

Evaluation of Trans Metro Dewata Service and Infrastructure for Customer Satisfaction in Sarbagita, Bali

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ABSTRACT

In the streets of Bali, the number of motorcycles is nearly equivalent to its population, reaching around 4.1 million motorcycles. Trans Metro Dewata (TMD), as the public transportation system in SARBAGITA, Bali, faces challenges in encouraging the community to shift from private vehicles to public transport. Optimizing service systems and infrastructure is key to enhancing attractiveness and customer satisfaction. This study aims to analyze customer satisfaction levels with TMD services and identify optimization strategies to increase public interest in using public transportation. A quantitative method was applied through questionnaires distributed to 100 active TMD users. Data analysis involved the Customer Satisfaction Index (CSI), gap analysis, and validity and reliability tests using SPSS. Results show a CSI score of 68.17, categorized as "Satisfied" yet at the lower threshold. Best-performing attributes include staff responsiveness (+1.23), bus physical condition (+1.10), and ticket price relative to distance (+1.05). The weakest attributes are security at bus stops during nighttime (-1.74), weather protection at stops (-1.35), and availability of printed information (-1.29). Improvements in stop security infrastructure, information systems, and operational management can significantly boost public interest in using TMD as the primary transport choice.

Keywords: Trans Metro Dewata, public transportation, customer satisfaction, SARBAGITA, service optimization.

INTRODUCTION

As Bali undergoes continuous growth and development, the need for an effective transportation infrastructure to ensure the fluid movement of both people and commerce is increasingly apparent. However, the existing transportation network presents significant challenges. The transportation sector is a major consumer of energy and a substantial source of pollution, an issue compounded by a high reliance on private vehicles [1]. This dependence on private transportation has resulted in numerous adverse consequences, including severe traffic congestion, increased transportation costs, and a decline in air quality, prompting the government to explore more sustainable transportation alternatives [2].

Data from the Kementerian ESDM (Ministry of Energy and Mineral Resources) substantiates these challenges, indicating significant energy consumption within the transportation sector [3]. Furthermore, research from the Bali Environmental Agency identifies this sector as one of the largest contributors to emissions on the island, a situation exacerbated by data from 2020 showing vehicle ownership rates nearly equivalent to the island's population of 4.1 million [4]. In response to these issues, and mirroring initiatives in over ten other Indonesian cities such as Yogyakarta and Batam, the government has introduced a Bus Rapid Transit (BRT) system [5], [6]. The objective is to provide a public transportation option with efficiencies comparable to modern rail systems. It should be noted that evaluations of these analogous systems have yielded mixed results. For instance, research in Batam indicated that service quality was suboptimal due to inadequate facilities [7], while a study of the Yogyakarta bus system identified challenges related to long wait times and operational management [8]. Informed by these precedents, Bali has implemented its own bus service, the Trans Metro Dewata (TMD), to encourage a

modal shift from private to public transport in the high-density areas of Denpasar, Badung, Gianyar, and Tabanan [6].

Despite the deployment of a modern and comfortable fleet, the Trans Metro Dewata system has not achieved widespread adoption. A significant discrepancy exists between service provision and public utilization, which is characterized by chronic underuse, with vehicles frequently operating at very low occupancy rates [6]. Consequently, the TMD system is not effectively mitigating traffic and pollution problems and may inadvertently be contributing to them. This context provides the impetus for the current study, the primary goal of which is to identify the principal barriers and operational issues associated with the TMD's service and infrastructure from a user perspective. A thorough analysis will be conducted to formulate concrete and practical strategies for system enhancement. By determining how to position the bus service as a preferred transportation option, the ultimate aim is to contribute to a strategic framework that supports Bali's transition toward a more environmentally sustainable future.

RESEARCH METHODS

Research Design and Approach

This research employs a descriptive qualitative approach combined with a survey method to analyze customer satisfaction with TMD services [9]. Primary data were collected through structured questionnaires, while secondary data were obtained via field observations and documentation.

