Perceptions of Traffic Congestion among Two-Wheeler Users in Kathmandu Valley

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Abstract

In the Kathmandu Valley, traffic congestion is common problem to the travelers. Rapid urbanization, rising ownership of private vehicles, and insufficient road infrastructure, the road users are facing highly congested traffic, with frequent delays, wastage of fuel, and stress due to prolonged jams. The major objectives of the study included analyzing the time lost by two-wheeler riders due to traffic congestion and estimating the extra cost of fuel due to such delays. This study was a quantitative study that utilized descriptive and inferential designs. Primary data were gathered from 534 users of two-wheelers. Descriptive statistics, correlation, and multiple regression analyses were applied in testing the association between the dependent variables (time loss and fuel cost) and independent variables including the density of the traffic flow, narrow road, weather, driver attitudes, and efficiency in the traffic signal. On average, it is estimated that two-wheeler users lose about 11,730.25 minutes in a year due to congestion; this time is valued at approximately NRS 13,601.75 annually. Similarly it has additional cost of NRS16501.25 per year as additional fuel cost. Almost 30,000 NRS is loosed by a single two wheeler in this research paper.

Keywords: Fuel cost, narrow roads, productivity, traffic congestion, traffic density, weather condition

Introduction

Traffic congestion is a problem in not only in least developed countries but also is a serious threat to developed countries. It is basically blamed for loss of life and property which has a negative consequence in the society. People are losing their productivity due to bad weather and ultimately their income starts to decline. Two wheelers in Kathmandu valley has great influence in traffic congestion even the role of other types of vehicles cannot be ignored. Approximately 1.2 million vehicles, largely motorcycles, are on Kathmandu roads daily.

Two wheeler riders are suffering from traffic congestion so that they are losing their time and fuel.

Increased urbanization and the total numbers of vehicles on roads, without any significant adjustments to road infrastructure, have led to increased traffic congestion in urban areas of Nepal, particularly in the Kathmandu Valley. The sharp rise in two- wheelers has caused frequent traffic congestion, which has resulted in longer travel time, higher fuel use, and economic losses (Department of Transport Management [DoTM], 2023). Despite some studies being conducted regarding traffic management and environmental issues, the experiences of day-to-day commuters, particularly two- wheeler users, have not been given due attention in the literature (Shrestha & Shrestha, 2020; IUCN, 2004).

For two wheels' users who make daily trips using motorbikes and private cars traffic congestion entails considerable socio-economic expenses. These range from extremely high fuel expenses, loss of productivity, mental stress, to increased car maintenance costs. Moreover, volatile delays disturb work schedules, decrease earning opportunities, and adversely affect social life and mental well-being. Even though it forms a significant part of urban traffic, fewer studies have delved in detail into understanding the implications of congestion on this segment's economic well- being and social health. In the context of these gaps (Kumar & Pradhan, 2019.

Traffic congestion at principal intersections of Kathmandu Valley, like Kesharmahal, Narayanhiti, Tripureshowar, Koteshowar and Khanibhivag, has resulted in reduced traffic movement and longer queue lengths. The intersections are facing over- saturation, where they are surpassing capacity based on existing geometry and signalization. Studies emphasize the necessity for some actions to tackle congestion issues and improve traffic management efficiency at those intersections (Nepali et al. 2024).

Data and Methods

For this research article, data were collected from primary and secondary sources, Government of Nepal and Ministry of Labour, Transport and Management. Similarly data were taken from published articles and related other authentic sources. Data were compared and contrast with secondary data. For this, focus group discussion and key informant information used. Descriptive research design was a basic feature of this article. Studies of previous research articles was the main way to analyze the traffic congestion of Kathmandu, Nepal.

Data triangulation was the main method of argument to make knowledge check whether it is valid or not. Some key informants information were kept for its further reliability of the statement in this paper. Similarly, some international comparison made this analysis more comprehensive and near of reality. In essence, descriptive and analytical methods were used in the time of completing this research paper.

