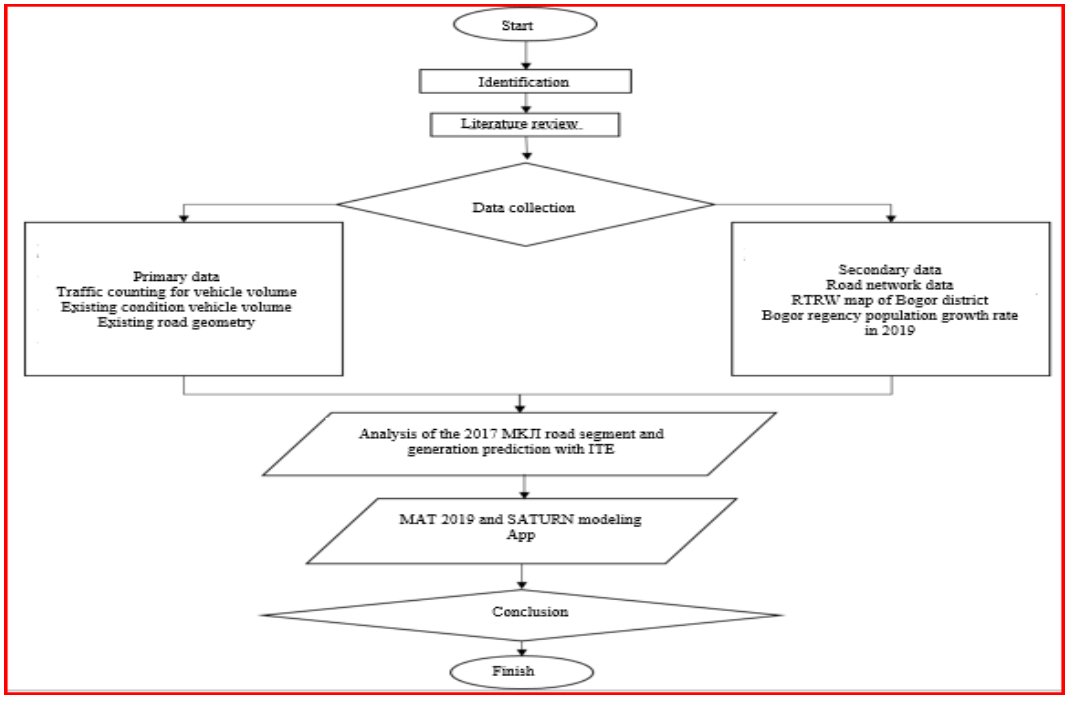

Figure 1. Research Flowchart

RESULTS AND DISCUSSION

ASTONJADRO
pISSN 2302-4240
eISSN 2655-2086
Volume 11, Issue 3, October 2022, pp.490-496
DOI: http://dx.doi.org/10.32832/astonjadro.v11i3 http://ejournal.uika-bogor.ac.id/index.php/ASTONJADRO

Road and inventory data

No	Nama Jalan	Tipe Jalan	Lebar Jalan	Fungsi Jalan	Kereb / Bahu	Hambatan Samping
1	JL Jakarta - Bogor (kemang)	4/2 T	13 m	Arteri Primer	Kereb 1 m	Rendah
2	JL Jakarta - Bogor (parung)	4/2 T	13m	Arteri Primer	Kereb 1 m	Rendah
3	Jl Serpong - Parung (gunung-sindur)	2/2 TT	9 m	Arteri Skunder	Bahu 0.5 m	Rendah
4	Jl Semplak-kemang	2/2 TT	6 m	Kolektor Primer I	Bahu 2.75 m	Rendah
5	Jl Mad Nur	2/2 TT	6 m	Kolektor Primer II	Bahu 1.5 m	Rendah
6	Jl Pasar Ciseeng	2/2 TT	6 m	Kolektor Primer II	Bahu 1 m	Sedang
7	Jl Pahlawan	2/2 TT	6 m	Kolektor Primer II	Bahu 1.5 m	Sedang
8	Jl H. Usa	2/2 TT	6 m	Kolektor Primer II	Bahu 1 m	Sedang
9	Jl H. Mawi	2/2 TT	6 m	Kolektor Primer II	Bahu 1 m	Sedang