Research Flow Diagram

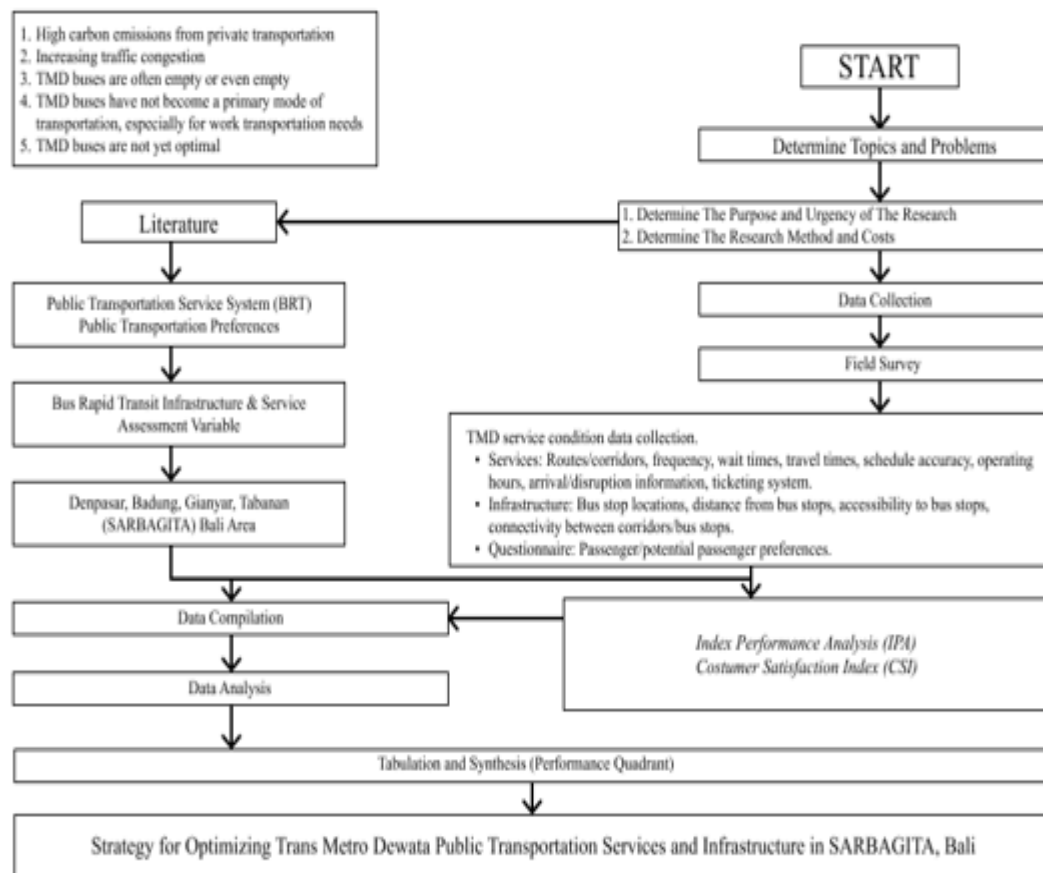


Figure 1. Research Flow chart

Population and Sample

The population includes all active TMD users in the SARBAGITA region. Using purposive sampling, 100 respondents were selected based on criteria: active TMD users for at least the last 3 months, minimum age 17 years, and willingness to participate.

Table 1. Respondent Statistic Frequency

No	Category	Sub-Category
1	Age Group	17-24 (48%) 25-34 (18%) 35-44 (23%) 45-60 (8%) Above 60 (3%)
2	Gender	Man (48%) Woman (52%)
3	Travel Destination	School/Campus (Student) (43%) Office (Employee) (24%) Tourist Attraction (Tourist) (33%)

Research Instrument

The questionnaire contains 38 questions across seven service categories:

1. Route Characteristics & Quality (4 items)
2. Performance & Service Reliability (7 items)
3. Bus & Stop Comfort (7 items)
4. Health & Cleanliness (4 items)
5. Fare & Ticketing (4 items)
6. Information, Service, and Customer Complaints (7 items)
7. Safety & Security (5 items)

Likert scales (1-4) measured importance (1=Not Important, 4=Very Important) and satisfaction (1=Not Satisfied, 4=Very Satisfied).

