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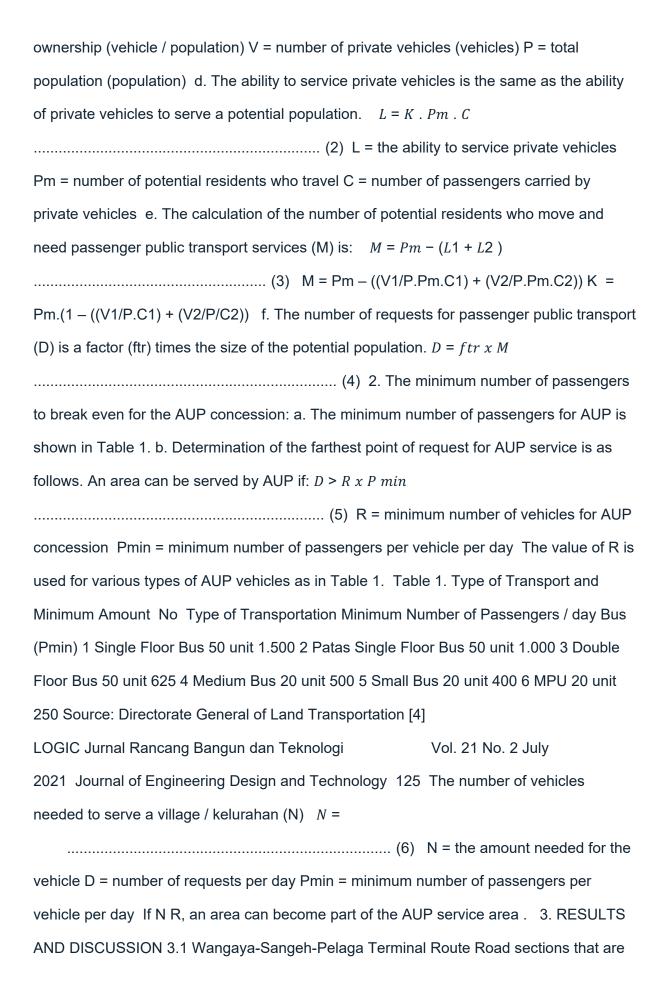
FEASIBILITY EVALUATION OF PUBLIC PASSENGER TRANSPORT CONNECTING URBAN AND RURAL AREAS (Case Study: Wangaya-Sangeh-Pelaga Terminal Route)

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Abstract. The purpose of this study is to evaluate the feasibility of carrying out public passenger transportation which is influenced by the population, potential residents to travel and ownership of private vehicles, by examining the Wangaya-Sangeh-Pelaga Terminal Route. The data collection method is by downloading secondary data from BPS Denpasar City and BPS Badung Regency in 2020. The secondary data required in each sub-district / village are: population; number of households; number of potential residents to travel (aged 5-65 years); ownership of 4-wheeled vehicles (cars); and ownership of two-wheeled vehicles (motorbikes). The data analysis method used is the Guidelines for the Delivery of General Passenger Transportation from the Directorate General of Land Transportation, Decree No. SK.687 / AJ.206 / DRJD / 2002. Of the fifteen sub-districts / villages that the WanagayaSangeh-Pelaga Terminal Route route passes, only four sub-districts / villages are eligible to be included in the AUP service area, meeting the N> R requirements. Eleven other kelurahan / villages cannot be included in the transportation management area. general passenger. Thus, the WangayaSangeh-Pelaga Terminal Route is not suitable for public passenger transportation. Keywords : feasibility, routes, and public transportation .

1. INTRODUCTION The change in the community to use private transportation is triggered by the poor quality of public transport services. User ratings of a service depend on a balance between sacrifice and profit, both monetary and non-monetary. The needs of individual customers (passengers) are a significant determinant of the level of customer experience satisfaction and reuse intention [1][2][5]. The attributes of satisfaction with the

use of public transportation include: being on time; travel speed; service frequency; ticket price; personnel behavior; driver behavior; information about procrastination; ticket sales network; availability of information; stop safety; neatness of the vehicle; ease of going up and down; seating capacity; on-board noise; security; comfort, cleanliness. all of which are the quality of service felt by the user community [3][6][8][9]. This study evaluates the feasibility of carrying out public passenger transportati on (AUP) that connects urban and rural areas, by taking a case study of the Wangaya-Sangeh-Pelaga Terminal Route. This route connects the Denpasar City area with the Badung Regency area. North Badung is famous for its agro-tourism areas, such as Sangeh and Pelaga villages. The Wangaya Terminal, which is located in Banjar Wangaya Kelod, as well as other terminals in Denpasar, is under the coordination of the UPT Passenger Terminal for the Denpasar City Transportation Service. This terminal used to be a hangout for drivers, now it has changed the function of the land, turning it into a traditional market. The public transport fleet that should have been at the terminal was forced to hang out outside the terminal. The Wangaya terminal is practically suspended animation [1][7]. The problem now is whether the routes served p-ISSN : 1412-114X e-ISSN : 2580-5649

