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Analysis of Batam Trans Bus Performance Quality on Urban Transportation System Activities in Supporting Availability of Regional Facilities

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Abstract

Batam City is one of the developing citiesBus Rapid Transit (BRT) as a mode of mass transportation for the community. Bus Rapid Transit (BRT) operations began in 2004. The existence of the Trans Batam Bus is still less popular with the public because other modes of transportation are easier to use as daily public transportation. Apart from that, the use of private vehicles is still high in Batam City. Trans Batam buses are provided as an integrated mode of transportation to serve the community and provide comfortable, safe facilities and prioritize safety. This research aims to identify the performance of the Trans Batam Bus transportation system based on the SPM for Road-Based Mass Transport (Permen No. 27 of 2015). The research method uses a questionnaire as a research instrument with data processing using scoring (Likert Scale). Multiple linear regression analysis method to determine the magnitude of performance. The sample was 99 respondents who used Trans Batam services. The research results show that aspects that are considered good and efficient according to public perception are busway facilities (0.748), integration with other transportation systems (0.413), and punctuality (0.233). The results of statistical calculations show that there is an influence of public interest of 72.5% on the performance of Bus Rapid Transit (BRT) with the aspects that have the most significant influence, namely security and safety.

Introduction

Law Number 22 of 2009 concerning Road Traffic and Transportation states that "The government is obliged to guarantee the availability of public transportation". It is emphasized that basically Bus Rapid Transit (BRT) is emulated with the performance of a modern public transport transportation system. The performance of a transportation system can be seen from two perspectives, namely from the management (operator) side and the user side. The performance of the transportation system in terms of management includes frequency, capacity, operational costs and scheduling system. The performance of the transportation system from the user side includes various service attributes that influence users in making movements and choosing the mode of transportation used. Public transport performance is the work ability of public transport in carrying out operations and/or services to transport users (Buana, 2021).

Performance in public transportation is divided into two, namely operational performance and public transportation services. The performance of public transportation needs to be assessed so that people who use public transportation get the rights as service users (Rizki, 2022), in addition to that, the service and operational performance of public transportation attracts people to use it. Performance in public transportation is included in the transportation system. The

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transportation system can be interpreted as a unit of components that support each other and work together in providing transportation services that serve areas from the local level (village and city) to the national and international level (Miro, 2012).

The transportation system is organized with the aim of coordinating the process of movement of passengers and goods by arranging components where infrastructure is the medium for the transportation process, while facilities are the tools used in the transportation process. The aim of the transportation system is to achieve an optimum passenger and goods transportation process within a certain time and space, taking into account factors such as safety, comfort and smoothness, as well as time and cost efficiency. A movement system that is safe, fast, comfortable, cheap, reliable and in accordance with the environment can be created if the movement is regulated by a good engineering and traffic management system (Tamin, 2008).

The role of the urban transportation system is to help determine the desired form of urban planning by combining several strategies. Strategies in the transportation system help cities look neater, thereby reducing the need for travel by public transportation, including the following examples: making the transportation system more effective, and limiting the use of private cars (Dameria et al., 2023). Types of public transportation that are often used by people include buses and public transportation. Currently, there are still many people who are not interested in public transportation modes, this is due to the lack of availability of facilities for using public transportation modes, such as the availability of seats during peak hours, erratic bus arrival times.

One of the researchers (Masbiran et al., 2022), who conducted research on the opportunities for implementing buy the service (BTS) subsidies on bus rapid transit (BRT) to improve the quality of public transportation services in Padang Panjang City, showed the results of the research that the BTS concept is a form of innovation for encourage increased targeted services in increasing the use of public transportation. BTS aims to provide convenience for people's mobility in urban areas and fulfill the SPM for public transportation. Through the BTS mechanism, the government can influence and control public transport operators so that their behavior is in line with government goals. This is also in accordance with government policy as stated in Article 158 of Law Number 22 of 2009 concerning Road Traffic and Transportation (Morlok, 1978).

Winandanto & Narendra (2021), with the results of research on bus rapid transit (BRT), found that the problem is that the cause of traffic jams in urban areas is the increasing tendency of transportation service users to use private vehicles compared to public transportation, resulting in increasingly dense traffic flow. Therefore, it is very important to have public transportation facilities to support residents in switching from private vehicles to public transportation that is adequate to accommodate people who use public transportation. The decreasing role of public transport is also caused by the low level of public transport service itself. Basically, a low level of service involves inadequate facilities and infrastructure, long travel times, the number of passengers exceeding carrying capacity, low levels of comfort, inadequate network systems, and difficult accessibility in certain areas.