Validity and Reliability

Validity was tested via Product-Moment Correlation with a critical value of $r=0.361$ ($\alpha=5\%$). Reliability was assessed with Cronbach's Alpha, with a minimum acceptance of 0.60. Results showed all items are valid ($r > 0.361$) and highly reliable (Cronbach's Alpha > 0.90)[10].

Data Analysis Techniques

Data analysis uses:

Customer Satisfaction Index (CSI): $CSI = (\Sigma(MIS \times MSS) / \Sigma MIS) \times 25$

1. Gap Analysis: $Gap = MSS - MIS$
2. Descriptive Analysis: to describe respondent characteristics and data distribution

Interpretation of CSI: 0-64,99 (Not Satisfied), 65-80,99 (Puas), 81-100 (Very Satisfied), MSS (Mean Satisfaction Score), MIS (Mean Importance Score)

RESULT AND DISCUSSION

Customer Satisfaction Index (CSI) Results

Based on the analysis of 38 service attributes of TMD, the Customer Satisfaction Index (CSI) is obtained at 68.17. This value indicates that overall, TMD users feel "Satisfied" with the services provided. However, the CSI value is at the lower threshold of the "Satisfied" category (66-80.99), indicating there is still significant room for improvement in the services. (Interpretation of CSI 68.17: Although classified as "Satisfied," this value suggests that customer satisfaction can still be significantly improved through enhancements to the service attributes that have the highest negative gaps.)

Reliability and Validity Test Results

The results of testing the research instrument show:

Validity: All 38 question items have a calculated r value $> 0,361$ (table r for $N=30$, $\alpha=5\%$), so it is declared valid

Reliability:

Cronbach's Alpha for dimensions of interest: 0,927 (very high)

Cronbach's Alpha for dimensions of satisfaction: 0,953 (very high)

Table 2. Comprehensive Analysis of All Service Attributes

No	Service attributes	MIS	MSS	Gap	Satisfaction ranking	Status
1	Strategic route according to the purpose	3,00	2,71	-0,29	17	Needs Improvement
2	Strategic bus stop location	3,59	2,65	-0,94	32	Needs Improvement
3	Distance between stops	1,73	2,59	0,86	5	Good
4	Easy bus transfer	2,21	2,62	0,41	8	Good
5	Smooth bus journey	3,59	2,86	-0,73	28	Needs Improvement
6	Operational schedule (4:30 AM - 10:00 PM)	2,90	2,92	0,02	13	In Accordance
7	Bus arrival frequency	3,47	2,49	-0,98	34	Needs Improvement
8	Headway between buses	3,53	2,30	-1,23	35	Really needs Improvement
9	Travel time	3,00	2,62	-0,38	19	Needs Improvement
10	Feeder vehicle performance	2,78	2,24	-0,54	24	Needs Improvement
11	Parking facilities at bus stops	2,02	2,31	0,29	9	Good
12	Stops accessibility	2,00	2,59	0,59	6	Good
13	Weather protection at stops	3,61	2,26	-1,35	37	Really needs Improvement
14	Bus capacity/density	1,76	2,81	1,05	4	Very Good
15	Bus seat quality	3,02	2,82	-0,20	16	Needs Improvement
16	Disability/elderly seat	3,48	2,89	-0,59	26	Needs Improvement
17	Bus AC system	3,06	3,15	0,09	12	Good
18	Night bus lighting	3,10	3,01	-0,09	15	Needs Improvement
19	First aid equipment	2,94	2,59	-0,35	18	Needs Improvement
20	Cleanliness inside the bus	2,99	3,12	0,13	11	Good
21	Availability of hand sanitizer	2,27	2,80	0,53	7	Good

