Analysis of Ability to Pay and Willingness to Pay in Trans Sulawesi Train Makassar - Parepare Route

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Abstract

The Trans Sulawesi train on the Makassar – Parepare route will traverse four significant stations with a planned length of ± 144 km and start operating in October 2022. Currently, it is not known the amount of travel fare applied to the Makassar - Parepare route. An analysis study of the ability to pay and willingness to pay for the Trans Sulawesi train for the Makassar - Parepare route aims to determine the value of the ability and willingness to pay for prospective service users to determine the Trans Sulawesi train rate. The data was collected by using interview surveys and distributing questionnaires through revealed preference and stated preference approaches. The ability to pay value was analyzed using the household budget method, and the willingness to pay value was analyzed based on the respondent's perception approach. Based on the results of the study obtained, the value of the ability to pay (ATP) of Rp144.279,00 and the value of willingness to pay (WTP) of Rp61.426,00.

Keywords: ATP; SDG number 9, 11; stated preference; Trans Sulawesi train; WTP

1. Introduction

Makassar City is the fourth largest city in Indonesia and the largest in eastern Indonesia, which continues to develop yearly. As a service center in Eastern Indonesia (KTI), the city of Makassar acts as a trade and service center, a center for industrial activities, a center for government activities, a node for goods and passenger transportation services on both land, sea, and air and a center for education and health services making the development of the city of Makassar Very fast [1]. There has been an increase in the population of the city of Makassar in the last five years. In 2015, the population of the city of Makassar reached 1,449,401 people, while in 2019 there were 1,545,373 people, and there was a population increase of 95,972 people during the last five years [2], [3].

In the Regional Spatial Plan for the Mamminasata Metropolitan National Strategic Area, Makassar City is designated as an urban planning zone and has become the center of growth and movement destination. (PEP RES RI No. 59 of 2011 concerning RTRW KSN Mamminata). With this stipulation, Makassar city has officially become the center of growth and the center of the agglomeration of economic activities of the Mamminasata KSN. The agglomeration area is an area that has many facilities (socio-economic facilities) so that it becomes the center of attraction for population activities [4].

In 2015 the Trans Sulawesi railway network began to be built to connect major cities in Sulawesi. This project is one of the national strategic projects of inter-city railways, and railway line work begins with the Makassar – Parepare route [5]. Before the existence of the Trans Sulawesi train, there were three choices of transportation modes to travel from Makassar to Parepare or vice versa, namely passenger cars with fares ranging from Rp60.000,00 – Rp70.000,00, with a travel time of ± 4 hours, motorbikes with a travel time of ± 3-4 hours and a private car with a travel time of ± 4 hours, the cost of traveling for a motorbike and a private car is enough to pay for fuel.

The Trans Sulawesi railway line Makassar – Parepare is planned with a total length of ± 144 km, crossing 4 major stations namely Maros, Pangkajene, Tanete Rilau, Barru and 8 smaller stations namely Mandai, Rammang-Rammang, Labakkang, Ma'rang, Mandalle, Takalasi, Mangkoso and Palanro [6]. The Trans Sulawesi train is planning to start operating on October 2022. Hoping that motorbike, private car, and passenger car service users will be able to use a new mode of transportation, the Trans Sulawesi train. Since now, there has been no rate for the Makassar-Parepare route. In determining the value of

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travel fares, the ability to pay and the willingness to pay off potential service users will need [7].

This study aims to determine the value of the ability to pay (ability to pay) and willingness to pay (willingness to pay) prospective users of the Trans Sulawesi train service, where this value can later be used to determine the fare for the Trans Sulawesi train route Makassar - Parepare.

2. Research Methods

The study was conducted by interviewing and distributing questionnaires using a revealed preference and stated preference approach to Makassar – Parepare travellers, because the research was conducted during the COVID-19 pandemic, the distribution of questionnaires was carried out online and offline.

2.1. Number of samples

In order to achieve best research results, especially in preference surveys, the number of samples must be between 75-100 samples for each category [8]. So, in this study, a sample of 200 respondents was taken consisting of users of motorbikes, private cars, passenger cars and Damri buses in the Trans Sulawesi train service route that is Makassar city, Marros regency, Pangkajene and Islands regency, Barru regency, and Parepare city.

