Research on Urban Traffic Management Evaluation-Taking Dhaka City as an Example

Prodhan Md Safiq Raihan
Hohai University, China

Mithun Biswas
Hohai University, China

Hasan Md Mahmudul
Shandong University of Technology, China

Mir Fazle Rabbi
Hohai University, China

Md Tohidul Islam
Southwest Forestry University, China

Md Rakibul Islam
Hohai University, China

Abstract:

As urbanization continues to accelerate worldwide, efficient traffic management becomes crucial for sustainable urban development. This thesis presents a comprehensive evaluation of urban traffic management in Dhaka City, using it as a case study to analyze the challenges, assess the current strategies, and propose potential solutions for improving traffic flow and reducing congestion.

Dhaka, the capital city of Bangladesh, is a rapidly growing megacity facing severe traffic congestion and associated problems. This research aims to assess the effectiveness of existing traffic management measures, identify their limitations, and propose evidence-based strategies for enhancing urban mobility. The study adopts a multidimensional approach, integrating quantitative and qualitative methods to evaluate Dhaka’s traffic management system holistically.

The research methodology encompasses collecting and analyzing various data sources, including traffic volume, travel time, road infrastructure, traffic regulations, and public opinion surveys. Additionally, interviews with key stakeholders such as government officials, urban planners, transportation experts, and citizens will be conducted to gather valuable insights into the challenges faced and potential solutions.

The evaluation will focus on key aspects of urban traffic management, including traffic flow optimization, public transportation efficiency, infrastructure development, and traffic safety. By analyzing the collected data and stakeholder inputs, the study aims to identify the major bottlenecks and deficiencies in the current system, highlighting the underlying causes of traffic congestion in Dhaka.

Furthermore, this thesis will propose a set of comprehensive recommendations for improving urban traffic management in Dhaka City. These recommendations may encompass infrastructure upgrades,
intelligent transportation systems, public transportation enhancements, and policy interventions aimed at reducing private vehicle usage and promoting sustainable modes of transport.

The findings of this research are expected to provide valuable insights for policymakers, urban planners, and traffic management authorities in Dhaka and other megacities facing similar challenges. By addressing the shortcomings in the existing traffic management system and implementing effective solutions, this study aims to contribute to the sustainable development of Dhaka City and improve the quality of life for its residents.

**Keywords:** urban traffic management, traffic congestion, Dhaka City, transportation efficiency, infrastructure development, sustainable mobility.

**Introduction**

With the rapid growth of urbanization and population, cities around the world are grappling with the increasing challenges of urban traffic management. Efficient transportation systems are vital for sustainable urban development, economic growth, and the overall well-being of citizens. Among the many cities facing these issues, Dhaka City, the capital of Bangladesh, stands out as an extreme case of traffic congestion and inadequate traffic management. This thesis aims to conduct a comprehensive evaluation of urban traffic management in Dhaka City, analyze its current state, identify challenges, and propose potential solutions to improve traffic flow and reduce congestion.

Dhaka City is a bustling metropolis with a population exceeding 20 million people, making it one of the most densely populated cities in the world. The rapid urbanization and population growth in Dhaka have outpaced the development of transportation infrastructure and management strategies, resulting in severe traffic congestion, increased travel time, air pollution, and reduced quality of life for its residents. The city's limited road capacity, inadequate public transportation system, lack of traffic discipline, and rapid motorization have compounded the traffic management challenges. This research endeavors to evaluate the effectiveness of existing traffic management measures in Dhaka City. By adopting a multidimensional approach, incorporating both quantitative and qualitative methods, a comprehensive understanding of the current traffic management system will be achieved. The evaluation will encompass various aspects such as traffic volume, travel time, road infrastructure, traffic regulations, and public perception. Data will be collected from diverse sources, including traffic monitoring systems, surveys, and interviews with key stakeholders involved in traffic management and urban planning.

The analysis will focus on key areas of urban traffic management, including traffic flow optimization, public transportation efficiency, infrastructure development, and traffic safety. By examining the collected data and stakeholder insights, the study aims to identify the root causes of traffic congestion in Dhaka and the limitations of the existing management strategies.

Based on the evaluation findings, this thesis will propose evidence-based recommendations and potential solutions to enhance urban traffic management in Dhaka City. These recommendations may encompass a range of measures, including infrastructure upgrades, the implementation of intelligent transportation systems, improvements in public transportation, and the introduction of policy interventions to encourage sustainable modes of transport.

The significance of this research lies in its potential to contribute to the sustainable development of Dhaka City and serve as a reference for other cities facing similar traffic management challenges. By identifying the shortcomings in the current system and suggesting effective solutions, this study aims to improve traffic flow, reduce congestion, and
enhance the overall quality of life for the residents of Dhaka.

