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Improving Trans Intan Public Transportation Facilities to Support Accessibility and Mobility in Banjar Regency

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***Abstract*—**This study aims to analyze and improve the public transportation infrastructure facilities of Trans Intan feeder services to support accessibility and mobility in Banjar Regency. The Trans Intan feeder service currently serves four routes in the Martapura urban area; however, it faces several key challenges, including limited Bus Stops, unsynchronized operational schedules with the BRT Trans Banjarbakula main service, and the absence of service integration performance assessments. The research methods used include primary and secondary data collection, operational performance analysis of feeder services, infrastructure demand analysis using the 85th percentile method and land use analysis, timed transfer synchronization analysis, and Spatial Network Analysis for Multimodal Urban Transport Systems (SNAMUTS) to measure the level of transportation network integration. The results indicate that the total demand for new infrastructure facilities in the Martapura urban area reaches 42 points, consisting of 3 transit hubs, 9 bus stops, and 30 bus stopping places (TPB). The proposed operational analysis yields headway settings of 12 minutes during peak hours and 16 minutes during off-peak hours, with 16 hours of daily operational time (06:00-22:00) to align with the BRT Trans Banjarbakula schedule. Schedule synchronization at three transit hub points produces an average maximum intermodal waiting time of 10 minutes. The SNAMUTS analysis results demonstrate a significant increase in the Composite Index value from 248.2 in the existing condition to 733.9 in the proposed condition, representing a 2.96-fold improvement. This study recommends infrastructure development, extension of feeder operational hours, and implementation of the timed transfer concept to enhance public transportation integration in Banjar Regency.

Keywords—Feeder Service, Infrastructure, Integration, SNAMUTS, Synchronization, Timed Transfer, Transit Hub

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I. INTRODUCTION

Public transportation is a strategic policy instrument in the provision of road-based passenger transport, with the primary objective of reducing traffic congestion through collective vehicle use [1]. From a public service perspective, public transportation is not merely a business entity but rather a means of fulfilling basic mobility needs that must be provided by the government. With its massive and organized carrying capacity, integrated public transportation is expected to guarantee inter-regional connectivity and more efficient road space utilization compared to private vehicle use.

Proper public transportation management must be supported by adequate infrastructure as stipulated in national legal frameworks. Based on Law Number 22 of 2009 concerning Traffic and Road Transport, the government is responsible for ensuring the availability of supporting facilities for traffic safety and smoothness [2]. One component of road equipment to support public transportation operations is the vehicle passenger stopping place, including both bus stop buildings and bus stopping place (TPB) signs.

The Trans Intan feeder service is designed to support and complement the main corridor service of BRT Trans Banjarbakula by reaching residential areas with narrower road access. Currently, the Trans Intan feeder service operates four routes: Route A1 (SMP Negeri 1 Martapura - Islamic Boarding School Darul Hijrah Putra), A2 (Ratu Zalecha Green Open Space Square - Bincau 3-Way Intersection), A3 (Bincau 3-Way Intersection - Karang Intan District Office), and A4 (Bincau 3-Way Intersection - Education Road - Sekumpul Road - Sekumpul Shopping Center Complex - Minister Four Road - Pangeran Hidayatullah Road).

Banjar Regency, as part of the Banjarbakula National Strategic Area, is facing new dynamics in its transportation governance. The presence of the Teman Bus (BRT) has successfully become the main axis of community movement. The availability of feeder services is currently the main requirement for expanding service coverage to residential areas. Based on the Governor Regulation of South Kalimantan Number 18 of 2024 concerning the Implementation of Mass Public Transport in the Banjarbakula Urban Agglomeration, the increase in mass public transport use must be implemented through the integration of transportation facilities and infrastructure [3].

Several problems were identified in this research: (1) the absence of effective feeder operational arrangements for integration with BRT Trans Banjarbakula; (2) the limited stopping facility infrastructure for feeder services in Banjar Regency; (3) the unavailability of adequate infrastructure facilities

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resulting in a lack of schedule certainty and compliance; and (4) the absence of an integration assessment between Trans Intan and BRT Trans Banjarbakula. The objectives of this study are to analyze feeder service operations, analyze infrastructure requirements, analyze BRT and feeder scheduling integration plans, and identify accessibility comparisons using SNAMUTS analysis.

