

Analysis of Operational Performance of Leading Provincial City Transport Routes (AKDP) in Gorontalo Province

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Abstract:- Consumer interest in using intra-provincial city transportation (AKDP) is decreasing. The cause is due to the increase in people's purchasing power so that to meet their transportation needs, people tend to choose to buy private vehicles rather than use public transportation. On the other hand, the operational performance of public transit, both from technical aspects, management and operational policies, is different from applicable quality standards. This research aims to identify superior AKDP routes in Gorontalo Province based on their characteristics and operational performance and formulate strategies to improve the performance of these superior routes through survey, observation and documentation approaches. The data analysis method uses qualitative and quantitative descriptive analysis by identifying the operational characteristics of services, then assessing their suitability based on public transport service standards according to A World Bank Study 1986 standards, Decree of the Director General of Transportation Land Number SK.687/AJ.206/DRJD/2002 and Minister of Transportation Regulation R. I. No. 10 of 2012. The research results show that the operational performance of AKDP transport services in Gorontalo Province is quite good; this is indicated by the fulfilment of minimum performance quality standards in terms of travel speed (37.85 km/hour) and travel time (1.68 minutes/km). Meanwhile, those that do not comply with performance quality standards, namely, load factor 62%; headway 44.57 minutes; waiting time 22.29 minutes and frequency only 2 (two) vehicles/hour.

Keywords:- AKDP; Gorontalo Province; Leading; Operational Performance.

I. INTRODUCTION

City transportation problems lie in the issues of traffic congestion and the public transportation system, both of which affect population mobility. Service operational performance that does not meet performance quality standards in public transportation can impair accessibility and mobility, resulting

in traffic jams. These traffic problems cause significant losses to road users, especially in wastage of materials fuel consumption, time efficiency, and low levels of comfort, safety and security in transportation.

Gorontalo, as one of the 32nd youngest provinces in Indonesia with a population that will reach 1.2 million people by 2024, is also open to problems and challenges in the transportation aspect. Based on survey results primary and secondary obtained, the movement of passengers from origin to destination in 2023, which was facilitated by various modes of transportation in Gorontalo Province, reached a movement growth rate above the Average of 4-6% (Gorontalo et al., 2023) or the equivalent of 4264–4520 people/hour/day. This means that in 2025, passenger movements could reach 5372–5694 people/hour/day, and in 2030 it could reach 6511–6901 people/hour/day.

On the other hand, there is a decline in public interest in public transportation in Indonesia; from year to year, the number of public transport operating is decreasing. Based on data from the Central Statistical Agency of the Republic of Indonesia, large and small cities in Indonesia, including Gorontalo Province, are experiencing a decline in the number of public transportation. A number of public transport In Gorontalo Province, in 2022, the AKDP type of transport was recorded at only 846 units, while in 2023, the number of AKDP transport fell to 804 units, meaning a decrease of 42 units (4.5%). Meanwhile, a decline also occurred in The city of Bandung in 2020, recorded at 13,610 units and in 2020 2021, the number of public transportation will fall to 11,812 units, down 1798 units (13.21%). According to BPS P data, Jakarta's number of passengers to Trans Jakarta in 2020 was as many as 695,000 people. In 2021, The number of Trans Jakarta passengers also fell to 541,800 people, meaning a decrease of 22.04%. Phenomenon This, of course, needs to be a severe concern for the government because it can hurt people's lives and the environment.

The need for transportation in general now and in the future is still essential in urban areas in Indonesia. This is because resident Urban areas are generally very dense, so they have high mobility in daily activities. Usage of vehicle transport: In general, passengers generally want a service performance that meets quality standards, including guaranteed travel time, waiting time, security, comfort and safety during the trip.