In last, this thesis will provide a comprehensive evaluation of urban traffic management in Dhaka City. Through data analysis, stakeholder insights, and proposed recommendations, the research aims to address the challenges faced by the city and contribute to the sustainable development of urban traffic management systems in Dhaka and other megacities globally.

**Urban Roads & Traffic Management**

Urban road and traffic management are important aspects of city planning and infrastructure management. They are involved in the design, construction, and maintenance of roads and highways within urban areas as well as the implementation of traffic management systems to ensure smooth flow of traffic and reduce congestion and accidents (Darbari, Medhavi, & Srivastava, 2008).

Effective traffic management in urban areas requires a holistic approach that considers various factors such as traffic volume, road capacity, vehicle speed, pedestrian safety and environmental impact. Strategies that can be used include traffic signals, speed limits, roundabouts, pedestrian crossings and the use of public transport systems.

In addition to traffic management, urban road design and construction also play an important role in ensuring the safety and efficiency of transportation. This involves careful consideration of factors such as road width, pavement quality, drainage and lighting. Overall, effective urban road and traffic management is essential for the sustainable development of cities, and requires collaboration between various stakeholders, including government agencies, urban planners, engineers and transportation.

**Classification of Urban Roads**

Urban roads can be classified into different categories based on various factors such as traffic volume, speed limit, land use, and function. Here are the most common classifications of urban roads:

- **Arterial roads:** These are major roads that connect different parts of the city and handle high volumes of traffic. They typically have a high speed limit, multiple lanes, and limited access points.

- **Collector roads:** These roads connect local roads to arterial roads and handle moderate traffic volumes. They typically have a lower speed limit than arterial roads and may have fewer lanes.

- **Local roads:** These are residential roads that provide access to individual properties and handle low volumes of traffic. They typically have lower speed limits and may have traffic calming measures such as speed humps or roundabouts.

- **Commercial roads:** These are roads that serve commercial and retail areas and may have a mix of vehicular and pedestrian traffic. They typically have lower speed limits than arterial roads and may have on-street parking and sidewalk amenities.

- **Industrial roads:** These are roads that serve industrial areas and may have heavy truck traffic. They typically have wider lanes and stronger pavement than other types of urban roads.

**Design Principles of Road Junction**

Design principles of road junctions are crucial to ensure safe and efficient traffic flow through intersections. Here are some key design principles of road junctions:

- **Visibility:** Good visibility is essential at junctions to allow drivers to see other vehicles, pedestrians, and traffic signals. Design principles such as keeping sightlines clear and minimizing visual obstructions can improve visibility at junctions.

- **Safety:** Safety is a key consideration in junction design. Measures such as roundabouts, raised pedestrian crossings, and traffic calming features can reduce speeds and improve safety for all road users (RSA Workshop, 2017).

- **Capacity:** Junction design should take into account the anticipated traffic volume and ensure that the junction has sufficient capacity to accommodate this traffic. Capacity can be increased through the use of multiple lanes,
dedicated turn lanes, and signal timing adjustments (NamGung, et al., 2020).

Efficiency: The design of junctions should aim to minimize delays and maximize efficiency for all road users. This can be achieved through measures such as coordinated signal timings, roundabouts, and clear lane markings (NamGung, et al., 2020).

Accessibility: Junctions should be accessible for all road users, including pedestrians and cyclists. Measures such as dedicated pedestrian and cycle crossings and curb ramps can improve accessibility at junctions.

Sustainability: Sustainable design principles should be considered in junction design, including features such as greenery, permeable pavement, and rain gardens to manage storm water runoff (NamGung, et al., 2020).

Context sensitivity: Junction design should be sensitive to the surrounding context, including the character of the neighborhood and the needs of local residents. Context-sensitive design can enhance the overall quality of life for residents and visitors.

Figure 1. How to Tackle a Roundabout
Source: Usha K. (2021)

Dhaka City as an Example of Urban Traffic

Dhaka, by some measures the most densely populated and fastest growing city in the world, and the 20th most populous, is a case study in how the problem has become so big - and why it's so difficult solve. Like many capitals in the developing world, Dhaka's infrastructure doesn't match the size of its population. According to one analysis, only 7 percent of cities are covered by streets, compared with about 25 percent in Paris and Vienna, and 40 percent in Washington and Chicago. Dhaka also lacks a conscious road network, with side roads leading to arteries leading to highways. There are 650 major intersections, but only 60 traffic lights, many of which don't work. That means overcrowded police officers aren't enforcing driving or parking
rules - they're directing traffic at intersections. The cost of Dhaka’s traffic congestion is estimated at $3.8 billion a year, and that's just delays and air pollution, not intangible losses in quality of life and social capital. Paradoxically, poor infrastructure is one of the reasons the city has grown so quickly. With no roads or trains to take them to the suburbs, Dhaka’s residents have no choice but to squeeze into the city center, build slums between high-rise buildings, and walk to work. Then there are the users of the road. Besides pedestrians, bicycles, rickshaws, scooters, motorcycles, CNG, buses and cars line the narrow lanes. All of these modes take up different amounts of space and have different top speeds. It's like a version of Tetris where none of the shapes fit (Hobbes, 2014).