Researcher Riawan (2018), in an analysis of medium capacity rapid trans bus services in urban transportation systems, showsthat the performance of BRT services in Batam City is still low. This can be seen from the inadequate condition of the facilities to support the comfort, safety and security aspects of service users.

Similar research was also carried out (Lendeon & Timboeleng, 2021) with the title analysis of the performance of the bus rapid transit (BRT) system in Kotamobagu City, found a problem, namely the existence of other modes of transportation, causing BRT operations to be less

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popular with the public because people are used to instant modes of transportation such as bentor, and the use of online motorbike taxis. and private vehicles commonly used by the people of Kotamobagu.

Mulyono's research (2024) proves the operational efficiency of assessing technical economic indicators explaining the transportation process, including network reliability to meet travel demand, consisting of connectivity reliability; Travel time reliability includes schedule reliability, lead time reliability, handling environmental impact reliability, and capacity reliability (Mulyono, 2024).

The city of Batam, with the largest population in the Riau Islands, also uses a transportation system using bus rapid transit (BRT), known as TransBatam, to handle traffic jams. Batam City is a city that is developing rapidly due to the influence of the region's function as a free port and trade area. Batam City is known as an industrial city which has many industrial and business activities in people's daily activities. To support community activities, transportation is very important. There is still very little public transportation in Batam City, so people need more transportation availability from the government. The following is the population in the Riau Islands in 2023, and the number of vehicle data in the Riau Islands in 2023.

Table 1. Population in 2023

City name	Resident
Batam city	1,269.41000 People
Tanjung Pinang City	239.85000 People
Karimun	266.18000 People
Bintan	165.78000 People
Phallus	102.85000 People
Natuna	85.45000 People
Anambas Islands	50.30000 People

Source: https://kepri.bps.go.id

Table 2. Number of National Police vehicle data for 2024

City name	Private car	Bus	Big car	Bicycle Motorcycle	Ransus	Total	%
Batam city	166,522	1,631	26,300	820,360	190	1,015,554	67.18
Tanjung Pinang City	23,486	211	5,630	165,920	160	195,488	12.93
Karimun	15,380	143	2,739	130,199	56	148,491	9.82
Bintan	8,802	359	2,526	89,025	57	100,785	6.67
Phallus	1,883	22	411	22,396	16	24,733	1.64
Natuna	2,249	20	626	19,704	22	22,628	1.50
Anambas Islands	181	19	53	3,699	19	3,972	0.26

Source: http://rc.korlantas.polri.go.id

Table 3. Number of TransBatam Bus Passengers

Year	Total passenger
2020	1,265,959 People
2021	1,172,266 people
2022	1,369,027 People

Source: Batam Transportation Department, 2023

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From the table above, it shows that the largest population in the Riau Islands is Batam City, namely 1,269,41,000 people. According to the Riau Islands Regional Police, the highest number of vehicles is in Batam City, namely 67.18%. It can be seen that the city of Batam is faced with a high population and a high number of vehicles, so the possibility of congestion becomes a major issue, a transportation system is needed.*buy the service subsidy*(BTS) in the form of bus rapid transit (BRT).Batam City has various types of public transportation currently available, such as conventional motorbike taxis. City transportation (pulpit), online motorcycle taxis, online taxis, conventional taxis, and Trans Batam buses.

Trans Batam is a public bus operated by the government.Trans Batam is transportation that provides cheap, safe and comfortable services to the community because Trans Batam buses currently use government subsidies. Trans Batam fares are subject to a fixed rate, not counting short or long distances, so all general passengers are charged six thousand rupiah while for students the fare is charged two thousand rupiah. There is an advantage in fares, but bus passengers feel that performance is not optimal. It was proven that because the bus officers were not clear enough in conveying information to passengers who did not understand Trans Batam, the officers still served manual and cash payments even though payments using Qris, Brizzi cards had been implemented, and the buses often arrived late so they did not match the set schedule and therefore exceeded the waiting time.