The condition of the public transport service system, including intra-provincial city transport (AKDP) in Gorontalo Province, generally still needs to improve its operational performance. Many Gorontalo people already use private transportation, both two-wheeled and four-wheeled. Every month, the increase in motorized vehicles in Gorontalo Province is above 1100 units. On average, motorbikes increase yearly by 579 units, and motorized rickshaws (Bentor) increase by 120 units in Gorontalo Province. Four or more wheeled vehicles also increase every month on Average.

Increasing private vehicle users in Gorontalo will cause transportation problems, including traffic jams. Congestion points are almost spread throughout the Central Business

District (CBD) of cities in Gorontalo Province. This area contains many offices, schools, business centres, shopping centres, and government centres. Private vehicles are among the dominant vehicles that pass through this traffic jam route. The mobility of the population does not use existing public transportation, and prefers to use private vehicles. This problem drives the need to know how effective and efficient the performance of inner-city transportation is within the province (AKDP) so that more people choose to use private vehicles rather than city vehicles within the province (AKDP).

II. RESEARCH METHOD

A. Research Location and Time

Research was conducted in the administrative area of Gorontalo Province, which consists of five districts and one city, including Gorontalo City, Gorontalo Regency, Boalemo Regency, Bone Bolango Regency, Pohuwato Regency and North Gorontalo Regency. The research period was carried out for 3 (three) weeks, from 08.00-17.00 WITA, with the busy activities of the people of Gorontalo who used public transportation within the Province (AKDP) from morning to evening.