Most people you talk to in Bangladesh blame the traffic jams on the rickshaws. There are too many of them, they say, and they drive so slowly, slaloming around the potholes, that they trap the cars, buses, and CNGs behind them. The government is under pressure to designate some lanes as car-only, to build wider roads and overpasses, to take the slow traffic out from in front of the fast (Hossain, 2016).

And this brings us to the third reason why the traffic problem is so difficult to solve: politics. All of these fixes sound easy and obvious, but they come at a cost. One and a half million people drive rickshaws for a living, plus another few hundred thousand own and repair them. Government efforts to get people out of rickshaws and into buses and trains are going to attract huge opposition.

In Dhaka, boosting bus capacity is a convoluted task. The city hosts a multitude of scattered bus service providers, tallying up to 60 entities, all altering their routes and schedules intermittently. Commuters' fares depend upon the distance traveled, so they must bargain with the driver over the transit costs. Since rivalries among the bus companies are fierce, drivers often overstuff the buses, going far beyond the maximum occupancy. This forces them to race recklessly on the road, exploiting every opportunity to accommodate more riders. Interestingly, a comprehensive analysis by the World Bank conducted in 2009 discovered these intricacies.

All of these small companies are linked to political parties or trade unions, making public transport less public than originally assumed. A hostile takeover could occur with government attempts to unify and regularize the system.

The cars and CNGs must have their separate lanes and lights based on their maximum speed. That's what international experts suggest to address the issue. To ensure fairness, car drivers should bear the expense of consuming more road space. The solution is evident - segregate the rickshaws from the aforementioned vehicles.

Being flown to work on a giant eagle would be just as politically feasible as the suggestion that no one needs a car. Although car ownership is not common among the masses, it is still an influential and politically vital group. Possessing a car, with the added benefit of a chauffeur, is a substantial incentive for those in power, whether it be a government official or an executive.

Amidst the fumes, horns, and heat of the streets, riding a swaying, shuddering rickshaw to reach your workplace seems like a huge inconvenience. Despite progressive development in the country of Bangladesh, every year, an extra 37,000 cars are being added to the already problematic road network in Dhaka. While this increase in cars may seem like a positive indicator of a brighter, middle-income future for many Dhaka residents, it can be a daunting reality to face (Adhikar, 2022).

The issue is compounded by the interference of law enforcement. It has been revealed by the World Bank that just 50% of bus drivers and fewer than half of CNG drivers have legitimate licenses. In exchange for bribes, the police are willing to look the other way when presented with counterfeit, ineffective, or non-existent documents. Implementing an effective licensing system and enforcing traffic regulations would mean taking away an essential source of income for an already underpaid group of workers.

Let's consider the perspective of a Bangladeshi politician for a moment. Addressing the issue of chaotic traffic means disaffecting every social
class – poor, middle, and wealthy – simultaneously. Essentially, it's a scenario akin to President Obama's battle with the healthcare system, albeit instead of patients, doctors, and insurance providers, we have police, bus officials, and rickshaw operators. As most Americans comprehend, deeply-rooted organizations don't disintegrate merely because their inability to function properly is recognized.

But this is where the metaphor fails. The Bangladeshi government has one last chance to own and pave the way with an option Obama never had: international donors. In 2012, the government announced a $2.75 billion plan to build a subway system. Eighty-five percent of the project will be financed by a loan from the Japan International Cooperation Agency at an interest rate of 0.01 percent.

A lot if you are a politician in Bangladesh. Not only do you avoid dealing with these troubling entrenched interest groups, but you also gain access to the poisha transport system on taka. Building a $255 million bus-metro line from the airport would cost Bangladesh only $45 million, thanks to loans from the French government and the Asian Development Bank.

However, for the residents of Dhaka, this is not a bargain. It will be years, if not decades, before these projects come to fruition (the debate over how the bus lines will be built has already begun), and the construction will only make Dhaka's traffic worse until they actually materialize. Meanwhile, cheaper solutions to Dhaka's congestion enforcing the law, reducing the number of cars, improving bus service are too politically costly to consider.

When I ask my Bangladeshi colleagues how long it takes to get anywhere, they always give two answers: "About fifteen minutes if there is no traffic. But is there traffic? Who knows?" Maybe that's the way to think about how the world's megacities will solve traffic congestion. Didn't make a hard political decision? Maybe a few years. But what about them? who knows?