Literature review

This section is developed to illustrate what had actually did in this context. It is useful to identify content and methodological gap in the given subject matter. All types of literatures

are combine since there is no such separate provision in a research article. Theoretical, empirical and policy review are listed and try to manage on the basis of thematically and chronological order. Its history to some extent is useful since how the condition of congestion and environment degradation emerge in Nepal and rest of world. In the nomadic period, population was low and natural resources were plenty. There was no pressure on natural resources. There was no means of transportation, so that no problem were there. Environment was clean and friendly to the living beings. When there was a agricultural revolution, people life became easier. It was the reason for rapid growth in population. Industrial revolution was the prime cause of environment degradation and thereafter invention of various vehicles aggravated the situation.

World Bank, (2002) Traffic congestion is a condition that occurs when the volume of traffic generates demand that exceeds the capacity of a road network, leading to slower speeds, longer trip times, and increased vehicular queuing. Transportation or transport is the conveyance of people, animals, commodities and services from a location to a different location. There are different types of transport from ancient civilization to modern civilization from walking, boats, riding on animals, to wheeled vehicles to airplane. Developing countries in the recent decades have experienced huge population increases.

Downs (2004) describes traffic congestion as a situation where the number of vehicles using a road exceeds its designed capacity during peak times, resulting in delays, increased fuel consumption, and frustration among road users. Litman (2011) defines traffic congestion as the incremental delay caused by interactions among vehicles on the road network, often intensified by inadequate infrastructure, traffic incidents, or poor traffic management systems.

Modernization-driven urbanization leads to urban mismanagement, which is related with longer times to complete travel and isolated housing, commercial, and industrial regions. Dependency on private transport is a reason behind congestion. Public transport systems lag behind, either as a result of policy failure. As a result, cities have persistent traffic, especially during rush hours. It decreased productivity, environmental degradation, and low standard of living.

By identifying specific places in a road network where capacity is limited, causing congestion and late, Daganzo's (1997) bottleneck theory illustrate a point focus on explanation of congestion. Lane drops, intersections, mergers, and other roadway features that restrict traffic flow result in bottlenecks. At these places, flow breaks down if demand is greater capacity, creating congestion.

Barnamala (2015) explore the complex problem of traffic problem in Dhaka, Bangladesh, focus its effects on environmental sustainability, public health, and economic productivity. It calculate how daily traffic congestion causes time loss approximately 1.3 hours per person which results in an estimated yearly economic loss of more than 7,000 crore Taka. The financial burden is further increased by the higher operating costs and physical discomfort. Pollution from congestion has a significant negative impact on residents' health, causing

respiratory problem, headaches, stress, and eye effect. Higher noise and air pollution, which reflect on long-run risks to public health.

Vencataya,, Pudaruth, Dirpal, and Narain, (2018) suggest that congestion has a significant impact on society through higher accidents and stress, contract the economy through lower productivity and increased fuel consumption, and affects health of people and environment. The study had empirical evidence to support these negative effects, and more efficient, proper traffic management, infrastructural growth, and better public transport are needed.

Fattah, Morshed, and Kafy (2022) identified main reasons for traffic congestion and its complex consequences. Research frequently illustrated heavy port-bound traffic, narrow roads, uneven driving behavior, and port entrance congestion as key reasons of traffic delay and collapse flow state. These congestion leads toward economic, and environmental consequences. Social impacts related with increased stress levels among road users, health problems, and lower productivity, while economic costs are significant, with estimations around $2 million daily (Bangaladesh) due to delays, fuel wastage, and operator income losses. Environmental costs are also notable, with elevated emissions of pollutants such as CO_2, CO, and NOx during peak hours, exacerbating urban pollution. It emphasized the need for sustainable solutions like exclusive lanes for port trucks, improved public transportation like metro-rail, and improved traffic management.