are still eligible to be included in the delivery of public transport? This study examines this problem by referring to the guidebook published by the Directorate General of Transportation [4] .   2. METHODS The Directorate General of Transportation [4] provides practical guidelines which are one of the guidelines that can be used in determining the service area of AUP 1. Number of requests for city AUP services in sub-districts located around the city-built area boundary. a. Total population of kelurahan = P (souls) b. The number of people with the potential to move = the number of people aged 5 - 65 years = Pm (people) c. Private vehicle segregation figures are calculated based on $K =$

.... (1) K = number of private vehicle

ownership (vehicle / population) V = number of private vehicles (vehicles) P = total population (population) d. The ability to service private vehicles is the same as the ability of private vehicles to serve a potential population. $L = K \cdot Pm \cdot C$

.... (2) L = the ability to service private vehicles Pm = number of potential residents who travel C = number of passengers carried by private vehicles e. The calculation of the number of potential residents who move and need passenger public transport services (M) is: $M = Pm - (L1 + L2)$

.... (3)   M = Pm – ((V1/P.Pm.C1) + (V2/P.Pm.C2)) K = Pm.(1 – ((V1/P.C1) + (V2/P/C2))   f. The number of requests for passenger public transport (D) is a factor (ftr) times the size of the potential population. $D = ftr \; x \; M$

.... (4) 2. The minimum number of passengers to break even for the AUP concession: a. The minimum number of passengers for AUP is shown in Table 1. b. Determination of the farthest point of request for AUP service is as follows. An area can be served by AUP if: $D > R \; x \; P \; min$

.... (5) R = minimum number of vehicles for AUP concession Pmin = minimum number of passengers per vehicle per day The value of R is used for various types of AUP vehicles as in Table 1. Table 1. Type of Transport and Minimum Amount No Type of Transportation Minimum Number of Passengers / day Bus (Pmin) 1 Single Floor Bus 50 unit 1.500 2 Patas Single Floor Bus 50 unit 1.000 3 Double Floor Bus 50 unit 625 4 Medium Bus 20 unit 500 5 Small Bus 20 unit 400 6 MPU 20 unit 250 Source: Directorate General of Land Transportation [4]

The number of vehicles needed to serve a village / kelurahan (N) $N =$

.... (6)   N = the amount needed for the vehicle D = number of requests per day Pmin = minimum number of passengers per vehicle per day If N R, an area can become part of the AUP service area .   3. RESULTS AND DISCUSSION 3.1 Wangaya-Sangeh-Pelaga Terminal Route Road sections that are

traversed by the Wangaya-Sangeh-Pelaga Terminal Route are shown in Table 2. Table 2. Route of Terminal Wangaya-Sangeh-Pelaga PP Street name Kelurahan/Village Subdistrict District / City Jl. Kartini, Jl. Maruti Dangin Puri Kauh Denpasar Utara Kota Denpasar Jl, Cokroaminoto, Jl. Sutomo, Jl. Gadjah Mada Pemecutan Kaja Jl. Ahmad Yani Utara Peguyangan Jl. Raya Darmasaba Peguyangan Kaja Jl. Raya Sibang Gede Sibang Gede Abiansemal Kabupaten Badung Jl. Raya Sibang Kaja Sibang Kaja Jl. Raya Mambal Mambal Jl. Raya Sangeh Blahkiuh Jl. Raya Sangeh Sangeh Jl. I Gusti Ngurah Rai Carangsari Petang Kabupaten Badung Jl. Raya Getasan Getasan Jl. Raya Pangsan Pangsan Jl. Raya Sulangai Sulangai Jl. Raya Pucak Mangu Petang Jl. Raya Semanik Pelaga Source: BPS Denpasar City [10] and BPS Badung Regency [11] Table 2 shows the road sections traversed by the Wangaya-Sangeh-Pelaga Terminal Route, namely: (1) The route route crosses the Dangin Puri Kauh and Pemecutan Kaja Villages including the North Denpasar District, Denpasar City; (2) Peguyangan, Peguyangan Kaja, Sibang Gede, Sibang Kaja, Mambal, Blahkiuh, Sangeh villages are included in the Abiansemal District, Badung Regency; and (3) Carangsari, Getasan, Pangsan, Sulangai, Evening, and Pelaga villages including the Petang District, Badung Regency 3.2 Potential Age of Travel Data on the number of potential residents to travel, are assumed to be 5 - 65 years old. Table 3 shows the number of household heads (KK), population, and age at travel. Table 3. Number of Households, Population, and Potential Age to Travel Kelurahan/Village Number of household Total Population Age Potential to Travel Dangin Puri Kauh 8.084 23.098 19.633 Pemecutan Kaja 11.526 36.018 32.745 Peguyangan 4.091 13.501 11.476 Peguyangan Kaja 1.994 9.889 8.406 Sibang Gede 1.910 7.260 6.171