**History of Dhaka Urban Traffic Management**

Dhaka, the capital city of Bangladesh, has experienced significant urbanization and population growth over the last few decades, resulting in severe traffic congestion and road safety issues. The history of Dhaka's urban traffic management can be traced back to the early 1970s when the city's road network was expanded, and new transportation systems were introduced, including bus rapid transit, cycle rickshaws, and auto-rickshaws.

In the 1980s, the government of Bangladesh launched the Dhaka Urban Transport Project (DUTP) to improve the city's transportation infrastructure and alleviate traffic congestion. The project included the construction of new roads, flyovers, and bridges, as well as the introduction of new transportation modes such as mass transit buses and water transport.

Despite these efforts, traffic congestion continued to worsen in Dhaka, and the government launched several initiatives in the 1990s and 2000s to address the issue. These included the development of a comprehensive transportation plan, the introduction of Intelligent Transport Systems (ITS), and the implementation of a high-occupancy vehicle (HOV) lane on one of the city's main roads.

An holistic approach to urban traffic management in Dhaka, focusing on the development of sustainable transportation systems that prioritize public transportation, walking, and cycling. This has included the construction of a metro rail system, the expansion of the bus rapid transit network, and the implementation of bike-sharing programs.

Despite these efforts, traffic congestion and road safety remain major challenges for Dhaka's urban traffic management. The city's rapid population growth and limited transportation infrastructure continue to pose significant challenges, and there is a need for ongoing research and innovation in traffic management strategies to ensure the city's transportation system remains efficient, safe, and sustainable (Sanaullah, 2021).
Figure 2. Year 2022 in Dhaka City  
Source: Hasan, R.A. (2022)

Figure 3. Growth Trends of Total Numbers of Registered Vehicles in Dhaka (2003-2011)  
Source: The Bangladesh Road Transport Authority (BRTA) 2011
Problems of Dhaka Urban Traffic Management

Dhaka, the capital city of Bangladesh, is facing severe traffic management problems due to its high population density, rapid urbanization, and inadequate infrastructure. Some of the key problems of Dhaka's urban traffic management are:

1. Traffic congestion: Dhaka is one of the most congested cities in the world, with traffic jams becoming a daily occurrence. The high volume of vehicles on the roads, combined with inadequate road infrastructure, causes severe traffic congestion and delays, leading to frustration and wasted time for commuters (Sakib, 2023).

2. Inadequate public transportation: Dhaka's public transportation system is inadequate and unreliable, leading to more people using private cars and increasing traffic congestion. The city needs to improve its public transportation system by expanding the bus and rail networks and ensuring their efficiency and affordability (Alam, 2018).

Figure 4. Motorized Vehicle Growing Trend in Dhaka (2010-2021)
Source: Bangladesh Road Transport Authority (BRTA), 2021

Figure 5. Land Use by Zone IN DHAKA
Source: Dhaka Transport Coordination Board. (2011)
3. Poor road infrastructure: The quality of road infrastructure in Dhaka is poor, with many roads being narrow, poorly maintained, and not designed to handle the high volume of traffic. The lack of proper road infrastructure leads to more accidents and congestion, further aggravating the traffic management problem (Razi, & Alam, 2019).

4. Lack of pedestrian and cycling infrastructure: Dhaka's pedestrian and cycling infrastructure is inadequate, with few dedicated bike lanes and sidewalks. This makes it dangerous for pedestrians and cyclists to navigate the city, leading to more people using cars and adding to the traffic congestion (Khan, & Mitra, 2011).

5. Lack of traffic management and enforcement: Dhaka's traffic management system is ineffective, with inadequate enforcement of traffic rules and regulations. This leads to a disregard for traffic laws, such as ignoring traffic signals and driving on the wrong side of the road, contributing to traffic congestion and accidents.

To address these problems, Dhaka needs a comprehensive approach to urban traffic management, including improving road infrastructure, expanding public transportation, creating dedicated pedestrian and cycling infrastructure, and enforcing traffic rules and regulations. The government and city authorities must work together to develop and implement a long-term plan for sustainable and efficient urban traffic management in Dhaka (Efroymson, 2022).

Problem of Dhaka Traffic Management

People's Opinion

The people of Dhaka have varying opinions on the problems with traffic management in the city, and their perspectives are shaped by their experiences as commuters, pedestrians, and drivers. Some common concerns and opinions include:

Traffic congestion: Many people in Dhaka feel that traffic congestion is the most significant problem with traffic management in the city. The high volume of vehicles on the road, coupled with inadequate infrastructure and public transportation options, makes it challenging to move around the city efficiently.

Road safety: Road safety is another significant concern for people in Dhaka, with many feeling that the roads are dangerous due to reckless driving, lack of adherence to traffic laws, and poor infrastructure. Many people have personal experiences with accidents or near-misses on the roads, leading to a sense of unease and frustration.

