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Research Article

Assessing Traffic Problems in Chennai: Fuel Consumption and User Perceptions Among Two-Wheeler Riders

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Abstract: There are many job opportunities in cities compared to rural areas due to which people move into cities which has facilities for more jobs, education and has a higher standard of living. Hence in cities commuting to work, to school, and to all other day to day activities has increased and has led to traffic congestion problems. Traffic congestion has become a major challenge in our metropolitan cities like Chennai due to the fast pace of urbanisation and the increasing number of vehicles on the road. Two-wheelers are widely used for daily commuting because they are affordable and convenient for busy roads. At the same time, heavy traffic conditions often lead to longer travel times and increased fuel consumption for people. This study aims to examine the traffic problems faced by two-wheeler users in Chennai and to analyse their impact on fuel usage. Primary data was collected from 120 respondents using a structured questionnaire. The study applies a descriptive research design and uses percentage analysis for data interpretation. The findings show that most commuters travel 10-20 km daily and spend around 30-60 minutes in traffic congestion. The study suggests improving traffic management and road infrastructure to reduce congestion and fuel wastage.

Keywords: Traffic congestion, Fuel Efficiency, Rapid Urbanisation, Commuter Behaviour, Transportation management.

INTRODUCTION

In metropolitan city Chennai there has seen a significant increase in the number of vehicles in city roads due to the rapid urban growth over the past few years. As the city is also developing infrastructural there is lot of roads, bridges and metro construction going on .As a result, it has become more difficult for daily commuters to manage transportation. Two-wheelers remain the most preferred mode of travel because they are economical and easy to ride in crowded streets. However, delays caused by signal waiting, road diversions and construction activities affect the efficiency of travel. Often, these conditions cause fuel to be used excessively and commute times to be longer. Understanding these issues is important for improving urban mobility and reducing fuel wastage. Hence, the purpose of this study is to study two wheeler riders perception towards traffic issues and their impact on fuel consumption among two-wheeler users in Chennai.

THEORETICAL BACKGROUND OF THE STUDY

The theoretical foundation of this study is based on concepts related to urban transportation systems, traffic congestion, and fuel consumption. Existing road infrastructure is under significant pressure due to a considerable growth in vehicle ownership caused by rapid urban expansion and population growth. The theory of traffic flow states that congestion occurs when the road capacity exceeds the volume of vehicles, leading to slower movement and an increase in travel delay. Frequent stopping and prolonged idling of vehicles are often the result of these conditions, leading to higher fuel consumption. Moreover, road design, traffic signal coordination, and overall traffic management practices are all factors that affect transportation efficiency. Ineffective management of these elements can lead to reduced mobility and increased operational costs for commuters. Understanding these theoretical perspectives helps in examining the relationship between traffic congestion and fuel consumption among two-wheeler users in Chennai.

REVIEW OF LITERATURE

Recent studies have revealed that traffic congestion is having an increasingly significant impact on fuel consumption and urban mobility. A study done by Parkavi (2025) has examined that high traffic volumes at major junctions like Kathipara and T. Nagar, leading to severe delays and controlled speed. Similarly, Agrawal (2025) highlighted that road transport in India contributes significantly to energy consumption and carbon emissions, mainly due to the increasing number of vehicles. Rishikesh (2024) analysed the concept of Mobility as a Service (MAAS) and found that its adoption could decrease the use of private vehicles to enhance fuel efficiency. According to Desai (2024), switching to public transportation is highly influenced by traffic congestion, fuel costs, and travel time. Furthermore, Halder (2024) highlighted the economic effects of congestion, acknowledging that a substantial amount of fuel is discarded each year because of idling

vehicles and major cities. In summary, these studies suggest that fuel consumption and commuting patterns are greatly influenced by traffic congestion, increasing vehicle usage, and infrastructure challenges, supporting the relevance of the present study.

RESEARCH METHODOLOGY:

The study's approach is based on a descriptive research design to examine the effect of traffic problems on fuel consumption among two-wheeler users in Chennai. By utilising the descriptive approach, one can comprehend the characteristics, behaviour, and opinions of commuters regarding traffic congestion and fuel usage. Primary data is collected through a structured questionnaire and secondary data was gathered from the research articles and related sources to back up the study. A sample of 120 respondents using two-wheelers were selected from Chennai for the purpose of the study. Responses from the respondents were collected through Google forms and convenience sampling technique is used for the purpose of the study. The study was carried out over a period of three months. ANOVA Correlation and Regression ism used by the researcher to analyse the data statistically.