2.2. Research settings

The location in this study is the Makassar-Parepare route, which means that the district-city areas that are in the route are part of the research location so that the travel agents who are the sample in this study are travellers.

2.3. Data collection

This research collected data based on facts in the field or what is commonly called primary data. The primary data in this study were obtained from interviews to determine the habits of travellers and surveys (questionnaire distribution) to service users of motorbikes, private cars, passenger cars and damri buses to achieve the research objectives, knowing the characteristics, the value of ability to pay, the value of willingness to pay and probability of switching modes, while secondary data, supporting data that supports primary data in achieving research objectives, are obtained from related agencies [9].

2.4. Questionnaire preparation

To obtain primary data in this study, a survey was conducted using a questionnaire which was divided into 4 parts, the characteristics of the respondents, the probability of switching modes, ability to pay and willingness to pay.

2.5. Data analysis

The data from the research survey that has been collected is processed and analyzed to achieve the research objectives, while the data analysis in this study is as follows:

- Characteristic Analysis

Analysis of passenger characteristics will be carried out using descriptive statistical methods, statistical techniques used to analyze data by describing or describing the data that has been collected so that a picture of the data will be obtained in the form of a percentage value of each characteristic [10].

- Ability to pay analysis

Ability to pay (ATP) is a person's ability to pay for transportation services he receives based on income that is considered ideal. The approach used in the ATP analysis is based on the allocation of costs for transportation and the intensity of the user's journey [11]. The factors that affect ATP is shown in Fig. 1.

ATP analysis is carried out using the household budget method, with the following formula 1 [11]:

$$ATP_{umum} = \frac{It.Pp.Pt}{Tt} \qquad (1)$$

Description:
It : Total family income a month
Pp : % Income for transportation a month from total family income.
Pt : % Cost of using transportation from family transportation income a month
Tt : Total length of family trips a month a trip.

- Willingness to pay analysis

Willingness to pay (WTP) is the willingness of users to pay for the services they get. The approach used in the WTP analysis is based on the user's perception of the tariff for services. WTP is influenced by several factors as shown in Fig. 2.
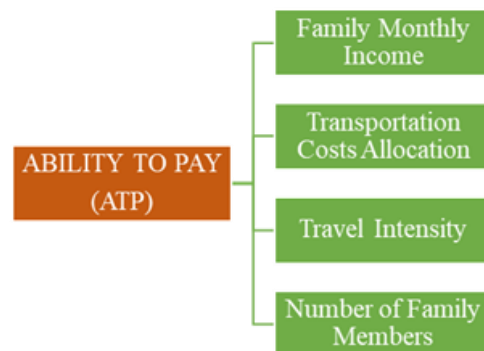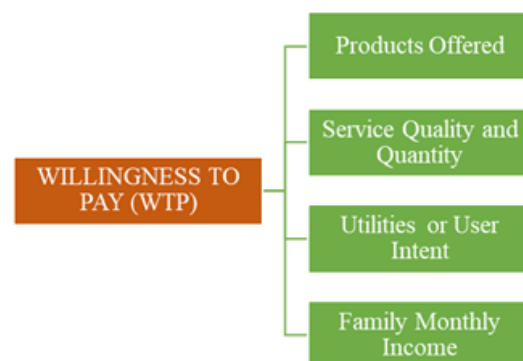

Figure 1. Factors of ability to pay [12]

Figure 2. Factors of willingness to pay [12]

Willingness to pay value obtained from each respondent and processed to get the average value (mean) of the WTP value, with the formula 2 [7]:

$$MWTP = \frac{1}{N}\sum_{i=1}^{n} WTPi \qquad (2)$$

Description:
MWTP : average
n : sample size
WTP i : the maximum WTP value of the i-th respondent

3. Results and Discussion

The samples obtained in this study were 211 respondents consisting of motorcycle users, private cars, and passenger cars. Before the distribution of the survey form, the questionnaire was tested online on the initial ten respondents, who were also part of the 211 respondents.