Sumber : Hasil Survey dan Analisa

Figure 2. Road segment inventory

The volume of vehicles in the study area

Vehicle survey is conducted based on daily peak hours and the total volume and total flow of vehicles are calculated. In conducting the survey, there are several tools such as traffic counting applications, paper, road boards and pens. The amount of traffic volume is shown in the following equation

V (vehicle/hour)= KR + KB + SM

V (Skr/hour) = (KR x ekr) + (KB x ekr) + (SM x ekr)

The results of the vehicle volume flow calculation using the above equation can be seen in figure 3.

Periode	Ruas jalan		Tipe jalan	SM	KR	KB	Volume	Volume (Skr/Jam)
16.30-17.30	Jl. Jakarta - Bogor (Kemang)	Utara	4/2 T	2138	1003	18	3159	1559
		Selatan		1503	735	10	2248	1123
18.55-19.55	Jl. Jakarta - Bogor (Parung)	Utara	4/2 T	1659	636	11	2306	1064
		Selatan		3335	654	5	3994	1494
19.10-20.10	Jl Serpong - Parung (gunung sindur)	Timur	2/2 TT	973	342	6	1321	739
		Barat		1102	365	6	1473	814
11.20-12.20	Jl Semplak - Kemang (Salabenda)	Utara	2/2 TT	1003	447	3	1453	952
		Selatan		846	326	1	1173	750
16.30-17.30	Jl. Mad Nur	Utara	2/2 TT	660	243	3	906	577
		Selatan		648	226	16	890	571
17.30-18.30	Jl.Ps Ciseeng	Utara	2/2 TT	1683	307	7	1997	904
		Selatan		1414	224	6	1644	939
17.30-18.30	Jl. Pahlawan	Utara	2/2 TT	1109	195	5	1309	756
		Selatan		1758	276	2	2036	894
18.15-19.15	Jl. H Usa	Timur	2/2 TT	1605	251	12	1868	827
		Barat		1426	285	6	1717	1006
18.10-19.10	Jl. H Mawi	Barat	2/2 TT	1444	150	0	1594	872
		Timur		2003	175	0	2178	876

Sumber : Hasil Survei dan Analisa

Figure 3. Vehicle volume flow

Calculation of the average speed of the roads in the sort table

The results of determining the average speed of urban roads with the following calculation examples:

VB = $(V_{BD} + V_{BL}) . FV_{BHS} . FV_{BUK}$

VB Kemang = (5.5 + (-2)) x 0.98 x 1

= 51.9 km/hour

The results of determining the average speed of urban roads with the following calculation examples:

VB = $(VB_D + FV_{B-W})$. $FVB\text{-}_{HS}$.$FVB\text{-}_{FJ}$

VB = (65 + (-3)) x 0.97 x 0.94

= 57 km/hour

Service level (V / C Ratio)

The value of the degree of saturation or Volume Capacity Ratio (VCR) for roads is obtained based on the analysis of traffic volume divided by road capacity. Existing Service Level (Level of Service, LoS).

No	Ruas Jalan	Tipe Jalan	Lebar jalan	Volume (V) Skr/jam	Kapasitas (C)	V/C	LOS
1	Jl. Jakarta - Bogor (kemang)	4/2 T	13m	2682	3163	0.84	D
2	Jl. Jakarta - Bogor (parung)	4/2 T	13m	2558	3163	0.81	D
3	Jl Serpong - Parung (gunung sindur)	2/2 TT	9m	1553	3163	0.49	C
4	Jl Semplak-kemang (ulalebuda)	2/2 TT	6m	1703	2624	0.65	C
5	Jl Mad Nur	2/2 TT	6m	1148	2736	0.42	B
6	Jl Pasar Ciseeng	2/2 TT	6m	1843	2567	0.72	C
7	Jl Pahlawan	2/2 TT	6m	1650	2652	0.62	C
8	Jl H. Usa	2/2 TT	6m	1833	2567	0.71	C
9	Jl H. Mawi	2/2 TT	6m	1748	2567	0.68	C

Figure 4. Traffic service levels

Looking at the existing conditions at the study location for the road network data, it can be concluded that the service level at each entrance is in categories C and D, which means that the value of C is a stable current and D is an unstable starting current. This relates to the ratio between current to capacity, the higher the volume of the vehicle compared to the capacity of the road, the higher the service level (LOS), which indicates that the flow is increasingly blocked (stops, queues, jams).