DATA INTERPRETATION AND FINDINGS

Table 1: Demographic profile of the respondents

Demographic profile		Number of Respondents	Percentage (%)
Gender	Male	62	51.7
	Female	58	48.3
Age	18–28 years	55	45.8
	28–38 years	29	24.2
	38–48 years	13	10.8
	48–58 years	5	4.2
	Above 58 years	18	15.0
Distance Travelled per Day	Below 10 km	24	20.0
	10–20 km	54	45.0
	21–30 km	19	15.8
	Above 30 km	23	19.2
Average Time in Traffic	Less than 30 minutes	38	31.7
	30–60 minutes	56	46.7
	1–2 hours	8	6.7
	More than 2 hours	18	15.0

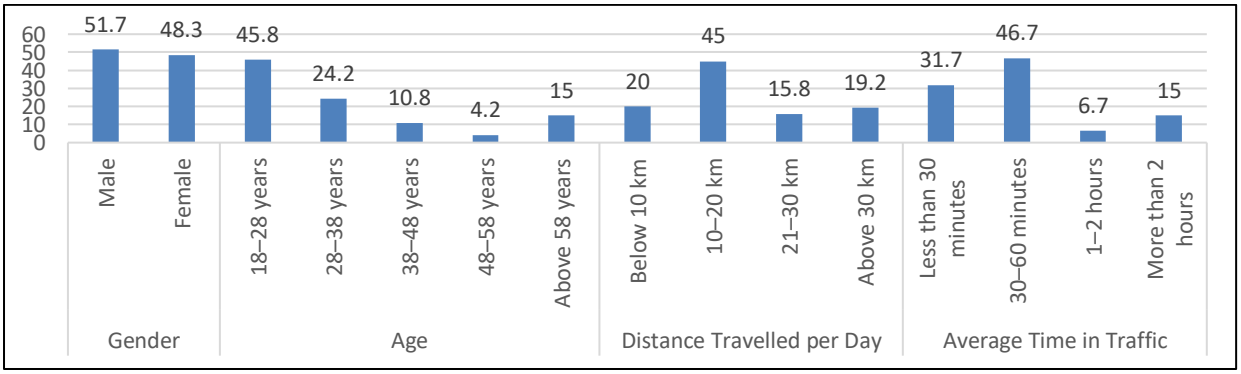

Chart 1: Demographic profile of the respondents

Inference:

The demographic analysis shows that there is a close ratio of male and female respondents, with 51.7% being male and 48.3% being female. A large proportion of respondents (45.8%) belong to the 18-28 years age group, suggesting that younger commuters constitute a major segment of two-wheeler users in Chennai. Regarding travel distance,45% of respondents travel between 10-20 km daily, which stipulates moderate commuting distances within the city. As for traffic exposure,46.7% of the respondents spend approximately 30-60 minutes indoors every day, highlighting the significant effect of congestion on daily commuters. By examining these demographic characteristics, we can clearly understand the respondent profile used to examine traffic problems and their impact and influence on fuel consumption among two-wheeler users.

Table 2: Reasons for Traffic Jam in Chennai

Statement	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
Number of vehicles is the main cause	16.7	50.8	28.3	4.2	0.0
Poor road maintenance contributes	22.5	50.0	25.8	1.7	0.0

Metro & flyover construction increases traffic	39.2	38.3	22.5	0.8	0.0
Inefficient signal timing increases delays	20.8	44.2	32.5	3.3	0.8
Lack of traffic discipline causes congestion	25.0	35.8	35.0	5.0	0.0
Encroachments & roadside parking contribute	29.2	37.5	31.7	4.2	0.0
Traffic congestion increases stress	30.0	45.0	27.5	1.7	0.0