Kelurahan/Village Number of household Total Population Age Potential to Travel Sibang Kaja 1.509 6.214 5.282 Mambal 1.505 5.340 4.539 Blahkiuh 1.518 6.049 4.442 Sangeh 1.296 4.706 4.000 Carangsari 1.253 5.011 4.115 Getasan 533 2.131 1.800 Pangsan 633 2.650 2.253 Sulangai 1.202 4.809 4.088 Petang 1.082 4.326 3.677 Plaga 1.272 5.089 4.176 Source:

BPS Denpasar City [10] and BPS Badung Regency [11] Table 3 shows the number of households, the number of residents, and the number of potential trips in the 15 kelurahan/villages that are passed by the Wangaya-Sangeh-Plaga Terminal Route. The largest population of potential travel age is in Pemecutan Kaja Village (Denpasar City), amounting to 32,745 people, while the smallest is Getasan Village (Badung Regency), amounting to 1,800 people. 3.3 Ownership of Private Vehicles The number of private motorized vehicle ownership (four-wheeled / car and two-wheeled / motorbike (SPM) is shown in Table 4.

Table 4 Ownership of Private Vehicles

Kelurahan/Village	Ownership Amount	
	Car	SPM
Dangin Puri Kauh	914	8.015	8.929
Pemecutan Kaja	1.012	16.742	17.754
Peguyangan	846	6.124	6.970
Peguyangan Kaja	604	4.254	4.858
Sibang Gede	550	3.250	3.800
Sibang Kaja	397	3.461	3.858
Mambal	162	2.447	2.609
Blahkiuh	118	1.876	1.994
Sangeh	253	1.352	1.605
Carangsari	268	1.398	1.666
Getasan	122	934	1.056
Pangsan	184	1.154	1.338
Sulangai	250	1.614	1.864
Petang	172	19.59	2.131
Pelaga	243	1.793	2.036

Source: BPS Denpasar City [10] and BPS Badung Regency [11] Table 4 shows the number of people who own two-wheeled vehicles (motorcycles/SPM) and fourwheeled vehicles (cars). The largest car ownership and SPM are in Pemecutan Kaja Village (Denpasar City) with 17,754 people, the smallest in Getasan Village (Badung Regency) with 1,056 people. Determine the Number of Demand / Requests (D). Table 5 shows the results of the calculation of demand for transportation with the assumption that the number of passengers of 4-wheeled vehicles (cars) is one person, as well as one motorbike user (spm). Table 5 Calculation of Total Demand / Request (D)

Kelurahan/vilaage	P	Pm	V1 mbl	V2 spm	K1 (3)/(1)	K2 (4)/(1)	L1 (5)*(2)*1	L2 (6)*(2)*1	M (2)-(7)-(8)	D (9)*2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dangin Puri Kauh	23.098	19.633	914	8.015	0,0396	0,4082	777	8.015	10.841,11	21.682,22
Pemecutan Kaja	36.018	32.745	1.012	16.742	0,0281	0,5113	920	16.742	15.082,96	30.165,62
Peguyangan	13.501	11.476	846	6.124	0,0627	0,5336	719	6.124	4.632,89	9.265,78
Peguyangan Kaja	9.889	8.406	604	4.254	0,0611	0,5061	513			

Kelurahan/Village	P	Pm	V1	V2	K1	K2	L1	L2	M	D
							4.254		3.638,58	7.277,16
Sibang Gede	7.260	6.171	550	3.250	0,0758	0,5267	468	3.250	2.453,50	4.907,00
Sibang Kaja	6.214	5.282	397	3.461	0,0639	0,6552	337	3.461	1.483,54	2.967,09
Mambal	5.340	4.539	162	2.447	0,0303	0,5391	138	2.447	1.954,30	3.908,60
Blahkiuh	6.049	4.442	118	1.876	0,0195	0,4223	87	1.876	2.479,35	4.958,70
Sangeh	4.706	4.000	253	1.352	0,0538	0,3380	215	1.352	2.432,96	4.865,91
Carangsari	5.011	4.115	268	1.398	0,0535	0,3397	220	1.398	2.496,92	4.993,84
Getasan	2.131	1.800	122	934	0,0573	0,5189	103	934	762,95	1.525,90
Pangsan	2.650	2.253	184	1.154	0,0694	0,5122	156	1.154	942,57	1.885,13
Sulangai	4.809	4.088	250	1.614	0,0520	0,3948	213	1.614	2.261,48	4.522,96
Petang	4.326	3.677	172	1.959	0,0398	0,5328	146	1.959	1.571,80	3.143,61
Pelaga	5.089	4.176	243	1.793	0,0478	0,4294	199	1.793	2.183,60	4.367,19

Table 5 shows the total population (P); number of potential travel ages (Pm); number of car ownership (V1); number of SPM ownership (V2); ratio of car ownership to population (K1); ratio of ownership of SPM to total population (K2); car service capability (L1); MSS service capability (L2); the number of people who need public transportation services (M); and the number of requests for public transport passengers (D) in each kelurahan/village along the Wangaya-Sangeh-Plaga Terminal Route.