Results and Discussion
In this section, data were and narratives were used to make the comparison between knowledge to verify their ground. Nepal is a country with three ecological zones with various types of road and vehicles. Traffic congestion is rampant in Kathmandu and it is a cause of environment degradation of Nepal. Transportation sufficiency is the feature of Kathmandu however single use of vehicle is a common problem of this area which taken as a pride of individual. One important matter is, here both quantitative aspect of congestion with qualitative aspect are explained. Level of income is the prime determinants of motorbike riding and the nature of job second top cause of bike use as a vehicle to reach in destination.
In the context of Kathmandu, 534 motorbike riders were interviewed to explore regarding to congestion and its especially economic effect, there income distribution was illustrated in table.

Table 1
Respondents Income

Income	Frequency	Percent
Below 15000	90	16.9
15001-30000	106	19.9
30001-50000	190	35.6
50001-70000	104	19.5
Above_70000	44	8.2
Total	534	100.0

Source: Field Survey,2025

In the data, what is unlocked that 35.6 percent riders have monthly income of Rs 30000 to 50000. They are doing their own business and some are doing good jobs in Kathmandu valley. They are getting much trouble due to traffic congestion and not completing their work in time. Its opportunity cost sometime is huge since it is not easy to express in some monetary units.

Similarly when riders were asked regarding to traffic jam, they had different version. Most respondent were accepting the fact that there is less than 30 minutes loss to reach their destination when they should travel almost 15 Kilometers in a day.

One of the respondent opinion that due to the traffic congestion of Tripureshowar around 11 am, I have severe migrant problem after 10 years. My productivity and working capacity had decreased. I'm not interested to share my ideas to others in working areas and prefer to stay alone.

Similarly, next rider has very bad experience regarding to traffic congestion. When he was passing through Koteshwor around 5 pm, he was not able to reach in airport in time and lost his domestic flight to Biratnagar. Some have no timely reaching their office and getting psychological pressure from the boss of a firm. Some caught in an accident and still life is difficult. Plan of an individual may not move accordingly as expected by people so it has lot of problems.

Table 2
Respondents, Traffic Jam daily in 15 KM Travel

Group	Frequency	Percent
less than 30 minutes	268	50.2
30-45 minutes	186	34.8
45-60 minutes	42	7.9
more than 60 minutes	38	7.1
Total	534	100.0

Source: Field Survey, 2025

Respondents were asked about how often they face traffic jam while riding their two wheelers. As per the data, people facing traffic jam less than 30 minutes dominates our data collection consisting of one hindered thirty-four respondents. People facing more than one-hour traffic jam is lesser with only thirty eight respondents. Other respondents include 30 to 45 minutes with 186 and 45 to 60 minutes with 42 respondents respectively. These delays contribute to increased stress, fuel consumption, and productivity loss. The data underscores the severity of congestion faced by two-wheeler users in Kathmandu Valley.

 Monthly fuel consumption is presented to illustrate the economic impact of traffic congestion on two-wheeler users in the Kathmandu Valley. The average monthly fuel consumption of respondents provides a basis for estimating their total travel hours, as fuel usage can be converted into approximate ride time, which further supports the assessment of traffic

congestion exposure. The fuel is additionally used by this congestion and their working hours may be reduced in aggregates.

This ultimately reduce marginal productivity of Labour (MP_L) and their income starts to decrease. So that it is such problem that will have long run impacts on people health, leads toward higher expenses in old age. It can be presented in a table;

Table 3
Respondents, Fuel Consumption (Monthly)

Group	Frequency	Percent
1-3 Liters	16	3.0
3-5 Liters	24	4.5
5-10 Liters	248	46.4
10-20 Liters	208	39.0
Above 20 Liters	38	7.1
Total	534	100.0

Source: Field Survey,2025

Nearly half of the respondents (46.4%) consume 5–10 liters and 39% consume 10–20 liters, respectively. Only 7.1% consume over 20 liters, which indicates various travel distances and usage rates. High fuel consumption indicates the impact of traffic jam, which causes additional wastage of fuel due to idling and stop-and-go driving. This carries a significant economic burden for two-wheeler users in Kathmandu Valley.