Fig 1 Gorontalo Province AKDP Transport Model

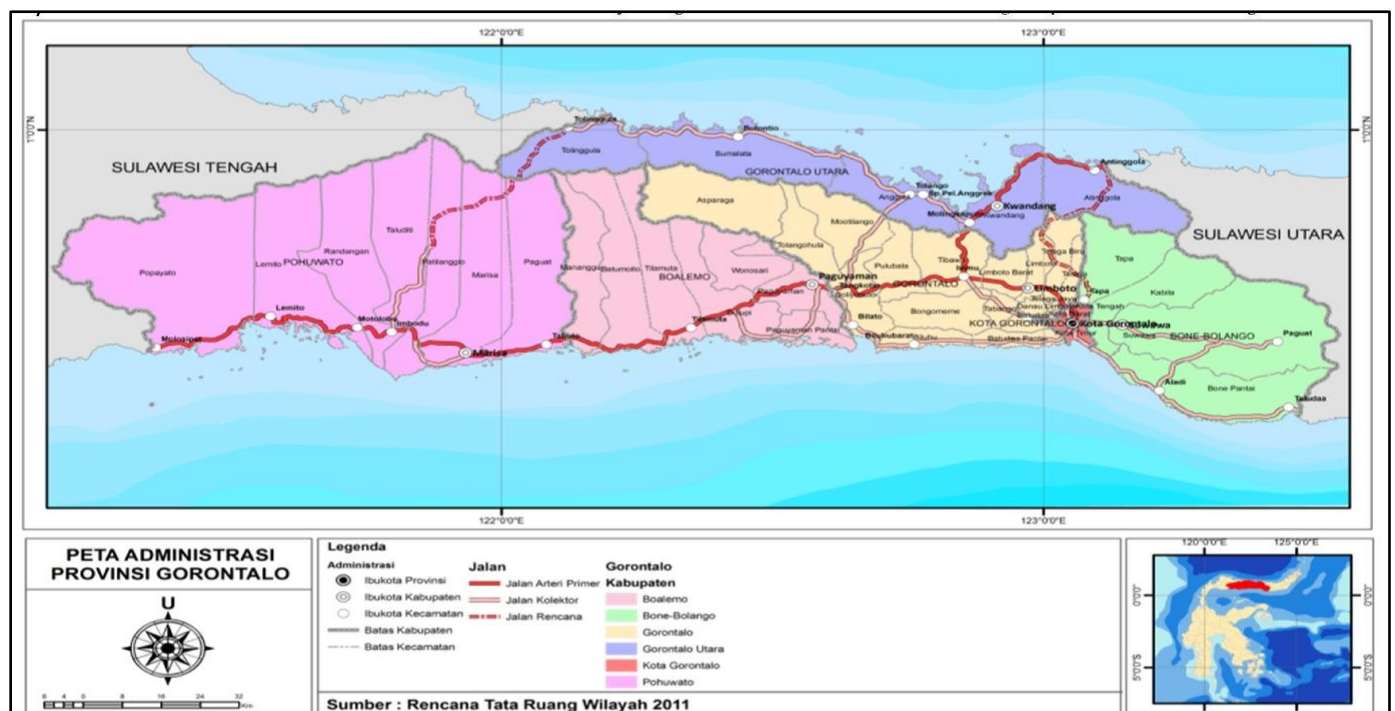


Fig 2 Administrative Map of Gorontalo Province

B. Research Sample

A sample is a part taken from the entire object being studied and is considered to represent the entire population. This research is a sample of areas within regional administrative zone units. Determination of zone units is carried out by considering the results to be achieved, namely the zone units passed or crossed as city transport routes within the province (AKDP). The public transport sampling technique used is the Slovin equation as follows (Sugiono, 2003).

$$n = \frac{N}{1 + e^2}$$

➤ Information:

- n = minimum sample
- N = population sample
- e = percentage of tolerance limit (margin of error) = 30%

Table 1 Result of Calculation of Sample Number of AKDP Transport Vehicles

No.	Route Origin Destination	Population (Vehicles)	Minimum Sample Number (Vehicles)
1.	Regency Gorontalo / (AB- 05) Dungingi Terminal- Isimu Terminal	18	7
2.	AA - 02) Gorontalo City Center Terminal- Terminal Telaga-Tml. Limboto	22	7
3.	North Gorontalo Regency/(AB-01) Dungingi - Kwandang Terminal	16	6
4.	Boalemo Regency/(AB-02) Dungingi - Tilamuta Terminal	21	7
5.	Pohuwato Regency/(AB- 06) Dungingi - Marisa Terminal	19	7
6.	Bone Bolango Regency/(AC-01) T er m i n a l Leato-Bone Pantai-Taludaa	2	2
Total number		98	36