From year to year, Trans Batam service facilities have improved, several service facilities have been improved and updated to attract the number of passengers, as follows: (a) The Trans Batam bus stop or shelter room is equipped with free internet facilities (free wifi), restroom/toilet, comfortable waiting room, use of non-cash payment transactions with the application, arrival and departure schedules can be known clearly via the Trans Batam bus user application, can see the position of the bus; (b) Facilities on the Trans Batam bus, comfortable seating, air-conditioned bus, payment via QRIS provided free internet facilities, on time schedule, washroom/toilet available; (c) Cleanliness of the unit fleet is prioritized, several buses are provided/have handrails to secure standing passengers; (d) The bus stops are neatly painted and there are still stops that have permanent ticket counters.

This is used as an assessment by passengers regarding the Trans Batam bus facilities they are traveling on, which have various advantages that must continue to be improved. Passengers will compare the facilities of the major bus fleet with other fleets. From this explanation, the author chose Trans Batam, Batam City as the research object and took the title Analysis of the Performance of Trans Batam Buses in the Urban Transportation System of Batam City.

Literature Review

All forms of effort to move, divert, maneuver and transport objects to move to a place with a specific purpose are called transportation (Miro, 2012). The definition of a transportation system can be interpreted as a combination of components in transportation that interact with each other to form a transportation function (Miro, 2012).

The definition of a transportation system can be interpreted as a combination of components in transportation that interact with each other to form a transportation function. Transportation systems are further grouped into activity systems (transport demand), network systems (transport supply), movement systems (traffic) and institutional systems.

Performance is the ability or potential of public transportation modes to serve movement needs. Fitri (2023) states that service performance in transportation is capacity, accessibility and service quality.

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Bus Rapid Transit (BRT) or busway, which is a type of mass transportation based on a high-quality transit system based on a transit system with the aim of mobility in urban areas that has high quality and is equipped with infrastructure such as pedestrian paths, as well as service operations that prioritize speed, punctuality, comfort and relative costs. cheap. The operation and development of Bus Rapid Transit (BRT) in Indonesia is a form of implementation of the vision and mission of the government of the Republic of Indonesia in the 2014-2019 period as stated in the Trisakti Concept and the Nawacita Program (Directorate General of Land Transportation).

The operation of public transportation is regulated and determined by the Ministry of Transportation as stated in Minister of Transportation Regulation Number 27 of 2015 concerning Minimum Service Standards (SPM) for Road-Based Mass Transportation. In an effort to improve safety in road-based mass transportation related to safety aspects. In this regulation, there are 6 aspects and their service quality, namely indicators, value, size and quantity. There are 6 aspects, namely security aspects, safety aspects, comfort aspects, affordability aspects, equality aspects and regularity aspects.

Methods

The research method used is a quantitative descriptive method with primary and secondary data collection and distribution of questionnaires. Determining the sample using a purposive sampling technique was distributed to the people of Batam City as users of Trans Batam services totaling 99 samples. The data analysis technique used was scoring analysis (Likert scale) to identify the suitability of Trans Batam bus performance and statistical calculations of multiple linear regression analysis to determine the magnitude of the influence of performance on the assessment of the people of Batam City.

According to Sugiyono (2013), the Likert scale is used to measure the attitudes, opinions and perceptions of a person or group of people regarding social phenomena. The use of the Likert scale is measured by describing the indicators of the variables that are used as benchmarks for compiling statements or questions.

Table 4. Likert Scale Answers

Answer	Value Weight
Strongly Disagree (STS)	1
Disagree (TS)	2
Enough (C)	3
Agree (S)	4
Strongly Agree (SS)	5

Table 5. Index

Answer	Value Weight
Highly Unsuitable (STS)	0 – 1
Not Compliant (TS)	1.1 – 2
Enough (C)	2.1 – 3
Compliant (S)	3.1 – 4
Very Suitable (SS)	4.1 – 5

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Results and Discussion

General Overview of Batam City

Batam City is located in the Riau Islands Province, which is geographically located at (1º7) North Latitude and (104º7) East Longitude and is on a very busy trade and shipping route. The area of Batam City is approximately 1,647.83 km², consisting of 1,035.30 km of sea and 612.53 km of land, while the surrounding islands total 186 islands, 80 of which are inhabited while the remaining 106 islands are still empty. Batam City has the following territorial boundaries: (a) To the north it borders the Singapore Strait and Singapore; (b) To the south it borders Lingga Regency; (c) To the west it borders Karimun Regency; (d) To the east it borders Bintan Island and Tanjung Pinang

Batam's location is very strategic, namely on the busiest international shipping route in the world with a distance of only 12.5 nautical miles (20 km) from Singapore and is the gateway for tourist traffic coming in and out of the country, which is the Indonesian government's capital to spur regional development. from all aspects of life, especially in the economic sector.