Resurrection Analysis in the Study Area

The trip generation analysis uses the ITE (Institute Transportation Engineers) method based on the type of land use and the activity intensity of an area.

Trip generation rate is done to get the value of the trip generation rate of an area. The procedure used for analysis is the ITE method by estimating the area of land in the Ciseeng, Parung, and Kemang sub-districts in a certain time period. The trip generation is carried out to determine the large number of visitors on the land.

pISSN 2302-4240
eISSN 2655-2086
Volume 11, Issue 3, October 2022, pp.490-496
DOI: http://dx.doi.org/10.32832/astonjadro.v11i3 http://ejournal.uika-bogor.ac.id/index.php/ASTONJADRO

Description / ITE Code	ITE Code	Units	Sqm / Unit Of measure	Koef ITE	SQF (92.9)	ITE Bangkitan (Trip/jam)
High School (SMA Fitrah Islamic International School)	Institutional	KSF²	16326	0.97	175.7	170.5
Junior High School (Smp Riyadhul Jannah)	Institutional	KSF²	10000	1.19	107.6	128.1
Junior Community College (Sekolah Tinggi Sandi Negara)	Institutional	KSF²	17105	2.54	184.1	467.7
Townhouse (Panorama Bali Residence)	Residential	Dwe Unit	3000	0.52	1560	1560.0
Regional Park (Taman Kepues Ciseeng)	Recreational	acres	7196	0.2	77.5	15.5
Single Family Detached Housing (Perumahan Kaisar Ciseeng)	Residential	Dwe Unit	400	1	400	400.0
Government office bulding (Kantor Desa Cibeuteung muara)	Office	KSF²	203	1.21	2.2	2.6
High School (SMAS Al Mukhlisin)	Institutional	KSF²	14340	0.97	154.4	149.7
Government office bulding (Kantor Kecamatan ciseeng)	Office	KSF²	550	1.21	5.9	7.2
Wholesale Market (Pasar Ciseeng)	Retail	KSF²	6509	0.88	70.1	61.7
Utilities (PT Sierad Produce TBK)	Industrial	KSF²	7038	0.76	75.8	57.6
Junior High School (SMP Pewaris Peradaban)	Institutional	KSF²	3000	1.19	32.3	38.4
Elementary School (SMPN 2 Ciseeng)	Institutional	KSF²	11200	1.19	120.6	143.5
Elementary School (SDN Karya Bangsa)	Institutional	KSF²	1280	1.21	13.8	16.7

Figure 5. Description of the ITE

The results of the analysis of generation calculations in three districts are shown in figure5, with examples of calculations as follows:ITE Rissing = Koefisien ITE x SQF

ITE SMA Fitrah Islamic International School = 0.97 x 175.7 = 170.5 (trip/hour)

CONCLUSION

The large amount of generation and attraction in the study locations in three sub-districts, namely Ciseeng, Parung and Kemang Districts which include education areas, trade or market centers, parks, and hospitals has a generation of 9,140 trips / hour and a pull of 29,404 trips / hour. The design of the transportation modeling equation for the Ciseeng, Parung and Kemang sub-districts is Y = 94,565 + 1,015. (X). Ciseeng District, namely on the Jl. H Usa has a service level C, section Jl. Pahlawan has a service level of C, and a section of Jl. Ciseeng Market has a service level of C. Parung District, which is on the Jl. Jakarta-Bogor (Parung) has service level D, section Jl. Serpong-Parung (Mt. Sindur) has a service level of C, and the Jl. H. Mawi has a service level C. Kemang District, namely on Jl. Mad Nur has service level B, section Jl. Jakarta-Bogor (Kemang) has a service level D, and the Jl. Semplak-Kemang (Salabenda) has a service level of C.

