Bengaluru's Traffic Odyssey: A Journey Through Improvement and Deterioration

Introduction:

Bengaluru, often dubbed India's Silicon Valley, is a city of contrasts. Its vibrant tech scene and bustling streets are matched only by its notorious traffic congestion. In recent years, Bengaluru's traffic situation has resembled a rollercoaster ride, with periods of improvement followed by frustrating setbacks. This article delves into the highs and lows of Bengaluru's efforts to combat congestion, exploring the factors driving its traffic odyssey.

To develop indices for measuring road traffic congestion, speed, and travel times, several parameters are typically considered. These parameters provide quantitative metrics that can be used to assess the state of traffic flow and congestion on roadways. Here are some key parameters commonly used in the calculation of traffic indices:

- Vehicle Speed: Average vehicle speed is a fundamental parameter used to evaluate traffic conditions. It represents the rate at which vehicles are moving along a roadway and is measured in kilometres per hour (km/h). Slower speeds often indicate congestion and reduced traffic flow.

- Traffic Volume: Traffic volume refers to the number of vehicles traveling on a roadway over a specific period, typically measured in vehicles per hour. Higher traffic volumes can contribute to congestion, especially when road capacity is exceeded.

- Roadway Capacity: Roadway capacity is the maximum number of vehicles that a roadway can accommodate per unit of time. It is influenced by factors such as the number of lanes, lane width, and design standards. When traffic volume exceeds roadway capacity, congestion occurs.

- Congestion Duration: Congestion duration measures the amount of time that roadways experience congestion over a given period, such as peak hours or weekdays. It provides insight into the frequency and duration of congestion episodes.

- Travel Time: Travel time refers to the time it takes for vehicles to travel along a roadway segment or between two points. It is influenced by factors such as vehicle speed, traffic volume, and congestion. Longer travel times indicate slower traffic flow and potential congestion.

- Queue Length: Queue length represents the length of vehicle queues or lines formed due to congestion, typically at intersections, toll plazas, or bottleneck locations. Longer queue lengths indicate more severe congestion and potential delays for motorists.

- Variance in Speed: Variance in speed measures the variability in vehicle speeds along a roadway segment. Higher variance indicates less uniform traffic flow and potential congestion hotspots.

- Level of Service (LOS): LOS categorizes roadways based on their operating conditions, considering factors such as speed, density, and flow rate. LOS ranges from A (free-flow conditions) to F (severe congestion). LOS provides a qualitative assessment of traffic conditions and is often used in conjunction with quantitative parameters.

In general, the most congested cities are characterized by a combination of several factors, including:

- ∧ High Traffic Volume: Cities with consistently high traffic volumes experience congestion more frequently, especially during peak travel times.

- ∧ Low Vehicle Speeds: Slow-moving traffic is a hallmark of congestion, as vehicles spend more time on the road and travel at reduced speeds.

- ∧ Long Travel Times: Extended travel times indicate congestion and delays, particularly for commuters traveling to and from major employment centres.

- ∧ Frequent Congestion Events: Cities with frequent congestion events, such as recurring bottlenecks or gridlock, are often considered highly congested.

- ∧ Widespread Impact: Congestion that affects multiple roadways and neighbourhoods across the city indicates a systemic issue with traffic flow and capacity.

While considering these parameters can provide a comprehensive understanding of traffic congestion in a city, it's essential to recognize that different cities may face unique challenges and exhibit varying patterns of congestion. Therefore, a holistic assessment that takes into account multiple factors is typically more informative when determining the level of congestion in a city. Additionally, the specific thresholds or criteria used to define "most congested" may vary depending on the objectives of the analysis and the context in which it is conducted.

Travel Time and Congestion Levels - Bengaluru Perspective:

Coming back to Bengaluru, travel times on major roads in Bengaluru can vary significantly depending on factors such as time of day, traffic conditions, and road infrastructure projects. For analysis purposes, 10 major corridors across north, south, east and west parts of Bengaluru are considered and are presented below,

i. Hebbal Flyover: Hebbal Flyover is a crucial transportation artery in Bengaluru, connecting the city centre with the northern parts of the city. It often experiences heavy traffic, especially during peak hours due to its importance as a gateway to areas like Manyata Tech Park and the Kempegowda International Airport.

ii. Mysore Road: Mysore Road is one of the major arterial roads connecting Bengaluru with the city of Mysore. It passes through several important areas and junctions, including K.R Market, Nayandahalli and Kengeri. Traffic congestion on Mysore Road can vary, especially near key intersections and during peak hours.

iii. & iv. Richmond Road and Residency Road: These are important roads in the central part of Bengaluru, known for their commercial and residential areas, as well as shopping and dining establishments. They can experience moderate to heavy traffic, particularly during office hours and weekends.

v. KR Puram: KR Puram is a significant locality in Bengaluru, and its main road connects the city centre with areas like Whitefield and Hoskote. Traffic congestion can be high, especially near Beniganahalli Bridge and Bhatarahalli Junction, hence the link between these two points is considered as the fifth corridor.

vi. Bellary Road: Bellary Road, also known as NH 44, is a major highway connecting Bengaluru with Bellary and other parts of North Karnataka. It passes through areas like Hebbal and Yelahanka and can experience heavy traffic, particularly near the Hebbal Flyover junction. The link between High Grounds Police Station and Esteem Mall is considered as the sixth corridor.

vii. Bengaluru East: This area encompasses several neighbourhoods and localities in the eastern part of Bengaluru, including areas like Kasturinagar, Kalyan Nagar and Ramamurthy Nagar. Traffic conditions can vary depending on specific roads and intersections, hence a 10 km long corridor from Kasturinagar to Traffic Management Centre, Infantry Road, is selected.