Inadequate public transportation: Many people in Dhaka feel that the city's public transportation system is inadequate, with limited options for commuters and insufficient coverage across the city. The system is often unreliable, with long wait times and overcrowding on buses and other modes of transport.

Poor infrastructure: The poor condition of the roads, limited parking facilities, and inadequate pedestrian infrastructure are common complaints among people in Dhaka. These issues make it difficult for people to move around the city safely and efficiently.

Air pollution: Air pollution is a growing concern for people in Dhaka, with many feeling that the high levels of pollution are impacting their health and quality of life. There is a sense of frustration that more is not being done to address this issue, particularly with regards to reducing vehicle emissions.

Lack of awareness: Some people in Dhaka feel that there is a lack of awareness among commuters, drivers, and policymakers about the importance of sustainable and safe transportation practices. There is a sense that more needs to be done to educate people about the benefits of public transportation, cycling, and walking as viable alternatives to driving.

Traffic Congestion Problem at Pic Hours

Traffic congestion during peak hours is a common problem in many cities around the world, including Dhaka. The morning peak hours from 8 am to 10 am and the evening peak hours from 5 pm to 8 pm tend to experience heavy traffic congestion in Dhaka. The traffic congestion during peak hours in Dhaka affects the people in several ways:
Increased travel time: Commuters experience significantly longer travel times during peak hours due to traffic congestion. What could be a relatively short journey outside of peak hours may take double or even triple the time during these hours. This can lead to frustration, stress, and fatigue among commuters.

Decreased productivity: The prolonged travel time during peak hours can have a negative impact on people's productivity, especially those who need to reach their workplaces or attend important meetings. Spending a significant amount of time stuck in traffic can result in lost working hours and decreased efficiency.

Health and well-being issues: Prolonged exposure to traffic congestion and the associated air pollution can have detrimental effects on people's health. The emissions from vehicles, combined with the stationary traffic, can lead to increased levels of air pollution, which can contribute to respiratory problems, allergies, and other health issues.

Increased stress levels: Dealing with the daily hassle of traffic congestion can significantly increase stress levels among commuters. The frustration of being stuck in traffic, the constant honking, and the slow progress can have a negative impact on people's mental well-being.

Impact on personal and social life: Traffic congestion during peak hours can disrupt personal schedules and commitments. People may find it challenging to reach appointments, attend social gatherings, or spend quality time with family and friends due to the prolonged travel times and unpredictable traffic conditions.

Economic implications: Traffic congestion has economic implications as well. Businesses may face delays in the transportation of goods and services, which can result in increased costs and inefficiencies. Additionally, the fuel consumption and time wasted in traffic congestion can lead to financial losses for individuals and the overall economy.

Environmental impact: The increased number of vehicles on the road during peak hours contributes to higher carbon emissions and worsens the environmental impact of transportation. This can further exacerbate air pollution, contribute to climate change, and have long-term consequences for the environment.

It is crucial to address the traffic congestion problem during peak hours in Dhaka to mitigate these effects on the people living and working in the city. Implementing effective transportation and traffic management strategies, improving public transportation options, and promoting alternative modes of transport can help alleviate these issues and create a more livable and sustainable city.

Impact of Traffic in Dhaka

Traffic in Dhaka has a significant impact on the environment, with several negative effects on air quality, noise pollution, and public health. Some of the impacts include:

Air pollution: Traffic in Dhaka is a significant contributor to air pollution in the city, with vehicles emitting a range of pollutants, including carbon monoxide, nitrogen oxides, particulate matter, and sulfur dioxide. These pollutants can cause respiratory and cardiovascular illnesses, and long-term exposure can lead to chronic health problems such as asthma and lung cancer.

Noise pollution: The high volume of traffic in Dhaka creates significant noise pollution, which can impact the quality of life for residents, leading to stress, sleep disturbance, and hearing loss.

Carbon emissions: Vehicles in Dhaka emit significant amounts of carbon dioxide, a greenhouse gas that contributes to climate change. As such, traffic in the city is a significant contributor to the country's carbon footprint.

Urban heat island effect: The high density of vehicles in Dhaka leads to the urban heat island effect, whereby urban areas are significantly warmer than surrounding rural areas. This effect can lead to increased energy demand for cooling, exacerbate air pollution, and contribute to heat-related illnesses (Alom, & Zahid, 2014).

Loss of green space: The construction of roads and other transportation infrastructure has led to the loss of green space in Dhaka, which can
impact local ecosystems, reduce biodiversity, and exacerbate the urban heat island effect.

Traffic congestion and other transport related problems, probably, will be placed in the rank number 1 among the all problems faced by the city dweller of Dhaka every day. The impact of traffic jam on Dhaka City can be viewed in three ways. The ways are -a. Impact on Economy -b. Impact on health. Impact on environment.