Source: Analysis Results, 2023

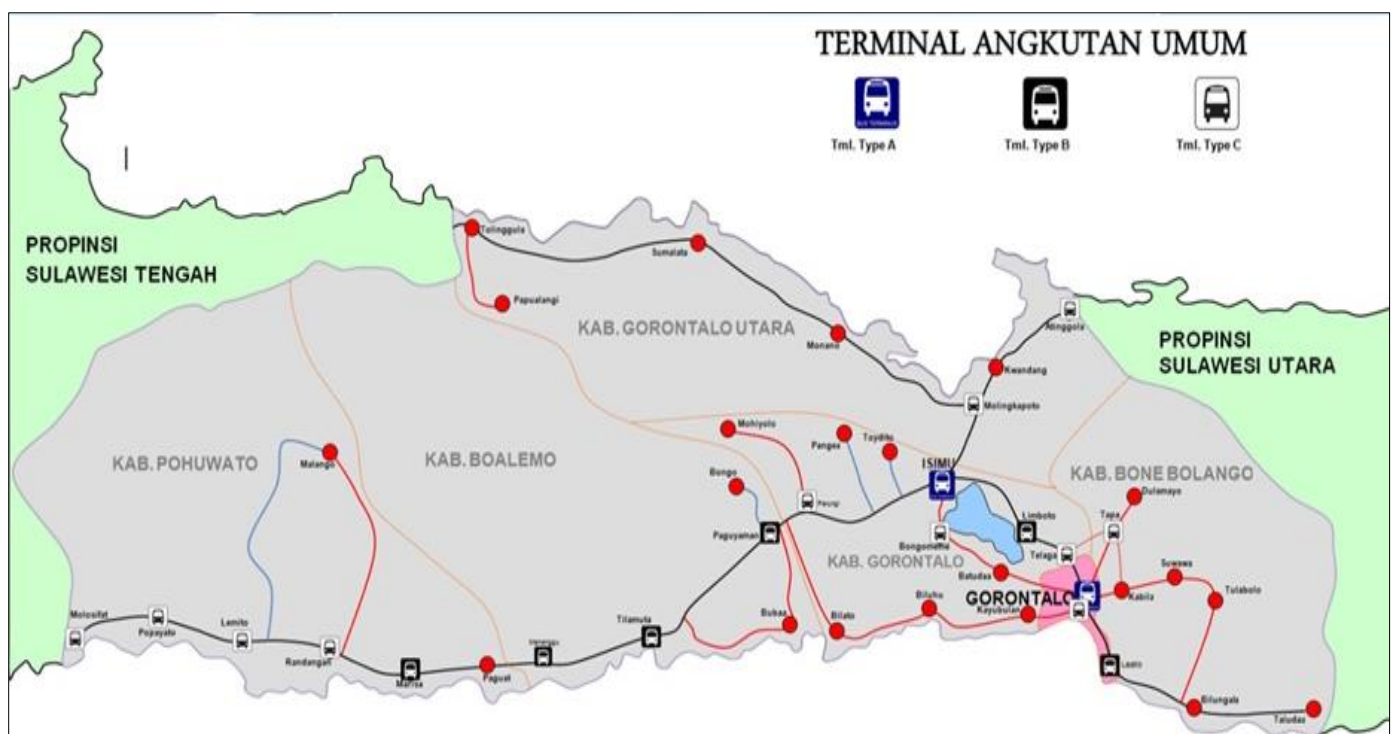


Fig 3 AKDP Transport Route Network Map for Gorontalo Province

C. Data Analysis

Primary and secondary survey data were analyzed qualitatively and quantitatively based on the standards provided by A World Bank Study 1986,

SK.687/AJ.206/DRJD/2002, and Minister of Transportation Regulation R. I. No. 10, in 2012, which has been summarized in table 2 below.

Table 2. AKDP Transport Service Operational Performance Standards

No	Operational Performance Parameters	Standard	Reference
1	Load factor, minimum	70 %	1, 2
2	Speed Travel, peak - non-peak times	30 – 50 km/hour	3
3	Headway, Maximum	10 – 12 minutes	1
4	Waiting time	5 – 10 minutes	2

	a. Average b. Maximum	10 – 20 minutes	
5	Travel time a. Average b. Maximum	1 – 1.5 hours 2 – 3 hours	2
6	Service Frequency	3 – 6 vehicle/hour	1

Sources: 1. A World Bank Study 1986, 2. SK.687/AJ.206/DRJD/2002,
3. Regulation of the Minister of Transportation of the Republic of Indonesia No. 10. 2012

Comparative analysis of operational performance standards between the standards given in Table 1 and the results of calculations of AKDP transport operational performance in Gorontalo Province, using several equations as follows:

➤ Load Factor Analysis

The load factor calculation is intended to measure passenger capacity for each trip so that from the load factor data, it can be seen whether each vehicle on each route can carry passengers at maximum capacity. The Directorate General of Land Transportation (2002) defines load factor as the ratio of sold capacity to available capacity for a single journey, typically stated as a percentage (%).

$$\text{Load factor} = \frac{\text{sold capacity}}{\text{available capacity}} \times 100\%$$

➤ Travel Speed Analysis

The speed recorded when public transport passes through each predetermined section is obtained from the length of the route and the travel time of each route. The Minister of Transportation Regulation R.I. No. 10 (2012) trip speed is the quotient of the distance travelled divided by the trip time, typically measured in kilometres per hour (km/h).

$$\text{Travel Speed} = \frac{\text{distance}}{\text{travel time}}$$

➤ Headway Analysis

Headway is a measure that states the distance or time when the front of successive vehicles passes an observation point on a road section. The A World Bank Study (1986) headway time difference between the leading bus and the bus immediately behind it.