No	Service attributes	MIS	MSS	Gap	Satisfaction ranking	Status
22	Trash cans on the bus	2,55	2,56	0,01	14	In Accordance
23	Price vs quality of service	3,62	3,20	-0,42	21	Needs Improvement
24	Price vs mileage	2,15	3,20	1,05	3	Very Good
25	Diversity of payment systems	3,74	2,90	-0,84	30	Needs Improvement
26	Ticket purchasing option	3,74	2,79	-0,95	33	Needs Improvement
27	TEMAN BUS application performance	2,93	2,54	-0,39	20	Needs Improvement
28	Printed information	3,63	2,34	-1,29	36	Really needs Improvement
29	Real time bus info	2,86	2,39	-0,47	23	Needs Improvement
30	Complaint system	3,07	2,64	-0,43	22	Needs Improvement
31	Complaint response	3,17	2,60	-0,57	25	Needs Improvement
32	Officer's appearance	2,94	3,12	0,18	10	Good
33	Officer vigilance	1,88	3,11	1,23	1	Very Good
34	Physical condition of the fleet	2,12	3,22	1,10	2	Very Good
35	Safety equipment	3,69	2,99	-0,70	27	Needs Improvement
36	CCTV security system	3,73	2,97	-0,76	29	Needs Improvement
37	Driver discipline	3,80	2,91	-0,89	31	Needs Improvement
38	Night stop safety	3,77	2,03	-1,74	38	Really needs Improvement

From the table above, it can be concluded that the CSI value of 68.17 indicates that although users are satisfied with TMD services, their satisfaction level is at the lower threshold of the category. This condition indicates that people who have never used TMD may still be hesitant to switch from private vehicles. To increase the attractiveness of TMD to non-users, significant service quality improvements are needed in attributes with the highest negative gaps.

From the table above, it can also be concluded that the performance of service and infrastructure attributes has not met passenger expectations, with the lowest satisfaction gap value. Analysis of factors inhibiting the adoption of Land Mass Transportation (TMD) shows that the security of bus stops at night is the main obstacle with the largest negative gap (-1.74). This insecurity makes people, especially women and vulnerable groups, reluctant to use public transportation at night [11]. In addition, suboptimal bus stop infrastructure, such as inadequate protection from the weather and uncomfortable seats (-1.35), as well as limited information systems (-1.29), are also quite significant obstacles [12]. Operational problems such as uncertainty of bus arrival times, as reflected in the negative gap in headway (-1.23) and bus frequency (-0.98), also reduce public interest in switching from private vehicles to TMD [13].

On the other hand, several factors supporting TMD adoption have shown positive results, potentially attracting new users. Satisfactory service quality from TMD staff (+1.23), good fleet condition (+1.10), ticket cost-effectiveness compared to distance traveled (+1.05), and comfortable bus capacity (+1.05) are factors that have been well implemented and can be utilized to increase TMD usage.