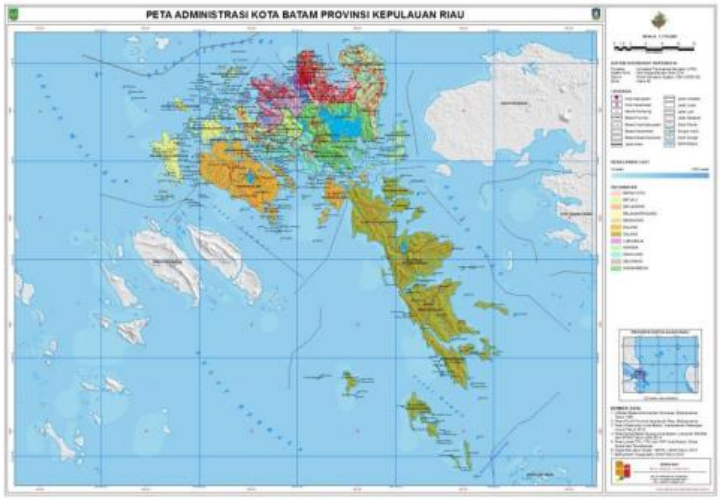

Figure 1. Administrative map of Batam City

Population

The population of Batam City according to the Central Statistics Agency in 2023 is 742,217 people. The population per sub-district is as follows:

Table 6. City Population Per District in 2023

Subdistrict	Amount
Behind Padang	10,700 inhabitants
Headdress	19,551 people
Galang	110,261 people
Beduk River	49,022 people
Roll	110,261 people
Nongsa	48,147 people
Batam City	96,971 people
Sekupang	85,631 people
Aji Stone	71,980 people
Lubuk Baja	44,555 people
Batu Ampar	31,648 people
Bengkong	63,490 people

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Amount	742,217 people

Source: BPS Batam City, 2023

Trans Batam Route

The Trans Batam route, which is called a corridor, is divided into 8 Trans Batam route corridors.The following are the Trans Batam corridor routes per corridor and service route.

Table 7. TransBatam Corridor in 2023

Corridor	Track	Amount
Corridor I	Sekupanga-Batam Center	20 units
Corridor II	Sekupang-Jodoh	20 units
Corridor III	Tanjung Uncang-Batam Center	20 units
Corridor IV	Sagulung-Sekupang	5 units
Corridor V	Matchmaking-Batam Center	3 units
Corridor VI	Piayu-Batam Center	5 units
Corridor VII	Punggur-Jodoh	5 units
Corridor VIII	Nongsa-Batam Center	7 units
Corridor IX	Tembesi-Galang	3 units

Source: https://dishub.batam.go.id

Figure 2. TransBatam Bus Route Network Map

Source: https://dishub.batam.go.id

Trans Batam Performance in Supporting Batam City's Urban Transportation System

Bus Rapid Transit (BRT) Batam City is assistance from the Central Government, in this case the Ministry of Transportation of the Republic of Indonesia. Procurement of Bus Rapid Transit (BRT) was initially planned to be 6 units, but there will be additional buses in line with the increase in population and road network. Trans Batam is a public transportation provider in Batam that operates bus routes. Trans Batam has 8 bus routes with 384 bus stops. The bus route covers the area from the North (Batam) with one stop at Nuvasa Bay to the South (Batam) with one stop at Piayu Laut Terminus (Sutianto et al., 2023).