3.1. Characteristic analysis

Based on the research survey results, the frequency distribution per variable will then be analyzed descriptively to determine the characteristics of prospective users of the Trans Sulawesi railway service. The following is a recapitulation of the frequency distribution of respondents' characteristics that show in Table 1.

Table 1. Frequency distribution recapitulation

Variable	Category	Percentage
Gender	Male	37.0%
	Female	63.3%
Age	≤ 17 Years	0.5 %
	18 - 25 Years	69.2 %
	26 - 35 Years	18.0 %
	36 - 50 Years	10.4 %
	≥ 50 Years	1.9 %
Job	Not Working	12.8%
	Students	30.8 %
	Civil Servant/Army/Police	12.3 %
	Private/Contracted/SOE Employees	19.9 %
	Entrepreneur/Freelancer	19.0 %
	Housewife	4.7 %
	Retired	0.5 %
Income	≤ Rp. 1,000,000	49.3 %
	Rp1.000.0001 - Rp3.000.000	19.9 %
	Rp3.000.001 - Rp5.000.000	19.4 %
	Rp5.000.001 - Rp7.000.000	5.7 %
	Rp7.000.001 - Rp9.000.000	2.8 %
	≥ Rp9.000.000	2.8 %

Variable	Category	Percentage
The Number of Dependents	No dependents	55.9 %
	1 dependents	18.0 %
	2 dependents	9.5 %
	3 dependents	8.5 %
	4 dependents	5.2 %
	5 dependents	2.4 %
	6 dependents	0.5 %
Desire to Switch	Want to Switch	92.4 %
	Don't want to switch	7.6 %
Origin of Travel	Makassar City	50.7 %
	Maros Regency	7.6 %
	Pangkep Regency	13.7 %
	Barru Regency	10.9 %
	Parepare City	17.1 %
Travel Destination	Makassar City	43.1 %
	Maros Regency	11.8 %
	Pangkep Regency	10.4 %
	Barru Regency	10.0 %
	Parepare City	24.6 %
Travel Purpose	Working	18.5 %
	School/university	20.9 %
	Get treatment	0.9 %
	Holiday	38.4 %
	Homecoming	19.0 %
	Others	2.4 %
Travel Frequency	1 times	40.8 %
	2 times	18.5 %
	3 times	14.7 %
	4 times	8.5 %
	5 times	4.7 %
	6 times	3.3 %
	8 times	1.4 %
	10 times	2.4 %
	12 times	0.9 %
	15 times	0.9 %
	20 times	0.9 %
	25 times	0.9 %
	30 times	1.4 %
	40 times	0.5 %
Travel Cost	Rp10.000	0.5 %
	Rp20.000	4.3 %
	Rp30.000	2.8 %
	Rp35.000	0.5 %
	Rp40.000	2.4 %
	Rp45.000	0.5 %
	Rp50.000	9.0 %
	Rp60.000	1.9 %
	Rp70.000	2.4 %
	Rp80.000	0.5 %
	Rp100.000	26.1 %

Variable	Category	Percentage
	Rp120.000	2.8 %
	Rp140.000	1.4 %
	Rp150.000	9.0 %
	Rp160.000	0.5 %
	Rp165.000	0.5 %
	Rp180.000	0.5 %
	Rp200.000	20.4 %
	Rp240.000	0.9 %
	Rp250.000	2.4 %
	Rp300.000	4.7 %
	Rp350.000	1.4 %
	Rp400.000	0.9 %
	Rp500.000	3.8 %
	90 Minutes	2.4 %
	120 Minutes	9.5 %
	150 Minutes	4.7 %
	180 Minutes	4.3 %
	210 Minutes	5.2 %
	240 Minutes	23.7 %
	270 Minutes	2.8 %
Travel Time	300 Minutes	6.6 %
	330 Minutes	1.9 %
	360 Minutes	3.3 %
	390 Minutes	2.4 %
	420 Minutes	14.2 %
	450 Minutes	3.3 %
	480 Minutes	14.2 %
	510 Minutes	1.4 %
Main Mode of Transportation	Private Car	38.9 %
	Passenger Car	27.5 %
	Motorcycle	33.6 %
Alternative Mode of Transportation	Private Car	19.4 %
	Passenger Car	38.4 %
	Motorcycle	22.3 %
	Damri Bus	18.0 %
	Online Motorcycle Taxi	0.9 %
	Public Transportation	0.9 %

The frequency distribution is used to analyze the characteristics of the respondents so that later the characteristics of respondents who want to switch to using the Trans Sulawesi train will be known, as well as to see the distribution of the sampling frequency in this study [13].