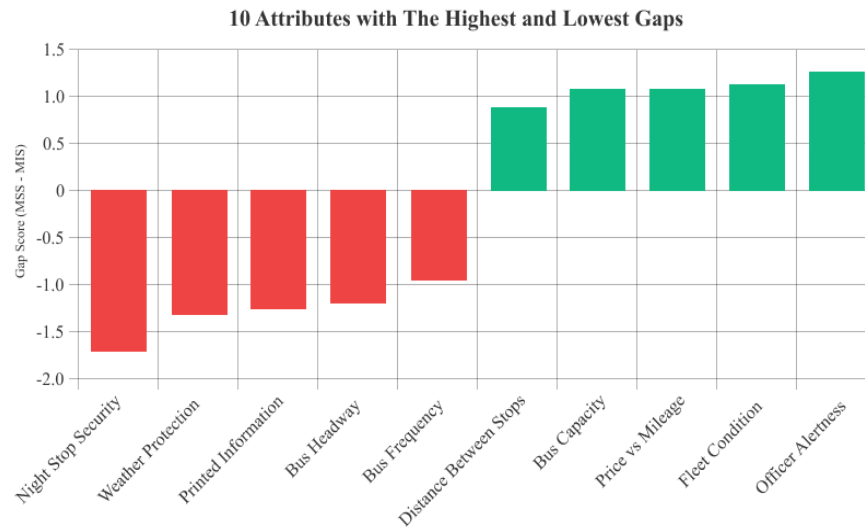


Figure 2. Attributes with The Highest and Lowest Gaps

Based on these conclusions, several strategies for optimizing TMD/Sarbagita services and infrastructure can be described as follows:

- a. Passenger safety and security are paramount. Safety and security aspects will be the most important and primary considerations for passengers when using public transportation. Therefore, all safety and security variables must be met as absolute requirements. Based on the above findings, the condition of bus stops is considered by passengers to be unable to provide a sense of security. Bus stops are still considered vulnerable to crime for passengers, especially at night. Organizers should provide bus stops that can provide a sense of security and comfort while waiting for the bus. This can be done by improving aspects that can prevent crime, including lighting systems, direct control and supervision systems (auto-surveillance) and indirect surveillance (CCTV), warning systems (crime alarms), and protection systems. Based on the findings, bus stop buildings are considered unable to optimally protect passengers from exposure to the hot sun and rain. As a result, passengers feel uncomfortable while waiting at the bus stop, especially in hot or rainy conditions. Therefore, it is necessary to review the bus stop design to make it more representative and functional, thereby improving passenger comfort [14]. Bus stops play a crucial role because the current bus wait time is quite long, making the time passengers spend at the bus stop a particular concern. The hope is that safe and comfortable bus stops will encourage passengers to be more patient while waiting for the bus.
- b. Bus arrival times and frequency are major challenges in the TMD/Sarbagita bus service. These challenges are caused by both internal and external factors. Internal factors include the limited number of buses compared to the service area. External factors include high levels of congestion on the roads served by buses. Therefore, achieving these goals requires integrated planning, both for services and urban planning, that focuses on public transportation (transit-oriented development) [15].

- c. A digital and manual (printed) public information system is needed. This system is designed to reach all groups, not just young people, but also less tech-savvy seniors. The Teman Bus app already provides many conveniences, but printed information also needs to be available in public spaces, especially at bus stops and other public facilities. This will make it easier for passengers to know how to access/reach/use TMD buses from their location.

CONCLUSION

Based on an analysis of 100 respondents who are active users of Trans Metro Dewata, this study produced several important conclusions: 1) Current Satisfaction Level: A Customer Satisfaction Index score of 68.17 indicates that TMD users are "Satisfied" but at the lower end of the category, indicating significant room for improvement in service quality, 2) TMD Strengths: Aspects that are already performing well include staff responsiveness (+1.23), fleet condition (+1.10), travel cost efficiency (+1.05), and comfortable bus capacity (+1.05). These strengths can serve as fundamental assets for attracting new users, 3) Priority Areas for Improvement: The three areas requiring the highest priority are nighttime bus stop security (-1.74), weather protection infrastructure (-1.35), and printed information systems (-1.29). Improvements in these areas would directly increase TMD's appeal to the public, 4) Potential for Increased Usership: By addressing identified gaps, TMD has significant potential to increase usership, particularly among segments of the population currently reliant on private vehicles. The implementation of the formulated optimization recommendations is expected to increase the CSI score to above 80 (the "Very Satisfied" category), which will directly impact public interest in using TMD as a primary transportation option. This will not only reduce congestion and pollution in the SARBAGITA area but also support Bali's vision as a sustainable destination. Successful TMD optimization requires a long-term commitment from all stakeholders, including local governments, TMD operators, and the community. With a systematic approach and phased implementation, TMD can become the backbone of a sustainable transportation system in Bali.

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