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The westernmost stop is Sagulung Harbor (Batam) and the easternmost stop is Teluk Nipah (Batam). Trans Batam route schedules (schedule, itinerary, service hours), as well as departure and arrival times to stations are updated in the application in real time. Trans Batam has bus routes operating in Batam including; The longest route from Trans Batam is COR 7. The bus route starts from Teluk Mata Ikan (Batam) and ends at Transfer Point Batam Center (Batam), covering more than 25 km and 39 stops (Lendeon & Timboeleng, 2021). The shortest path is COR 5, This bus line starts from the Batam center transfer point and ends at the Jodoh terminal transfer point, a distance of 15 km with 22 stops. Information about travel fares and to buy bus tickets online on the official Trans Batam application, namely SIP TB

Trans Batam Shelter

A bus stop/shelter is a place designed for buses so that bus passengers can get on or off the bus. Shelters are usually positioned on highways and are distinct from highway facilities such as bus stations. Shelter construction tends to reflect usage levels, because buses stop at busy locations, bus shelters are expected to have shelter, seating, and passenger information systems such as electronic facilities; Less busy stops can use simple poles and flags to mark the location. Bus stops can be grouped with transport agencies allowing interchange between routes from nearby stops and other modes of public transport. PengThose using public transportation services in Batam are now getting improved facilities with the relocation of the Trans Batam Bus Stop which was previously under the PJB Batu Aji Bridge. This new bus stop is located in front of the TPI Batu Aji Housing Complex, offering better and more comfortable access for passengers (Meyer & Miller, 2001).

Not only Trans Batam, bus operator DAMRI has also followed in the footsteps by moving its operations to this new bus stop.

This integrated bus stop is designed to make it easier for users of both services, Trans Batam and DAMRI, to move between modes of transportation more smoothly. The facilities offered at this new bus stop have been significantly improved, including toilets, prayer rooms and a spacious waiting area. The quality of this facility is designed to provide maximum comfort for customers.

The condition of BRT shelters in Batam City at several points has become unkempt because BRT operations are not running well. At several points there was damage to the roof of the shelter, causing inconvenience for users. The access road to the shelter has 2 sides, namely the side with stairs and the side without stairs, making it easier for wheelchair users. However, despite the condition of the shelter infrastructure, public interest is still lacking, so the BRT shelter is only a gathering place, not a place to wait for buses to arrive. BRT in Batam City is equipped with several facilities that can support passenger security, comfort and safety. These buses not only offer an attractive appearance, but are also equipped with modern facilities such as AC, CCTV, GPS and other comfort features.

Suitability of Trans Batam Bus Rapid Transit (BRT) Performance

The following are the results of the analysis of the existing conditions of Batam City BRT services regarding the SPM for Road-Based Mass Transport (Ministerial Regulation No. 27 of 2015).

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Table 8. Performance Compliance with SPM

Indicator	Assess/Measure	Results (Mean)
Bus Frequency	The more frequent bus schedules available, the less time passengers have to wait at stops or stations	4.72 Very suitable
Average Speed	The average speed that can be achieved by buses in the Busway system will affect the total travel time from the starting point to the final destination.	4.50 Very suitable
Punctuality	The level of punctuality or reliability in following the schedule is an important factor in ensuring time efficiency on the Busway system.	4.65 Very suitable
Transportation System Integration	Time efficiency can also be increased with good integration between the Busway system and other modes of transportation	4.46 Very suitable
Busway Facilities	The quality of Busway infrastructure, including stops, exclusive lanes and other supporting facilities, will influence the efficiency of service time.	4.59 Very suitable
Information Accuracy	This variable includes the accuracy and real-time data provided by the Busway schedule application. Accurate and up-to-date information will help users plan their trips more efficiently.	4.60 Very suitable
Integration with Other Transportation Systems	The usability of Busway timetable applications can be enhanced if the application is integrated with other transportation systems so that users can plan multi-mode trips more easily.	4.55 Very suitable
Notice or Notification	This variable includes the application's ability to provide notifications to users about schedule changes, service interruptions, or other important information.	4.55 Very suitable
Ease of Payment and Ticket Purchase	If the Busway schedule application also provides easy payment and ticket purchases, this can increase usability and convenience for users.	4.67 Very suitable
Platform Support	This aspect includes the app's support for multiple platforms, such as Android and iOS devices, and availability in the form of a website as well.	4.47 Very suitable

Next, a scoring analysis was carried out using a Likert scale aimed at finding out the suitability of Trans Batam's performance by interpreting the scores according to the criteria.