II. METHOD

This study employs a quantitative research approach with descriptive-analytical methods conducted in Banjar Regency, specifically on the four Trans Intan feeder routes (A1, A2, A3, and A4). The research location covers the Martapura urban area and its surroundings, which constitute the main activity center of Banjar Regency. The research was held for five months from January to Mei 2026.

Data collection techniques include both primary and secondary data collection. Primary data was obtained through dynamic surveys (onboard passenger surveys), static surveys (passenger counts at potential points), passenger interviews, and existing infrastructure condition inventories. Secondary data was obtained from Banjar Regency Public Works and Spatial Planning Agency, Banjar Regency Transportation Agency, Banjar Regency Regional Development Planning Agency, Banjar Regency Population and Civil Registration Agency, and the Strategic Plan documents of the South Kalimantan Transportation Agency 2021-2026 and the Strategic Plan of the Banjar Regency Transportation Agency 2025-2029.

The data analysis techniques employed include: (1) operational performance analysis of feeder services including travel time, headway, frequency, cycle time, number of vehicles, and load factor calculations; (2) passenger pocket analysis using frequency distribution and 85th percentile statistics to establish minimum passenger thresholds; (3) infrastructure demand analysis based on distance and land use in accordance with the Directorate General of Land Transport Decree Number 271/HK.105/DRJD/96 [4]; (4) transit hub and infrastructure point determination analysis; (5) timed transfer schedule synchronization analysis; and (6) Spatial Network Analysis for Multimodal Urban Transport Systems (SNAMUTS) analysis [5] including degree centrality, closeness centrality, 30-minute contour catchment, betweenness centrality, speed comparison, nodal connectivity, and composite index.

III. RESULTS AND DISCUSSION

1.1. Operational Performance Analysis

The existing operational performance analysis results show that Trans Intan services have relatively low load factors, ranging from 26% to 42%. The current feeder operational hours are only 11 to 11.5 hours per day, while BRT Trans Banjarbakula operates for 16 hours (06:00-22:00). This condition causes service discontinuity between the feeder and main services.

Based on this analysis, the study proposes operational changes to 16 hours (06:00-22:00) with proposed headway settings of 12 minutes during peak hours and 16 minutes during off-peak hours. The proposed number of vehicles Public Transport Trans Intan for each route is 10 units for route A1, 9 units for A2, 9 units for A3, and 12 units for A4, totaling 40 vehicles with a travel times of 26 minutes for A1, 23 minutes for A2 and A3, and 33 minutes for A4. The proposed operations were selected using the theory of the book Urban Transit: Operations, Planning, Economics [6] by taking into account the operational requests from SK.687/AJ.206/DRJD/2002 Regarding Technical Guidelines for the Implementation of Public Passenger Transportation in Urban Areas on Fixed and Regular Routes [7] for alignment with existing conditions and service policies. So, the operational proposal is a combination of policy based and demand based. The proposal is expected to create continuity of service between feeder transportation and main services.

1.2. Infrastructure Needs Analysis

Infrastructure demand analysis was conducted using the 85th percentile statistical method (quantitative) and perception of land use and observed activity centers (qualitative) to determine the minimum standard of passenger boarding and alighting per road segment and land use and activity centers. Based on the calculations, a minimum threshold of 28 passengers per segment was set as the requirement for bus stop construction, while segments below this threshold would only be provided with Bus Stopping Places (TPB).

Based on Table 1, the study concludes a total demand of 42 new infrastructure points in the Martapura urban area, consisting of 3 transit hubs, 9 proposed bus stops, and 30 proposed TPBs to ensure certainty of stopping points for the public and eliminate the habit of boarding and alighting passengers at arbitrary locations. The three proposed transit hubs include Earth Light Congratulations (CBS) Transit Hub, Sekumpul Shopping Center (PPS) Transit Hub, and Bincau 3-Way Intersection (BINCAU) Transit Hub.