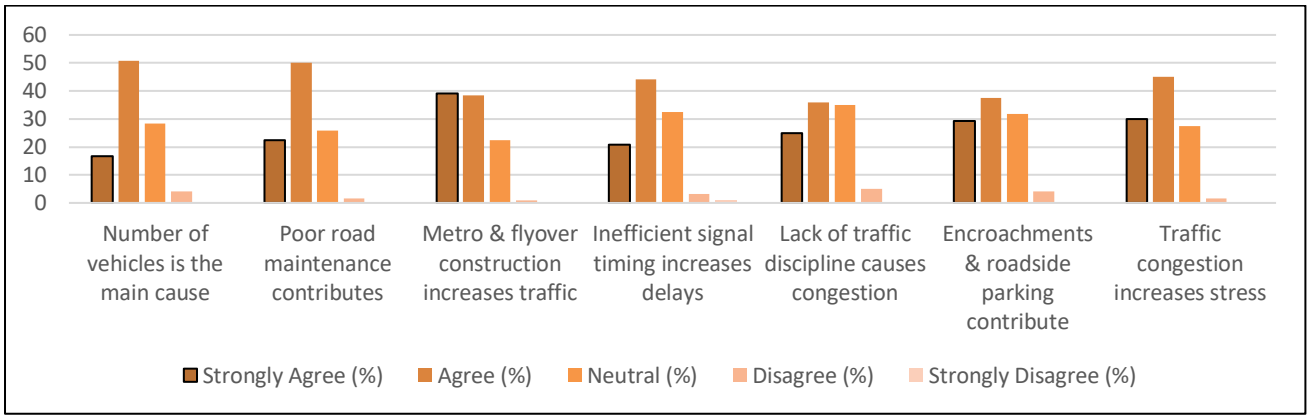

Chart 2: Reasons for Traffic Jam in Chennai

Inference:
According to the table, 50.8% of the respondents agree, and 16.7% are strongly in agreement, that the increasing number of vehicles is the primary cause of traffic congestion. In addition, a majority of 50% and a majority of 22.5% agree that road maintenance is a cause of congestion. A significant number of people (38.3%) agree and (39.2%) strongly agree that the construction of metro and flyover construction temporarily elevates traffic levels. Regarding inefficient signal timing, 44.2% agree, and 20.8% strongly agree that it increases delays. Additionally, 35.8% agree, and 25% strongly agree, that lack of traffic discipline causes congestion, while 37.5% agree and 29.2% strongly agree that encroachments and roadside parking contribute to traffic problems. Finally, 45% agree, and 30% strongly agree, that traffic congestion increases stress among commuters.

Table 3: Impact of traffic on fuel consumption

Impact of Traffic on Fuel Consumption	**No. of Respondents**	**Percentage (%)**
Traffic congestion directly increases my daily fuel expenses	14	11.7%
The more time I spend in traffic, the more fuel I consume	26	21.7%
Frequent traffic diversions increase travel distance and fuel usage	27	22.5%
Waterlogged or damaged roads increase petrol consumption	20	16.7%
Metro construction congestion significantly affects my fuel budget	15	12.5%
Better traffic management would help save petrol expenses	18	15%
Total	120	100%

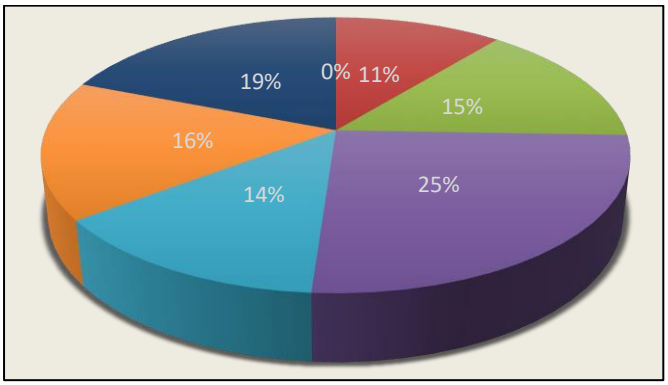

Chart 3: Impact of traffic on fuel consumption

Inference
From the above table, it is seen that the traffic diversions (22.5%), more time in traffic (21.7%), increase fuel use, damaged roads (16.7%), better traffic management 915%), metro work (12.5%), and congestion (11.7%) also affect fuel congestion. The majority (12.5%) of the respondents say traffic diversions are the main reason for increased fuel consumption.