From a recent study of RHD it has been found that, Annual loss caused by traffic congestions in Dhaka city is around Tk.200 billion Almost Tk was eliminated due to the delay time on the road. 120 billion, Taka 40 billion for trade and export, Tk 25 billion for environmental causes and The remaining amount is used for medical and other purposes. Source: RHD (Financial Express, 9 September 2012) (Shakil, 2016).

Approximately 3.2 million work hours are lost each day to traffic congestion. The estimated loss is more than half of the country's total annual development spending and a quarter of its revenue target for the current fiscal year. Bangladesh stands to benefit from huge economic growth by alleviating traffic congestion in the capital, which accounts for more than 35 percent of the country's gross domestic product (GDP), worth nearly $100 billion, the study said. Source: MCCI1.Research, The Daily Star (July 22, 2010) (Shakil, 2016).
Figure 7. Transport Medium in Dhaka City

Figure 8. Wastage of Time of Vehicle Operators Due to Traffic Jam

Figure 9. Cause of Traffic Jam Stated by Vehicle Operators
My Survey in Dhaka City

I make a survey in Dhaka city, Mohammad Pur to Nilkhet. From 2022 October to 2023 February.

I conducted a survey from October 2022 to the end of January 2023, 3 days a week, 2 hours, from Mohammad Pur, Dhaka City, to Nilkhet. I talk to different people and use different vehicles on the road at different times, trying to figure out the different causes of traffic jams. Different types of traffic on the road, with different speeds: rickshaws, minibuses, double-decker buses, private cars, Lagunas (which hold 11 passengers), bicycles, motorcycles, trucks, etc. playing together on the road. At one point, this road has four major road junctions, but even then, traffic jams are created here, the main reason for which is the movement of different types of vehicles at the same time. The problems that I am able to perceive are 1. Number of vehicle compared to rickshaws, 2, buses, 3, roads 4. Where there is parking. 5. Crossing people in the middle of the road, 6. Disobey traffic laws. 7. Lack of proper management.

Different Types of Traffic On the Road, With Different Speeds

Rickshaws, mini buses, double-decker buses, private cars, Lagunas (which hold 11 passengers), bicycles, motorcycles, trucks etc. plying together on the road. At one point, this road has four major road junctions, but even then, traffic jams are created here, the main reason of which is the movement of different types of vehicles at the same time. Rickshaws can go at a maximum speed of 10-15 km per hour, but they do not use one lane, so that no other vehicle can move in front of them, causing huge traffic jams. They don't allow buses, private cars to move ahead... Again, they stand at the moors for the passengers, causing traffic jams.

Most people you talk to in Bangladesh blame the traffic jams on the rickshaws. There are too many of them, they say, and they drive so slowly, slaloming around the potholes, that they trap the cars, buses, and CNGs behind them. The government is under pressure to designate some lanes as car-only, to build wider roads and overpasses, to take the slow traffic out from in front of the fast.

I Used Different Vehicles On This Route, 3 Days A Week to Try to Understand The Root Cause Of The Traffic Problem

The bus stops where they want, they don't stop at any bus station, they stop wherever they want and pick up passengers. This is a major problem in the entire Dhaka city, causing traffic jams. But they have no one to tell them, because of which traffic jams are created, they do not calculate any route. They move as they please, stopping and picking up passengers wherever they want. By doing this, the traffic flow is blocked. Especially they stop the bus at every intersection and pick up passengers, in many cases they stop the bus for a long time at different road junctions for passengers, causing terrible traffic jams, but no law is enforced. Most of the time they do not obey any traffic laws, and most of the bus drivers are not licensed drivers. It creates problems constantly people are victims of accidents on the road.

Road Capacity

Like many developing-country capitals, Dhaka’s infrastructure doesn't match the scale of its population. Just 7 percent of the city is covered by roads, compared with around 25 percent of Paris and Vienna and 40 percent of Washington and Chicago, according to one analysis. Dhaka also suffers from the absence of a deliberate road network, feeder streets leading to arterials leading to highways. There are 650 major intersections, but only 60 traffic lights, many of which don’t work. That means the already stretched-thin police force isn’t enforcing driving or parking rules they’re in the intersections, directing traffic. Then there are the users of the roads. Besides pedestrians, the narrow lanes are shared by bicycles, rickshaws, scooters, motorcycles, CNGs, buses, and cars. All these modes take up a different amount of space and have different top speeds. It’s like a version of Tetris where none of the shapes fit.
Apart from that, road repair work is done, which is very slow. Because of this, traffic congestion is created. For example, the road from Mohammadpur to Jigatla is about 2 kilometers. But here it took two months to install the electronic line underground, even after that they repaired the excavation site. By doing this, the traffic on the single lane of the road was stopped, and the traffic jam was created.