1.3. Schedule Synchronization Analysis

The timed transfer schedule synchronization analysis focused on three main nodes shows significant results in facilitating passenger transfers. By synchronizing the arrival times of Trans Intan feeder services with the departure schedule of BRT Trans Banjarbakula, an average maximum intermodal waiting time of 10 minutes was achieved based on table 2. The fastest transfer time was recorded for the transfer from route A4 to BRT in the PPS area, requiring only 4 minutes.

1.4. SNAMUTS Analysis

The integration assessment results using the Spatial Network Analysis for Multimodal Urban Transport Systems (SNAMUTS) method demonstrate that the proposed research design can drastically improve network quality. The Composite Index parameter, which is the accumulation of six accessibility and mobility indicators, recorded an increase from 248.2 in the existing condition to 733.9 in the proposed condition, representing a 2.96-fold improvement.

Based on Table 3, although the average value per facility decreased from 24.8 to 15.2, this actually

indicates a positive impact from the expansion of more evenly distributed service coverage to various areas in Martapura City. The increase in the total Composite Index value from 248.2 to 733.9 proves that the overall network expansion plan successfully maximizes the reach and quality of mass transportation accessibility.

TABLE 1.
PROPOSED INFRASTRUCTURE DEMAND IN MARTAPURA URBAN AREA

Infrastructure Type	Total
Transit Hub	3
Bus Stop Buildings	9
Bus Stopping Place (TPB) Signs	30
Total	42

TABLE 2.
VALUES INTERMODAL WAITING TIMES AT TRANSIT HUB

Transit Hub	Modes	Waiting Time
Transit Hub CBS	A2 to BRT	7 minutes
	A4 to BRT	7 minutes
	BRT to A2	9 minutes
	BRT to A4	8 minutes
	A4 to A2	5 minutes
	A2 to A4	6 minutes
Transit Hub PPS	A1 to BRT	7 minutes
	A4 to BRT	4 minutes
	BRT to A1	8 minutes
	BRT to A4	6 minutes
	A4 to A1	6 minutes
	A1 to A4	8 minutes
	Modes	Waiting Time
	A3 to A2	2 minutes
	A3 to A4	4 minutes
	A2 to A3	10 minutes
	A2 to A4	6 minutes
	A4 to A3	10 minutes
	A4 to A2	8 minutes

TABLE 3.
COMPARISON OF EXISTING AND PROPOSED INTEGRATION VALUES

Parameter	Existing	Proposed	Comparison
Total Composite Index	248.2	733.9	2.96 times
Average per Facility	24.8	15.2	0.61 times