REFERENCES

Agustania, R. (2017). Sebaran Perjalanan Akibat Di Bangun Fasilitas Olahraga (Sport Center) Di Kota Bontang. Prosiding SENSEI 2017 – Fakultas Teknik Unmuh Jember.

Badan Pusat Statistik Kabupaten Bogor. (2018). Kecamatan Ciseeng Dalam Angka 2018. Bogor: BPS Kabupaten Bogor.

Badan Pusat Statistik Kabupaten Bogor. (2018). Kecamatan Kemang Dalam Angka 2018. Bogor: BPS Kabupaten Bogor.

Badan Pusat Statistik Kabupaten Bogor. (2018). Kecamatan Parung Dalam Angka 2018. Bogor: BPS Kabupaten Bogor.

MKJI. (1997). Manual Kapasitas Jalan Inonesia. Jakarta: Kementrian Pekerjaan Umum.

pISSN 2302-4240
eISSN 2655-2086
Volume 11, Issue 3, October 2022, pp.490-496
DOI: http://dx.doi.org/10.32832/astonjadro.v11i3 http://ejournal.uika-bogor.ac.id/index.php/ASTONJADRO

MKJI. (2017). Manual Kapasitas Jalan Indonesia. akarta: Kementrian Pekerjaan Umum.

Ofyar.Z.Tamin. (2000). Perencaan dan Peermodelan Transportasi. Bandung: ITB.

Ramdhani, F. (2018). Analisis Model Bangkitan Dan Tarikan Pergerakan Kabupaten Rokan Hulu. 315 – RACIC Jurnal Teknik Sipil Universitas Abdurrab

Syaiful Syaiful, Hendra Rusfana. (2022). Rigid Pavement Planning In Traffic: Case Study In Ciherang Road And Pemuda Road, Bogor Regency, Indonesia. Journal of Applied Engineering Science, 1-13.

Syaiful Syaiful, Hermanto Siregar, Ernan Rustiadi, Eri Susanto Hariyadi. (2022). Performance of Three Arms Signalized Intersection at Salabenda in Bogor Regency, ASTONJADRO: CEAESJ, 11(1),pp.13-29.

Syaiful Syaiful, Yogi Pratama. (2019). Sustainable Studies about General Public Transport Performance in the City Of Bogor, ARPN Journal of Engineering and Applied Sciences 14 (18), 3241-3247.

Syaiful Syaiful, Dony Hariyadi. (2019). Case Study on Sustainable T-Jungtion Cibinong City Mall (CCM) in Bogor Indonesia, ARPN Journal of Engineering and Applied Sciences 14 (17), 2960-2971.

Syaiful Syaiful, Heru Prayoga, Juang Akbardin. (2020). Sustainable about the Need of Parking Systems at the Mall RDS Bogor, ARPN Journal of Engineering and Applied Sciences 15 (22), 2620-2626.

Syaiful Syaiful, Ahmad Fadly. (2020). Analysis of the Effectiveness of Bus Services Outside of Campus IPB Dramaga Bogor. ASTONJADRO: CEAESJ 9 (2), 173-186.

Syaiful Syaiful, Hermanto Siregar, Ernan Rustiadi, Eri Susanto Hariyadi. (2021). Traffic Improvement Strategy in Transportation System Using AHP Method. ARPN Journal of Engineering and Applied Sciences 16 (22), 2431-2439.

Syaiful Syaiful, Muhammad Nanang Prayudyanto, Rulhendri Rulhendri, Puri Anita Lestari, Aqies Naili Nabila, Salma Leandra Damiana, Haldiana Haldiana, (2022). Vehicle traffic volume analysis due to sound generated in front of the RS. Hermina Bogor. ASTONJADRO: CEAESJ 11 (2), 475-489.

Syaiful Syaiful, Lian Lasmana. (2020). A study on level of railway road damage with sustainable PCI method. ARPN Journal of Engineering and Applied Sciences 15 (8), 962-968.

Sumajouw, J. (2013). Analisis Dampak Lalu Lintas (Andalalin) Kawasan Kampus Universitas Sam Ratulangi. Jurnal Ilmiah MEDIA ENGINEERING Vol. 3, No. 2, Juli 2013 ISSN 2087-9334 (133-143).