viii. Yeshwanthpur: Yeshwanthpur is a major suburb in the northern part of Bengaluru. Its main road connects the city centre with areas like Peenya Industrial Area and Tumkur Road. Traffic congestion can be significant, especially near Yeshwanthpur Railway Station and the Tumkur Road junction. Hence, corridor from Yeshwanthpur Railway Station to Jayanagar 4th Block is considered.

ix. Kodigehalli: Kodigehalli is a locality in the northern part of Bengaluru, and its main roads connect it with areas like Hebbal and Jakkur. Traffic conditions can vary, but it may experience moderate congestion during peak hours between K.R Puram and Kodigehalli.

x. Whitefield: Whitefield is a major IT hub located in the eastern part of Bengaluru. Its main roads, such as Whitefield Main Road and ITPL Main Road, can experience heavy traffic, especially during office hours due to the presence of numerous tech companies and IT parks, hence the corridor between Hoodi and Hope Farm is considered.

These corridors cover a wide range of areas and road types in Bengaluru, each with its own traffic patterns and congestion levels. To obtain specific information on travel times and congestion on these corridors, real-time traffic data provided by navigation app was used. The exercise started in early 2022, when average time required to traverse each corridor, during peak hours, was collated.

In November 2022, the Head of Traffic Police in Bengaluru issued a directive to prohibit Heavy Transport Vehicles (HTVs) from entering the city via various highway entry points during peak morning and evening hours. Stringent enforcement measures were implemented, resulting in fines for HTVs found violating the prohibition. Data on travel times and congestion levels along the designated corridors were subsequently gathered during this period. Analysis revealed a notable enhancement in travel times, leading to smoother traffic flow and increased satisfaction among commuters

In January 2024, the assessment of current congestion levels and travel durations along the study corridors was conducted once more. Results indicated a decline in travel times and a rise in congestion levels. It is noteworthy that the prior prohibition on Heavy Transport Vehicles (HTVs) entering the city during peak morning and evening hours had been lifted, allowing HTVs unrestricted access to the city's main roads throughout the day.

The travel times collected in early 2022, in November 2022 and in January 2024 are presented in the table below,

Sl No.	Location	Corridor		Distance in Km	Travel Time (in Minutes)		
		From	To		Before 2022	Nov-22	Jan-24
1	Hebbal Flyover	Amruthalli Junction	Hebbal Flyover (Hebbal Police Stn)	7	16	12	25
2	Mysore Road	Kengeri	City Market	16.6	46	35	42
3	Richmond Road	Trinity Church (Richmond Road)	Richmond Circle	2.7	21	11	20
4	Residency Road	Richmond Circle	Mayo Hall	1.9	38	10	11
5	KR Puram	Benniganahalli Underpass	Battarahalli	5.5	31	13	17
6	Bellary Road	Highgrounds	Esteem Mall	7.3	22	15	22
7	Bengaluru East	Kasthurinagar	Traffic Management Centre	9.8	66	32	37
8	Yeshwanthpur	Yeshwanthpur Railway Station	Jayanagar 4th Block	14.5	65	45	54
9	Kodigehalli	KR Puram	Kodigehalli	16.6	97	60	65
10	Whitefield	Hodi	Hopefarm	4.4	25	15	20

The decision to lift the ban on Heavy Transport Vehicles (HTVs) entering the city during morning and evening peak hours could have directly impacted travel times and congestion levels in several ways. Firstly, allowing HTVs unrestricted access to the city's major roads throughout the day likely led to an increase in the overall volume of traffic during peak hours. With more vehicles, including large HTVs, on the roads simultaneously, congestion levels naturally escalate, resulting in slower travel times for commuters.

Moreover, HTVs typically require more space on the road due to their size and slower acceleration rates compared to smaller vehicles. This can further exacerbate congestion by reducing available road capacity and causing bottlenecks, especially during peak traffic periods.

Additionally, the presence of HTVs on the roads during all hours of the day may have altered traffic flow patterns and dynamics, leading to less efficient movement of vehicles and increased delays at intersections, merges, and other critical points along the study corridors.

Overall, the lifting of the ban on HTVs likely played a significant role in the observed deterioration of travel times and increase in congestion levels during the study period.

Recommendations:

Based on the findings of the study or analysis, several recommendations or outcomes could be suggested:

Re-evaluation of HTV Regulations: The study highlights the potential negative impact of allowing Heavy Transport Vehicles (HTVs) unrestricted access to the city's major roads during peak hours. Authorities may consider reinstating or modifying the ban on HTVs during these critical periods to alleviate congestion and improve traffic flow.

Redirection of HTVs to utilize the Satellite Town Ring Road: The 4-6 lane access controlled STRR, under Bharatmala Pariyojana, will link Bengaluru's suburban areas like Hoskote, Devanahalli, Doddaballapur, Ramanagara, Kanakapura and Anekal and will also link Hosur in Tamil Nadu. The total length being 288 km, the project is meant to ease traffic congestion in the city by providing a bypass for inter and intra city freight traffic, so that heavy vehicles can move along the peripheries of Bengaluru without entering it.

Implementation of Traffic Management Measures: To mitigate congestion and improve travel times, implementing targeted traffic management measures such as optimizing traffic signal timings, creating dedicated lanes for specific vehicle types, or introducing congestion pricing schemes could be explored.

Continuous Monitoring and Evaluation: Regular monitoring and evaluation of traffic patterns, congestion levels, and travel times are essential for identifying emerging issues and assessing the effectiveness of implemented measures. This ongoing analysis can inform future policy decisions and interventions aimed at improving traffic management and enhancing the overall transportation system efficiency.