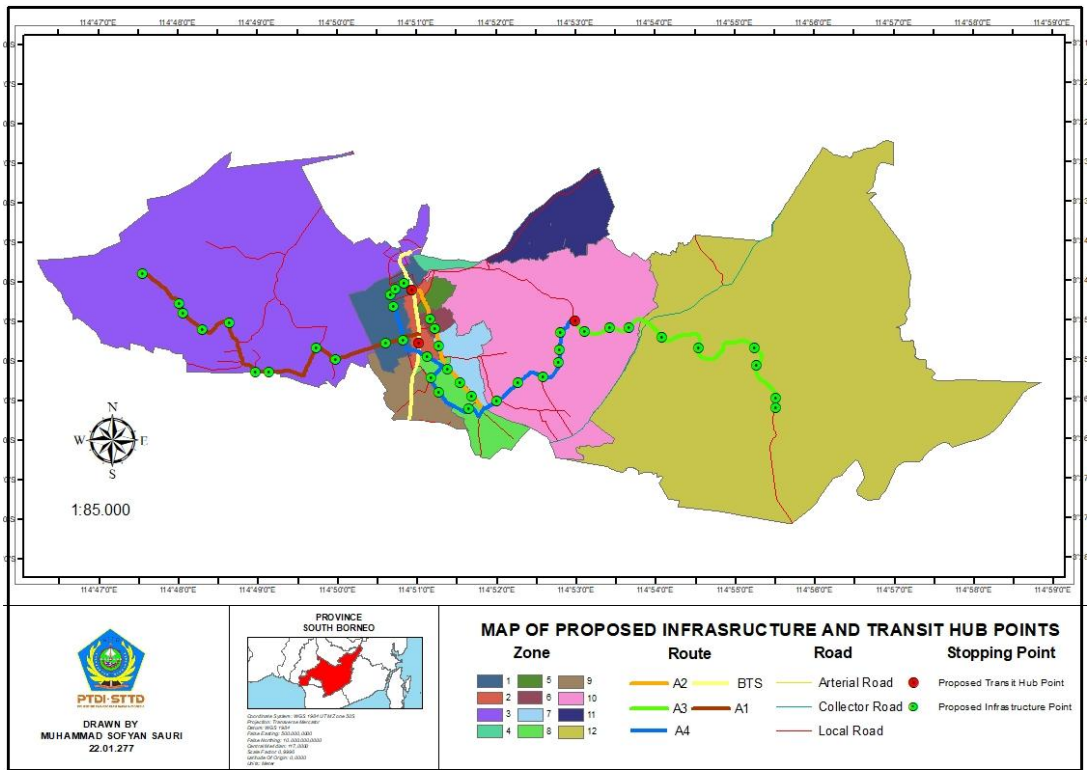

Figure. 1. Map of Proposed Infrastructure and Transit Hub Points

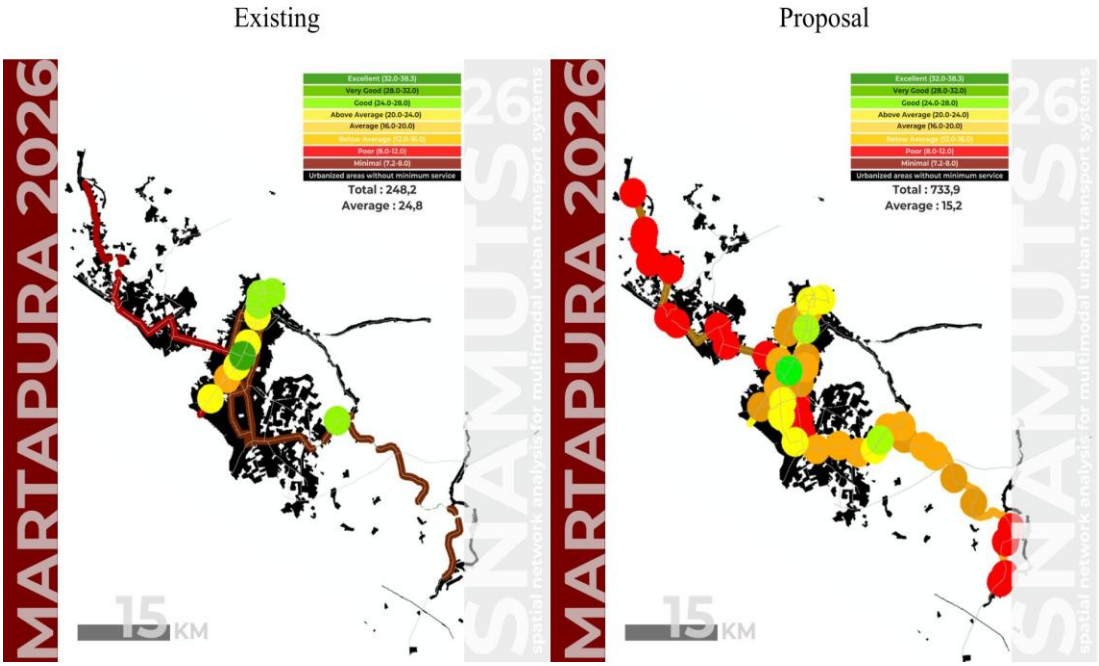

Figure. 2. Visualization of Existing and Proposed Integration Accessibility Values

IV. Conclusion

Based on the research results and analysis conducted, several conclusions can be drawn: (1) The operational performance analysis indicates the need to change feeder operational hours to 16 hours (06:00-22:00) with headway of 12 minutes during peak hours and 16 minutes during off-peak hours to align with the BRT Trans Banjarbakula schedule; (2) The total demand for new infrastructure facilities in the Martapura urban area reaches 42 points consisting of 3 transit hubs, 9 bus stops, and 30 TPBs; (3) Timed transfer schedule synchronization at three transit hubs produces an average maximum waiting time of 10 minutes; and (4) The SNAMUTS analysis results show a 2.96-fold increase in the Composite Index from the existing to the proposed condition.

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