3.4 Determining the Eligibility of an Area Served by Public Transportation Table 6 shows the feasibility of each sub-district / village to be served by public transportation, which is determined by the ratio of the value of N to the value of R.

Table 6 Determination of the Eligibility of Kelurahan / Desa Served by Public Transportation

Kelurahan/Village	D	Pmin	N (1)/(2)	R	Term N > R
	(1)	(2)	(3)	(4)	(5)
Dangin Puri Kauh	21.682,22	250	86,73	20	Memenuhi
Pemecutan Kaja	30.165,62	250	120,66	20	Memenuhi
Peguyangan	9.625,78	250	37,06	20	Memenuhi
Peguyangan Kaja	7.277,16	250	29,11	20	memenuhi
Sibang Gede	4.907,00	250	19,63	20	Tidak memenuhi
Sibang Kaja	2.967,09	250	11,87	20	Tidak memenuhi
Mambal	3.908,60	250	15,63	20	Tidak memenuhi
Blahkiuh	4.958,70	250	19,83	20	Tidak memenuhi
Sangeh	4.865,91	250	19,46	20	Tidak memenuhi
Carangsari	4.993,84	250	19,98	20	Tidak memenuhi
Getasan	1.525,90	250	6,10	20	Tidak memenuhi
Pangsan	1.885,13	250	7,54	20	Tidak memenuhi
Sulangai	4.522,96	250	18,09	20	Tidak memenuhi
Petang	3.143,61	250	12,57	20	Tidak memenuhi
Pelaga					

4.367,19 250 17,47 20 Tidak memenuhi Table 6 shows that most of the sub-districts / villages through the Wangaya-Sangeh-Pelaga Terminal Route cannot be included in the public transport service area. Sub-districts / villages that can be included in the public transport service area are those that meet N> R, namely Dangin Puri Kauh sub -district / village, Pemecutan Kaja, Peguyangan, and Darmasaba. These four sub-districts / villages are located in the North Denpasar District, Denpasar City. Other kelurahan / villages have a value of N LOGIC Jurnal Rancang Bangun dan Teknologi   Vol. 21 No. 2 July 2021 Journal of Engineering Design and Technology 128 in the North Denpasar District. Because the dominance of kelurahan / villages cannot be included in public transportation services, it can be concluded that on the Wangaya -Sangeh-Pelaga Terminal Route Route, it is not feasible to provide public transportation.   6. REFERENCES [1]. Beritatrans.com. 2019. Terminal dan Angkutan Umum Denpasar Mati Suri . https://www.beritatrans.com/artikel/139446/Terminal-dan--Angkutan-Umum-di-Denpasar-Mati-Suri/. Diakses: 21 Februari 2021. [2]. Bryant, B., & Cha, J. 1996. Crossing the Threshold. Market . Res (8(4), 337-339. [3]. Gatersleben, B., & uzzel, D. 2007. Affective Appraisals of the Daily Commute: Comparing Perception of the Drivers, Cyclist, Walker, and Users of Public Transport . Enviroment and Behavior, 3, 416-431. [4]. Keputusan Direktur Jenderal Perhubungan Darat No. SK.687/AJ.206/DRJD/2002 tentang: Pedoman Teknis Penyelenggaraan Angkutan Penumpang Umum di Wilayah Perkotaan dalam Trayek Tetap dan Teratur. [5]. Mittal, V., & Kamakura, A. (2001). Satisfaction, Repurchase Intent, and Repurchase Behaviour; Investigating the Moderating Effect of Customer Characteristic. J. Mark. Res. 38, 131 - 142. [6]. Mouwen, A. 2015. Drivers of Customer Satisfaction with Public Transport Services.. Department of Spatial Economics, VU University Amsterdam, De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands. Transport Research Part A 78, 1-20 [7]. NusaBali. 2016. Terminal Beralih Fungsi Jadi Pasar. Edisi Jumat, 11 November 2016, hal-3. [8]. Redman, L., Friman, M., Garling, T., & Hatig. 2013. Quality Atribut of Public Transport Chains: A Case Study for Netherlands. Transportation Research Part A, 35(6), 539-559. [9]. Sherestha, R. 2013. Low Carbon

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