$$\text{Headway} = \frac{60}{\text{Number of vehicles in 1 hour}}$$

➤ Travel Time Analysis

The Directorate General of Land Transportation (2002), defines travel time is when public transportation takes from one place of origin to the destination.

$$\text{Travel Time} = \frac{\text{traveling Time}}{\text{distances}}$$

➤ Waiting Time Analysis

Waiting time is the time of public vehicles at the initial and destination terminals. Based on World Bank Study (1986) standards, urban transportation waiting times classified as good are an average of 5 - 10 minutes and a maximum of 10 - 20 minutes.

$$\text{Travel Time} = \frac{1}{2} \text{ Headway}$$

➤ Frequency Analysis

World Bank Study (1986), defines the frequency of transportation services is the number of public vehicles per unit of time.

$$\text{Frequency} = \frac{60}{\text{headway}}$$

III. RESULTS AND DISCUSSION

A. AKDP Transport Operational Performance in Gorontalo Province

Based on the results of the analysis of the operational performance of AKDP transport from the perspective of load factors, travel speed, intermediary time, waiting time, travel time and vehicle frequency, the following results were obtained quantitatively and curatively:

➤ Load Factor Analysis

Table 3 Public Transport Performance Standards for Load Factor

Route Area	Average Load Factor (%)	Assessment Standards			Information
		Low (<70%)	Standard (70%)	Tall (> 70%)	
Gorontalo Regency	15	low	-	-	It is not by
Gorontalo City	57.14	low	-	-	It is not by
North Gorontalo Regency	86.7	-	-	tall	In accordance
Boalemo Regency	91.11	-	-	tall	In accordance
Pohuwato Regency	92.6	-	-	tall	In accordance
Bone Bolango Regency	27.78	low	-	-	It is not by
Average Amount	62%	low	-	-	It is not by

Source: Analysis Results, 2023

Based on existing standards, the analysis results in Table 3 show that the highest factor load according to the standards is located in the Pohuwato Regency route area (92.6%), followed by Boalemo Regency (91.11%) and North Gorontalo Regency (86.70%), Meanwhile, the lowest factor loads and not according to standards are Gorontalo Regency (15%), Bone Bolango Regency (27.78%), and Gorontalo City (57.14 %).

Overall, the average load factor for AKDP transport on the Gorontalo Province scale does not meet the minimum standard of 70% because it only ranges from 62% (not according to the standard)

➤ *Travel Speed Analysis.*

Table 4 Public Transport Performance Standards for Travel Speed

Route Area	Average Travel Speed (Km/Hr)	Assessment Standards			Information
		Low (< 30)	Standard (30 – 50)	Tall (>50)	
Gorontalo Regency	34	-	Standard	-	In accordance
Gorontalo City	22.5	Low	-	-	It is not by
North Gorontalo Regency	41.2	-	Standard	-	In accordance
Boalemo Regency	44.7	-	Standard	-	In accordance
Pohuwato Regency	46.02	-	Standard	-	In accordance
Bone Bolango Regency	38.7	-	Standard	-	In accordance
Average Amount	34	-	Standard	-	In accordance

Source: Analysis Results, 2023

Based on existing standards, the analysis results in Table 4 show that the highest travel speed according to the minimum standard is 30-50 km/hour, located in the Pohuwato Regency route area (46.20 km/hour), followed by Boalemo Regency (44.70%), North Gorontalo Regency (41.20 km/hour), Bone Bolango Regency (38.70 km/hour) and Gorontalo Regency (34 km/hour), while the lowest travel speed and not according

to standards, is located in the Gorontalo City route area (22.5 km/hour). Overall, the average travel speed of AKDP transport on a Gorontalo Province scale meets the minimum standard of 30-50 km/hour, which is around 34 km/hour (according to the standard).