3.2. Ability to pay analisis analysis

The value of the ability to pay respondents in this study was processed using the household budget method, namely based on family income, allocation of funds for transportation, and frequency of travel [14]. The results of the ability to pay calculation can be seen in Table 2.

Table 2. Ability to pay value of respondents

| Sample	Income (Rp)	Transport. Fund allocation 1 month (Rp)	% transport. Fund allocation 1 month	Travel fund allocation 1 month (Rp)	% travel fund allocation 1 month	Travel frequency 1 month	ATP (Rp)
	A	B	C = B / A	D	E = D / B	F	G = D / F
1	7.000.000	600.000	8.57%	500.000	83.33%	3	166.667
2	1.000.000	500.000	50.00%	200.000	40.00%	2	100.000
3	3.000.000	500.000	16.67%	200.000	40.00%	4	50.000
4	1.000.000	300.000	30.00%	100.000	33.33%	1	100.000
5	3.000.000	100.000	3.33%	100.000	100.00%	1	100.000
6	3.000.000	200.000	6.67%	200.000	100.00%	3	66.667
7	1.000.000	100.000	10.00%	200.000	200.00%	3	66.667
8	9.000.000	100.000	1.11%	50.000	50.00%	1	50.000
9	1.000.000	100.000	10.00%	100.000	100.00%	5	20.000
10	1.000.000	100.000	10.00%	100.000	100.00%	4	25.000
...	....	....	....	....	....	....	....
...	....	....	....	....	....	....	....
195	3.000.000	100.000	3.33%	200.000	200.00%	1	200.000
ATP average (Rp)							144.279
ATP price (Rp)							144.279
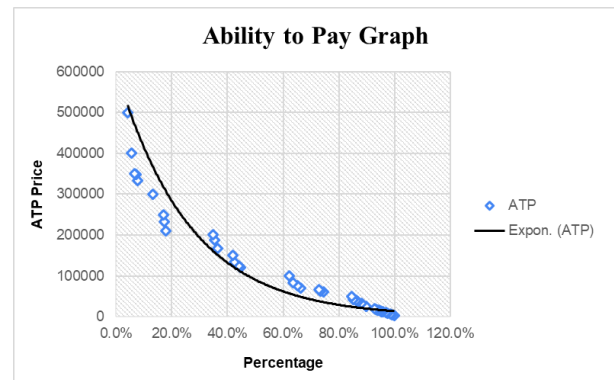
Figure 3. Graph of respondent's ability to pay value

Table 2 shows that the value of the ability to pay for respondents who want to switch to using the Trans Sulawesi train is Rp144.279,00 with a minimum value of Rp2.500,00 and a maximum value of Rp500.000,00. The results of the calculation of the respondents' ATP values are shown in Fig. 3.

Figure 3 shows that respondents have different values of ability to pay, influenced by family income, transportation funds allocation, and trip frequency.

3.3. Willingness to pay analisis analysis

The analysis based on the respondent's perception approach is needed to determine the value of the respondent's Willingness to pay, where the respondent determines the ideal fare that is willing to be issued for one trip. The following is the result of calculating the value of respondents' Willingness to pay, that show in Table 3.