Table 9. Number of respondents who answered

Criteria	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
STS (1)	1	-	-	-	-	-	-	-	-	-
T.S. (2)	-	2	-	-	-	-	-	-	1	-

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C (3)	-	2	-	3	4	1	4	3	2	3
STS (4)	23	39	34	47	32	37	36	38	25	46
SS (5)	75	56	65	49	63	61	59	58	71	50
Total number	99	99	99	99	99	99	99	99	99	99

Next, each indicator is calculated to find out the total score using the formula T x Pn.

Table 10. Total Score Results

Criteria	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
STS (1)	1	-	-	-	-	-	-	-	-	-
T.S. (2)	-	4	-	-	-	-	-	-	2	-
C (3)	-	6	-	9	12	3	12	9	6	9
STS (4)	92	156	136	188	128	148	144	152	100	184
SS (5)	375	280	325	245	315	305	295	290	355	250
Total number	468	446	461	442	455	456	451	451	461	443
	453/10=453									
Average value	4.72	4.50	4.65	4.46	4.59	4.60	4.55	4.55	4.67	4.47

Once the score is known, a calculation is carried out using the index formula to determine the interpretation percentage as follows:

I = 453/495 x 100% = 91.51%

According to the results of the analysis, the average performance variable is in very suitable criteria because the total average score is 453 (91.51%) compared to the expected 495 (100%).

The Influence of Performance on BRT Services

Table 11. Results of Multiple Linear Regression Analysis

Coefficientsa						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,410	,945		1,492	,139
	X1	-.109	.143	-.075	-.766	,445
	X2	,003	.132	,002	.021	,983
	X3	-.233	,210	-.135	-1.109	,270
	X4	-.017	,170	-.011	-.099	,921
	X5	,748	,170	,517	4,395	,000
	X6	-.209	,197	-.130	-1,063	,291
	X7	,413	,163	,288	2,531	.013
	X8	,198	,181	.134	1,091	,278
	X9	-.146	,177	-.100	-.822	,413
	X10	,007	,178	,005	,040	,968
a. Dependent Variable: Y						

Based on the results of the analysis using the SPSS program, the following equation results were obtained:

Y = 1.410 + 0.109 (X1) + 0.003 (X2) + 0.233 (X3) + 0.017 (X4) + 0.748 (X5) + 0.209 (X6) + + 0.413 (X7) + 0.198 (X8) + 0.146 (X9) + 0.007 (X10)

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The constant coefficient value is 1.410 which is positive. It is assumed that if the independent variable = 0 then the dependent variable is constant at a value of 1.410. This means that there is an increase in the variables Bus Frequency (X1), Average Speed (X2), Timeliness (X3), Transportation System Integration (X4), Busway Facilities (X5), Information Accuracy (X6), Integration with Other Transportation Systems (X7) , Notification or Notification (X8), Ease of Payment and Ticket Purchase (X9), and Platform Support (X10) which are standard indicators of BRT Trans Batam Batam City services in improving performance in using Trans Batam buses as a mode of public transportation in Batam City.

Table 12. R square test results

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.852a	,725	,243	,718
a. Predictors: (Constant), X10,				

Based on this output, it is known that the R Square value is 0.320, which means that the influence of variables Bus Frequency (X1) Average Speed (X2) Timeliness (X3) Transportation System Integration (X4), Busway Facilities (X5), Information Accuracy (X6), Integration with Other Transportation Systems (X7), Notice or Notification (X8), Ease of Payment and Ticket Purchase (X9), and Platform Support (X10) on the Public Interest variable (Y) which is 72.5%.

Conclusion

Results analysis of the performance of Trans Batam buses in supporting the urban transportation system of Batam City, namely: (1) Bus frequency (X1), Average speed (X2), Punctuality (X3), Transportation system integration (X4), Busway facilities (X5), Information accuracy (X6), Integration with other transportation systems (X7), Notification or notifications (X8), ease of payment and purchasing tickets (X9), and platform support (X10) show that the research results are very suitable. (2) The results of statistical calculations using multiple linear regression analysis to determine the performance of the Trans Batam bus service show that the influence of performance on public interest is 62%. Aspects that have a significant influence are aspects of busway facilities (X5), integration with other transportation systems (X7), and punctuality (X3). Safety and comfort are the main factors reviewed by users when using mass public transportation. In the calculation results, there is a positive value in the constant coefficient value, namely 1.410, which is assumed to be an increase in performance in providing and providing services to increase public interest in using Trans Batam.

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