**Place of Parking and Controlling the Private Cars**

Another major cause of traffic congestion is parking. Private car parking is one of the causes of traffic congestion in Dhaka city. It is important to find a lasting solution to the parking problem to control congestion, ensure proper utilization of resources and space. In that case it is necessary to increase the parking fee and control private vehicles. With the rapid increase in private cars, there is a need to provide more space for parking. Surely it will not be possible to demolish the market or house to provide space for parking. No matter how much space is allocated for parking to free up street and sidewalk parking, private cars will be re-parked on the streets if not controlled. It is not possible to solve this problem without controlling private cars. Dhaka is a densely populated city, the amount of land is very less in proportion to the population. There must be limited space for parking. Free or low-cost parking facilities are one of the reasons for the growth of private cars. Currently, all-day car parking is available almost everywhere in Dhaka for free or at a nominal cost. Which is encouraging people to use private cars. Reducing parking spaces and increasing parking fees will discourage people from using private cars.

**Crossing People in The Middle of the Road**

Crossing people in the middle of the road is a common sight in Dhaka city, and it poses a significant risk to pedestrians. The lack of pedestrian infrastructure, combined with the high volume of traffic and congestion, makes it difficult for people to cross the road safely. Many people resort to crossing in the middle of the road because there are no pedestrian crossings or they are too far away, or they are blocked by parked vehicles or street vendors.

**Disobey Traffic Laws**

Disobeying traffic laws is a significant problem in Dhaka, and it contributes to the city’s traffic congestion, accidents, and pollution. Many drivers and motorcyclists disregard traffic laws, such as speeding, running red lights, driving on the wrong side of the road, and using mobile phones while driving, which increases the risk of accidents and injuries.

There are several reasons why people disobey traffic laws in Dhaka. Firstly, the lack of enforcement and penalties for breaking traffic rules means that many drivers do not fear being caught or punished. Secondly, the high volume of traffic and congestion in the city leads to frustration and impatience among drivers, which can lead to reckless and dangerous driving. Finally, there is a lack of awareness and education about traffic laws and safe driving practices among the general public, which further contributes to disobedience of traffic laws.

**Lack of Proper Management**

The lack of proper traffic management is a significant problem in Dhaka city, and it contributes to the city’s traffic congestion, accidents, and air pollution. The city's roads are often clogged with traffic, and the lack of proper traffic management exacerbates the problem.

One of the key problems caused by the lack of proper traffic management is the inefficient use of road space. The city's roads are often congested, but there is no effective system in place to manage the flow of traffic. As a result, vehicles often move at a snail's pace, leading to long travel times, wasted fuel, and increased air pollution.

Another problem caused by the lack of proper traffic management is the high number of road accidents. The city has a high rate of road accidents, and many of these accidents are caused by reckless driving, poor road conditions, and inadequate traffic management. The city needs better traffic control systems, such as traffic lights, pedestrian crossings, and speed
limit enforcement, to reduce the number of accidents.

The lack of proper traffic management also affects public transport in the city. The city's bus system is inefficient, and unreliable, and often contributes to traffic congestion.

In conclusion, the lack of proper traffic management is a significant problem in Dhaka city, affecting various aspects of city life. The city needs to invest in traffic management infrastructure, improve its public transport system, and develop comprehensive traffic management strategies to address the problems facing the city. By doing so, the city can become more livable, sustainable, and safe for its residents.

Solution of Urban Traffic Management Taking Dhaka City as an Example

Improving urban traffic management is a complex task, and it requires a comprehensive approach that takes into account the city's unique characteristics, such as road network structure, traffic demand, and socio-economic conditions. In the case of Dhaka city, there are several solutions that can be implemented to improve urban traffic management. These solutions are based on research on urban traffic management evaluation and best practices from other cities around the world.

Traffic control systems: One of the most effective solutions to improve traffic management in Dhaka city is the implementation of traffic control systems, such as traffic lights, intelligent transport systems, and speed limit enforcement. These systems can help to reduce traffic congestion, improve traffic flow, and reduce the number of accidents. Research shows that traffic control systems have been effective in reducing traffic congestion in other cities such as Singapore, London, and Tokyo.

Public transport system: Improving the public transport system is another effective solution to reduce traffic congestion in Dhaka city. This can be achieved through increasing the number of buses, introducing dedicated bus lanes, and improving the quality of bus services. Research shows that an efficient and reliable public transport system can reduce traffic congestion, improve air quality, and reduce carbon emissions (Mohammed, & Nurul Habib, 2007).

Pedestrian infrastructure: Developing pedestrian infrastructure, such as sidewalks, pedestrian crossings, and foot over-bridges, can improve road safety and reduce accidents involving pedestrians. Research shows that cities that prioritize pedestrian infrastructure have lower rates of accidents involving pedestrians.