Table 4: Fuel Saving Practices adopted by the two-wheeler respondents

Fuel Saving Practices and Remedies	No. of Respondents	Percentage (%)
Turning off the engine at signals helps reduce fuel consumption	24	20
Regular vehicle servicing improves fuel efficiency	12	10
Maintaining proper tyre pressure reduces fuel consumption	15	12.5
Avoiding sudden acceleration and braking saves fuel	9	7.5
Planning routes in advance reduces unnecessary fuel usage	27	22.5
Avoiding peak hours reduces fuel wastage	17	14.2
Fuel-efficient vehicle models reduce petrol expenses	15	12.5
Government awareness programs can help riders reduce fuel consumption	15	12.5
Switching to electric two-wheelers reduces petrol dependence	15	12.5
Improving public transportation will reduce congestion	17	14.2
Expanding roads and building flyovers will reduce traffic	12	10
Strict traffic rule enforcement will improve traffic flow	16	13.3
Promoting carpooling and ride-sharing will reduce congestion	7	5.8
Smart traffic management systems will improve traffic flow	13	10.8
Total	120	100

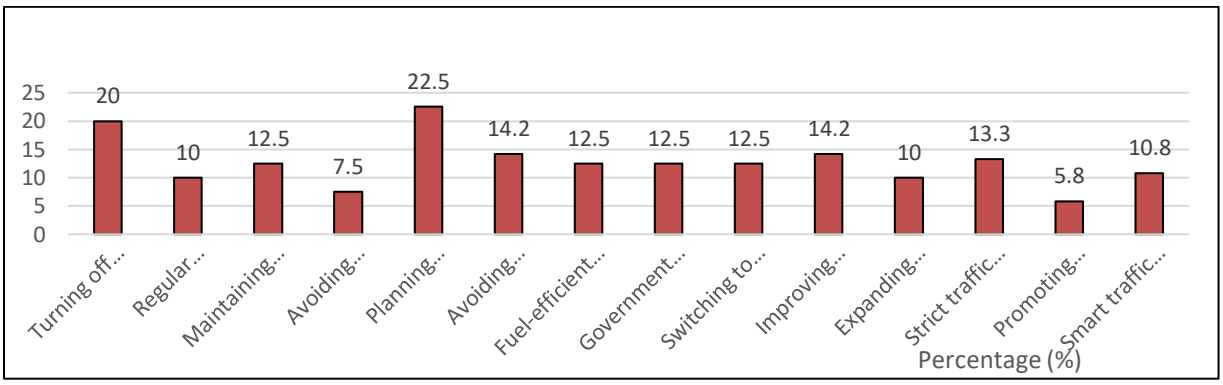

Chart 4: Fuel Saving Practices

Inference:
It is seen that the planning routes in advance (22.5%) and turning off the engine at signals (20%) are the most preferred fuel-saving methods, followed by avoiding peak hours (14.2%) and improving public transport (14.2%), while tyre maintenance, fuel-efficient vehicles, electric vehicles, awareness programs (12.5% each) also help, and carpooling (5.8%) is least preferred. The majority (22.5%) of the respondents prefer route planning as the most effective way to save fuel, followed by reducing idle time (20%).

STATISTICAL ANALYSIS

ANOVA Analysis

Hypothesis 1

- **H_0 (Null Hypothesis):** There is no significant association in the age of respondents and their opinions regarding whether traffic congestion in Chennai is severe.
- **H_1 (Alternative Hypothesis):** There is significant association in the age of respondents and their opinions regarding whether traffic congestion in Chennai is severe

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	**6.647**	4	**1.662**	4.491	.002
Within Groups	**42.553**	115	**.370**		
Total	49.200	119			

Inference:
Since P value (.002) is less than 0.05 we reject the null hypothesis and accept the alternate hypothesis. Hence there is significant association in the age of respondents and their opinions regarding whether traffic congestion in Chennai is severe

Hypothesis 2

- **H_0 (Null Hypothesis):** There is no significant association in the age of respondents and their opinions regarding metro and flyover construction increases traffic problems.
- **H_1 (Alternative Hypothesis):** There is significant association in the age of respondents and their opinions regarding metro and flyover construction increases traffic problems.