➤ *Headway Analysis*

Table 5 Public Transport Performance Standards for Headway

Route Area	Average Headway (Minutes)	Assessment Standards			Information
		Low (> 12)	Standard (10 – 12)	Tall (< 5)	
Gorontalo Regency	25.71	Low	-	-	It is not by
Gorontalo City	25.71	Low	-	-	It is not by
North Gorontalo Regency	48	Low	-	-	It is not by
Boalemo Regency	48	Low	-	-	It is not by
Pohuwato Regency	60	Low	-	-	It is not by
Bone Bolango Regency	60	Low	-	-	It is not by
Average Amount	44.57	Low	-	-	It is not by

Source: Analysis Results, 2023

Based on existing standards, the analysis results in Table 5 show that the Headway for the entire route area is Pohuwato Regency (60 minutes) and Bone Bolango Regency (60 minutes), Boalemo Regency (48 minutes) and North Gorontalo Regency (48 minutes), respectively she was followed by Gorontalo Regency (25.71 minutes) and Gorontalo City (25.71

minutes). Overall, the average Headway for AKDP transport does not meet standards on a provincial scale because it has exceeded the maximum of 10-12 minutes, which is already around 44.57 minutes (not according to standards).

➤ *Travel Time Analysis*

Table 6 Public Transport Performance Standards for Travel Time

Route Area	Travel time Average (Minutes/Km)	Assessment Standards			Information
		Low (>12)	Standard (6 – 12)	Tall (< 6)	
Gorontalo Regency	1.76	-	-	Tall	In accordance
Gorontalo City	2.67	-	-	Tall	In accordance
North Gorontalo Regency	1.46	-	-	Tall	In accordance
Boalemo Regency	1.34	-	-	Tall	In accordance
Pohuwato Regency	1.3 0	-	-	Tall	In accordance

Route Area	Travel time Average (Minutes/Km)	Assessment Standards			Information
		Low (>12)	Standard (6 – 12)	Tall (< 6)	
Bone Bolango Regency	1.55	-	-	Tall	In accordance
Average Amount	1.68	-	-	Tall	In accordance

Source: Analysis Results, 2023

Based on existing standards, the results of the analysis in Table 6 show that the highest travel time and according to minimum standards is located in the Pohuwato Regency route area (1.30 minutes/km), followed by Boalemo Regency (1.34 minutes/km), North Gorontalo Regency (1.46 minutes/km), Bone Bolango Regency (1.55 minutes/km), Gorontalo Regency (1.76 minutes/km) and Gorontalo City (2.67

minutes/km). Overall, the average travel time for AKDP transport on the Gorontalo Province scale meets the minimum standard of 6-12 minutes/km, which is around 1.68 minutes/km (according to the standard)

➤ Waiting Time Analysis

Table 7 Public Transport Performance Standards for Lay Over Time

Route Area	Average Wait Time (Minutes)	Assessment Standards			Information
		Low (> 20)	Standard (5 – 20)	Tall (<5)	
Gorontalo Regency	12.86	-	Standard	-	In accordance
Gorontalo City	12.86	-	Standard	-	In accordance
North Gorontalo Regency	24	Low	-	-	It is not by
Boalemo Regency	24	Low	-	-	It is not by
Pohuwato Regency	30	Low	-	-	It is not by
Bone Bolango Regency	30	Low	-	-	It is not by
Average Amount	22.29	Low	-	-	It is not by

Source: Analysis Results, 2023

Based on existing standards, the results of the analysis in Table 7 show that the highest waiting time according to the minimum standards is located in the Gorontalo Regency route area (12.86 minutes) and Gorontalo City (12.86 minutes), while the waiting time lowest and not by minimum standards, respectively in the Pohuwato Regency route area (30 minutes) and Bone Regency Bolango (30 minutes), followed by Boalemo Regency (24 minutes) and North Gorontalo Regency

(24 minutes). Overall, the average waiting time for AKDP transport on a Gorontalo Province scale is not up to standard because it has exceeded the standard minimum of 5-20 minutes, namely around 22.29 minutes (not according to standard)