When we tried to explore it with the help of a regression model, then it was estimated that it is true in the context of world context also. It was assumed for estimation;
$$Y = \beta_0 + \beta_1 \times X_1 + \beta_2 \times X_2 + \beta_3 \times X_3 + \beta_4 \times X_4 + e \qquad \ldots(1)$$
Where,
Y= Economic Impact (Time loss) of Traffic Congestion of Two wheeler use X1= Traffic Density (TD)
X2= Narrow roads (NR)
X3= Weather condition (WC)
X4=Poor driver attitudes (PA)
e = Error Terms

Table 3
Regression estimation of dependent and independent variables

	B	Std. Error	Beta		Sig.
(Constant)	1.071	0.363		2.952	0.003
TDD	0.319	0.07	0.284	4.585	0
1 NRR	-0.006	0.014	-0.026	-0.462	0.645
WCC	-0.106	0.075	-0.095	-1.404	0.161
PDAA	0.181	0.084	0.151	2.152	0.032
TSEE	0.246	0.082	0.198	3.011	0.003

Source: Based on primary data, 2025

The multiple regression analysis was conducted to examine the influence of traffic density, narrow road, weather condition, poor driver attitude, and traffic signal efficiency on time loss due to traffic congestion. The overall model was statistically significant, $F_{(5, 261)} = 11.966$, $p < .001$, indicating that the set of predictors reliably explained variation in time loss.

The Adjusted R Square value was .171, suggesting that approximately 17.1% of the variance in time loss is accounted for by the predictors included in the model. Although this represents a modest level of explanatory power, it is considered acceptable within the social sciences, where outcomes are often influenced by multiple contextual and behavioral factors.

Among the predictors, TDD ($\beta = .284$, $p < .001$), TSEE ($\beta = .198$, $p = .003$), and PDAA ($\beta = .151$, $p = .032$) were found to be statistically significant positive contributors to time loss. This indicates that increases in traffic density, Traffic signal efficiency, and poor driver attitudes are associated with higher levels of time loss.

Likewise NRR ($\beta = -.026$, $p = .645$) and WCC ($\beta = -.095$, $p = .161$) did not make significant contributions to the model. These findings highlight the importance of in traffic density, Traffic signal efficiency, and poor driver attitudes as key determinants of time loss, while suggesting that narrow road and weather condition may not play a substantial role in predicting the outcome variable within this context. If we analyze the data individually with beta (B) Value and significant value, following conclusion can be drawn.

Conclusions

The research paper concludes that traffic density, poor attitude of two wheelers, and better traffic light management are the most powerful factors backing to congestion-related time and fuel loss for two-wheeler users in Kathmandu. This irrelevance can be attributed to the adaptive psychology of two- wheeler users, who often follow alternate, congested routes by choosing alternatives, and the tendency of riders to limit travel time during bad weather. Overall, the findings convey the message that solving traffic density, improving two wheelers discipline, and better traffic signal efficiency are critical strategies for improving situation.

The finding conclude that traffic density and weather conditions have greater role to productivity loss among two-wheeler consumers. Greater congestion and bad weather increase travel time, directly reduce effective working hours. In contrast, narrow Roads are statistically insignificant, implies that riders manage this limitation by adjusting roads or travel timing.

The emperics findings reveal that two-wheeler users in Kathmandu incur an additional fuel cost of Rs. 16,501.25 per year due to traffic congestion. Likewise, they lose an estimated 11,730.25 minutes annually while being jammed in traffic. When these two values are compared, the monetary cost of congestion translates to Rs.1.40 per minute. This empirical data focus not only the direct financial burden on road users but also the crux economic value of the time. So that, congestion does not reflect on a delay in travel but also imposes a

significant economic loss. Its management reflect on improved infrastructure, reduce both time loss and fuel consumption.

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