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.756	4	1.939	3.367	.012
Within Groups	66.235	115	0.576		
Total	73.992	119			

Inference

Since P value (0.12) is less than 0.05 we reject the null hypothesis and accept the alternate hypothesis. Hence, there is significant association in the age of respondents and their opinions regarding metro and flyover construction increases traffic problems.

Hypothesis 3

- **H_0 (Null Hypothesis):** There is no significant association in the age of respondents and their opinions that traffic congestion increases their stress level.
- **H_1 (Alternative Hypothesis):** There is no significant association in the age of respondents and their opinions that traffic congestion increases their stress level.

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.867	4	1.467	2.593	.040
Within Groups	65.058	115	0.566		
Total	70.925	119			

Since P value (0.40) is less than 0.05 we reject the null hypothesis and accept the alternate hypothesis. Hence, there is significant association in the age of respondents and opinions that traffic congestion increases their stress level.

REGRESSION ANALYSIS

Hypothesis 4

- **H_0 (Null Hypothesis):** There is no significant relationship between traffic-related factors and the perceived impact of traffic on fuel consumption among two-wheeler users in Chennai.
- **H_1 (Alternative Hypothesis):** There is significant relationship between traffic-related factors and the perceived impact of traffic on fuel consumption among two-wheeler users in Chennai.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.375[a]	.140	.118	1.499

a. Predictors: (Constant), Do you agree that metro construction is temporarily having a severe impact on traffic in Chennai city? , Average time spent in traffic daily, Average distance traveled per day

b. Dependent Variable: Do you agree that there is of heavy Impact of Traffic & Fuel

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.565	3	14.188	6.315	<.001[b]
	Residual	260.602	116	2.247		
	Total	303.167	119			

a. Dependent Variable: Do you agree that there is of heavy Impact of Traffic & Fuel

b. Predictors: (Constant), Do you agree that metro construction is temporarily having a severe impact on traffic in Chennai city? , Average time spent in traffic daily, Average distance traveled per day

Inference:

The regression model shows a moderate positive relationship between the independent variables and fuel consumption. The regression analysis indicates that traffic-related factors such as the impact of metro construction, average time spent in traffic, and average distance travelled per day significantly influence the fuel consumption among two-wheeler users in Chennai. The model shows a moderate positive relationship ($R = 0.375$), suggesting that as traffic-related issues increase, fuel consumption tends to increase as well. However, the explanatory power of the model is relatively modest, with an R^2 value of 0.140, meaning that only 14% of the variation in fuel consumption is explained by these variables, while the remaining variation may be due to other factors not included in the study. The adjusted R^2 (0.118) further supports this, indicating limited but meaningful predictive ability. Overall, the findings imply that while traffic conditions do significantly affect fuel consumption, additional variables should be considered for a more comprehensive understanding of the issue. The ANOVA results ($F = 6.315$, $p < 0.001$) also indicate that the overall regression model is statistically significant, meaning that the selected traffic variables jointly have a significant effect on fuel consumption. Therefore, the null hypothesis is rejected, and it can be inferred that traffic conditions significantly influence fuel consumption among two-wheeler users, although additional factors may also play a role in explaining the full extent of this impact.

CORRELATION ANALYSIS

Hypothesis 5

Relationship between traffic conditions, user perceptions, and fuel consumption among two-wheeler users in Chennai

- **H0:** There is no significant relationship between perceived traffic congestion and fuel consumption among two-wheeler users.
- **H1:** There is a significant relationship between perceived traffic congestion and fuel consumption among two-wheeler users.