➤ Frequency Analysis

Table 8 Public Transport Performance Standards for Frequency

Route Area	Average Frequency (Kend . /Hour)	Assessment Standards			Information
		Low (<4)	Standard (4 – 6)	Tall (>6)	
Gorontalo Regency	3.43	Low	-	-	It is not by
Gorontalo City	2.71	Low	-	-	It is not by
North Gorontalo Regency	1.4	Low	-	-	It is not by
Boalemo Regency	1.4	Low	-	-	It is not by
Pohuwato Regency	1	Low	-	-	It is not by
Bone Bolango Regency	1	Low	-	-	It is not by
Average Amount	1.82	Low	-	-	It is not by

Source: Analysis Results, 2023

Based on existing standards, the analysis results in Table 8 show that the AKDP service frequency still needs to meet the minimum standard of 4-6 vehicles/hour. The only route area that approaches service frequency performance standards is the Gorontalo Regency area (3.43 kind./hour). In contrast, AKDP service frequency The lowest that did not meet the standards were Pohuwato Regency (1 kind./hour) and Bone Regency, respectively Bolango (1 vehicle/hour), Boalemo Regency (1.4 vehicles/hour) and North Gorontalo Regency (1.4 vehicles/hour), followed by the Gorontalo City route area (2.71

vehicles/hour). Overall, the average service frequency of AKDP transport on a scale in Gorontalo Province is not up to standard because it is below the standard minimum of 4-6 vehicles/hour, which is around 1.82 vehicles/hour (not according to standard).

B. Strategy for Improving the Performance of Leading AKDP Routes

After identifying superior AKDP routes, the next step is to formulate a strategy to improve the performance of these

superior routes. This strategy aims to improve the quality of public transportation services and increase the role of superior AKDP routes in supporting reducing traffic congestion increasing regional connectivity and accessibility, thereby having a positive impact on economic growth in Gorontalo Province. Strategies that can be implemented technically qualitatively include:

- Increasing infrastructure improvements to the AKDP transport route network, such as improving the condition of roads, terminals and supporting facilities.
- Coordination between stakeholders, namely increasing cooperation between stakeholders.
- Passenger Services, especially regarding improving fleet quality, increasing frequency of trips, adjusting fares, increasing security and safety of passengers, and increasing promotions and information.
- Digitalization, namely, using technology to improve efficiency and service quality.

Implementing this strategy is expected to improve the operational performance of superior AKDP routes and provide more significant benefits for the people of Gorontalo Province.

IV. CONCLUSION

Analysis of the operational performance of AKDP routes in Gorontalo Province shows superior AKDP routes with quite good characteristics and operational performance. Identifying superior AKDP routes is an essential step to improving the quality of public transportation services in Gorontalo Province. The results of identifying the operational performance of Intra-Provincial City Transport (AKDP) services in Gorontalo Province are currently dominantly not by the quality standards based on the A World Bank Study 1986 standard, SK.687/AJ.206/ DRJD/2002 and the Regulation of the Minister of Transportation R.I. No. 10. 2012. The operational performance of AKDP transportation services that do not comply with these standards, respectively, includes Average load factor (62%), average Headway (44.57 minutes), average layover time (22.29 minutes) and service frequency average vehicle (1.82 km/hour). In contrast, service operational performance that meets standards only includes average travel speed (37.85 km/hour) and average travel time (1.68 minutes/ km).

Strategies that can be implemented in improving the operational performance of AKDP transportation services in Gorontalo Province technically qualitatively include:

- Increasing infrastructure improvements to the AKDP transport route network, such as improving the condition of roads, terminals and supporting facilities.
- Coordination between stakeholders, namely increasing cooperation between stakeholders.
- Passenger Services, especially regarding improving fleet quality, increasing frequency of trips, adjusting fares, increasing security and safety of passengers, and increasing promotions and information.

- Digitalization, namely, using technology to improve efficiency and service quality.

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