Table 3. Willingness to pay value of respondents

Sample	Trans sulawesi rail ideal price (Rp)	WTP (Rp)
1	40.000	40.000
2	150.000	150.000
3	50.000	50.000
4	25.000	25.000
5	100.000	100.000
6	30.000	30.000
7	35.000	35.000
8	50.000	50.000
9	100.000	100.000
10	50.000	50.000
....	....	....
....	....	....
195	50.000	50.000
Average WTP (Rp)		61.426
WTP price (Rp)		61.426

Table 3 shows that the Willingness to pay the value of respondents who want to switch to using the Trans Sulawesi train is Rp61.426,00 with a minimum value of Rp3.000,00 and a maximum value of Rp150.000,00. The value of respondents' Willingness to pay is poured into a graph as shown in Fig. 4.
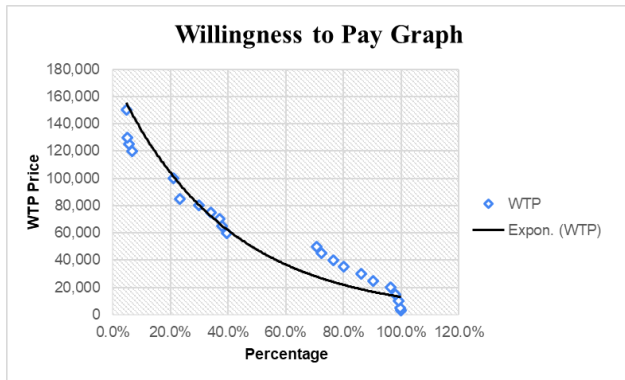

Figure 4. Graph of respondents willingness to pay value

Figure 4 shows that the ideal tariff value varies based on respondents' perceptions. This respondent's Willingness to pay was obtained from the average value of the respondent's WTP.

3.4. ATP – WTP relationship

Based on the calculation of ATP and WTP, the ability to pay value is Rp144.279,00 and Willingness to pay Rp61.426,00, which means that the respondent's ability to pay is greater than the respondent's Willingness to pay, so the respondent or prospective user of the Trans Sulawesi KA services in this study is a chosen rider, namely respondents who can have their vehicle or can choose the mode to be used [15]. The relationship between the value of ATP – WTP is shown in Fig. 5.

Based on Fig. 5, relationship between the value of ATP - WTP, the determination of the tariff as far as possible is not above the threshold of the ATP value of Rp. 144,279, but if it exceeds the ATP value, the government should provide support in the form of a subsidy for the difference between the tariff price and the respondent's ATP value so that the tariff applied is the same as the respondent's ATP value. The WTP value of respondents below the ATP
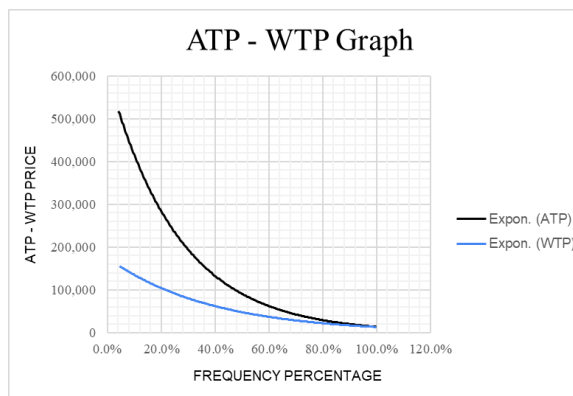

Figure 5. Ability to pay and willingness to pay value relationship

value can still increase rate by increasing service quality or improving service performance.

4. Conclusion

Based on the results of calculations and analysis, it can be concluded that:

1. From 211 respondents spread across Makassar city, Maros regency, Pangkajene and Islands regency, Barru regency, and the City of Parepare, it is known that the majority of the respondents are 63.0% are female, 69.2% aged between 18-25 years, 30.8% work as a student/student, 55.9% have no dependents, 49.3% earning Rp1.000.000,00, 50.7% are from Makassar, 43.1% have a trip destination to Makassar, 38.4% intend to go on vacation, 40.8% travel once a month, 26.1% spent a trip cost of Rp100.000,00, 23.7% spent 240 minutes of travel time, 38.9% use passenger cars as the main transportation, 38.4% use passenger cars as alternative transportation, 92.4% of respondents want to switch to using the Trans Sulawesi Railway

2. The value of the ability to pay respondents who want to switch to using the Trans Sulawesi train is Rp144.279,00, and the value of willingness to pay of respondents who want to switch to using the Trans Sulawesi train is Rp61.426,00, this shows that the ATP value is greater than the WTP value.

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