Correlations

		Which of the major problems you face in day today life in traffic in Chennai? [The number of vehicles on the road is the main cause of traffic congestion]	Which of the major problems you face in day today life in traffic in Chennai? [Ongoing metro and flyover construction increase traffic problems.]	Which of the major problems you face in day today life in traffic in Chennai? [Poor road maintenance contributes significantly to traffic congestion]	Which of the major problems you face in day today life in traffic in Chennai? [Inefficient traffic signal timing increases congestion.]	Which of the major problems you face in day today life in traffic in Chennai? [Encroachments and roadside parking contribute to traffic problems]	Which of the major problems you face in day today life in traffic in Chennai? [Lack of traffic discipline among road users causes congestion.]	Which of the major problems you face in day today life in traffic in Chennai? [Traffic congestion increases my daily stress levels.]
Which of the major problems you face in day today life in traffic in Chennai? [The number of vehicles on the road is the main cause of traffic congestion]	Pearson Correlation	1	.263**	.214*	.270**	.335***	.296**	.323***
	Sig. (2-tailed)		.004	.019	.003	<.001	.001	<.001
	N	120	120	120	120	120	120	120
Which of the major problems you face in day today life in traffic in Chennai? [Ongoing metro and flyover construction increase traffic problems.]	Pearson Correlation	.263**	1	.148	.200*	.331***	.374***	.297***
	Sig. (2-tailed)	.004		.108	.028	<.001	<.001	<.001
	N	120	120	120	120	120	120	120
Which of the major problems you face in day today life in traffic in Chennai? [Poor road maintenance contributes significantly to traffic congestion]	Pearson Correlation	.214*	.148	1	.333***	.375***	.396***	.150
	Sig. (2-tailed)	.019	.108		<.001	<.001	<.001	.103
	N	120	120	120	120	120	120	120
Which of the major problems you face in day today life in traffic in Chennai? [Inefficient traffic signal timing increases congestion.]	Pearson Correlation	.270**	.200*	.333***	1	.449***	.365***	.334***
	Sig. (2-tailed)	.003	.028	<.001		<.001	<.001	<.001
	N	120	120	120	120	120	120	120
Which of the major problems you face in day today life in traffic in Chennai? [Encroachments and roadside parking contribute to traffic problems]	Pearson Correlation	.335***	.331***	.375***	.449***	1	.519***	.308***
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		<.001	<.001
	N	120	120	120	120	120	120	120
Which of the major problems you face in day today life in traffic in Chennai? [Lack of traffic discipline among road users causes congestion.]	Pearson Correlation	.296**	.374***	.396***	.365***	.519***	1	.406***
	Sig. (2-tailed)	.001	<.001	<.001	<.001	<.001		<.001
	N	120	120	120	120	120	120	120
Which of the major problems you face in day today life in traffic in Chennai? [Traffic congestion increases my daily stress levels.]	Pearson Correlation	.323***	.297***	.150	.334***	.308***	.406***	1
	Sig. (2-tailed)	<.001	<.001	.103	<.001	<.001	<.001	
	N	120	120	120	120	120	120	120

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

***. Correlation at 0.001(2-tailed)

Inference

The correlation analysis indicates that the major traffic problems in Chennai are closely interconnected, with both infrastructural issues and driver behaviour playing significant roles. Strong positive relationships are observed between encroachment and lack of discipline among road users (r = .519), as well as between improper road maintenance and encroachment (r = .449), suggesting that poor infrastructure and unregulated road usage often occur together. Additionally, lack of discipline is moderately associated with daily stress levels (r = .406), indicating that behavioural factors contribute substantially to commuter stress. Traffic signal inefficiencies and population congestion also show meaningful correlations with other variables, reinforcing the idea that traffic issues are multi-dimensional rather than isolated. Overall, the findings suggest that improving road discipline, managing encroachments, and enhancing infrastructure could collectively reduce traffic congestion and its associated stress.

CONCLUSION

The study on traffic problems in Chennai and their impact on fuel consumption, along with the perceptions of two-wheeler users, reveals that traffic congestion is a significant factor influencing fuel usage. The findings from the correlation and regression analyses indicate that key traffic-related issues such as metro construction, increased time spent in traffic, travel distance, traffic signals, parking constraints, and lack of lane discipline are positively associated with higher fuel consumption. Users' perceptions also align with these findings, as most respondents acknowledge that traffic conditions contribute to increased fuel usage in their daily commute. Overall, the study concludes that traffic congestion in Chennai not only affects travel time and commuter experience but also leads to economic and environmental consequences through increased fuel consumption. The inclusion of user perceptions strengthens the findings, highlighting the need for effective traffic management strategies, improved infrastructure planning, and policy interventions to reduce congestion and promote fuel efficiency.

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