Traffic education and awareness: Improving traffic education and awareness is essential to reduce the number of accidents in Dhaka city. This can be achieved through public campaigns, education programs in schools, and training for drivers and pedestrians. Research shows that education and awareness programs have been effective in reducing the number of accidents in other cities such as Bogota, Colombia.

Integrated transport planning: Developing an integrated transport planning strategy that considers the needs of all road users, including pedestrians, cyclists, and public transport users, can improve urban traffic management in Dhaka city. This can be achieved through coordination between different transport modes and the use of smart transport technologies. Research shows that cities that have implemented integrated transport planning strategies have been successful in reducing traffic congestion and improving road safety.

In conclusion, improving urban traffic management in Dhaka city requires a comprehensive approach that considers the city’s unique characteristics and incorporates best practices from other cities around the world. The solutions outlined above, based on research on urban traffic management evaluation, can help to reduce traffic congestion, improve road safety, and create a more livable and sustainable city for its residents (Chowdhury, 2022).
Management of Traffic Signaling System Dhaka

The management of the traffic signaling system in Dhaka is a crucial aspect of urban traffic management. The city's rapid population growth and inadequate transportation infrastructure have led to severe traffic congestion, making it difficult for people to move around the city. Effective traffic signaling can help to mitigate this problem by improving traffic flow and reducing the risk of accidents.

The traffic signaling system in Dhaka is managed by the Dhaka Metropolitan Police (DMP). The DMP is responsible for the installation, maintenance, and operation of traffic signals at intersections and other strategic locations throughout the city. The traffic signals are designed to control the flow of traffic and ensure the safe movement of pedestrians and vehicles.

In recent years, the DMP has introduced several measures to improve the traffic signaling system in Dhaka. One such measure is the introduction of intelligent traffic signal systems, which use sensors to detect the presence of vehicles and adjust the signal timings accordingly. This has helped to reduce traffic congestion and improve traffic flow in some areas of the city. The DMP also regularly conducts traffic studies to identify areas where traffic signals need to be installed or upgraded. These studies take into account factors such as traffic volume, vehicle speed, and pedestrian movement, among others. The DMP also conducts regular inspections of the traffic signals to ensure they are working correctly and are properly maintained. One of the challenges faced by the DMP in managing the traffic signaling system in Dhaka is the high volume of vehicles and pedestrians on the city's roads. This makes it difficult to control traffic flow and ensure the safety of road users. To address this challenge, the DMP has introduced measures such as the installation of pedestrian bridges and the introduction of dedicated lanes for buses and other public transport vehicles.

In conclusion, the management of the traffic signaling system in Dhaka is a critical aspect of urban traffic management. The DMP has introduced several measures to improve the system, such as the introduction of intelligent traffic signals and regular traffic studies. However, the high volume of vehicles and pedestrians on the city's roads presents a significant challenge that requires ongoing attention and management (Chowdhury, 2022).

![Figure 10. Smart Traffic Control System Using Image Processing](https://example.com/image.png)

*Figure 10. Smart Traffic Control System Using Image Processing*

*Source: Abirami, S. (2021)*
Some Plans and Traffic Management

The transport strategic plan provides for 5 metro lines, 2 bus rapid transit (BRT) lines, 3 ring roads, 8 radial roads, 6 expressways, 21 flyovers, upgrading of ring roads around Dhaka waterway. Traffic management and safety, bus route concessions, and pedestrian priority strategies through 2025. From the beginning, the government gave higher priority to flyovers and subways. However, none of the projects were completed on time. This increases both the cost and the suffering of the citizens (Abirami, 2021).

According to the Ministry of Roads and Transport, the Ministry of Local Government and the Ministry of Public Works, about 45 billion takas (45 billion taka) was spent on flyover construction in the past decade. More than 200 crore taka (200 billion taka) is used to develop Hatirjheel. Another 2 billion takas (Tk 200 million) was spent on the procurement, operation and maintenance of traffic lights, but these were of no use.

Action Plan

To minimize the traffic congestion level, the following immediate measure can be taken:

i. NMT (Non-Motorized Transport) free road,
ii. Maximum use of road width,
iii. Ban unauthorized parking,
iv. Reducing encroachment of footpath. Controlling road side activities,
vi. Proper management of signaling system,
vii. Speed wise dedicated lane for vehicles,
vii. Car free days,
ix. High Parking charge,
x. Effective use of underpass and over bridge,
xii. School bus,
xii. Time rescheduling (Shakil, 2016)

Use of Waterways and Railways

There are many rivers and lakes in Dhaka city, Hatirjheel Lake, Buriganga River are worth mentioning. By using and improving these waterways the pressure on the roads can be reduced to a great extent. Encouraging the public to make maximum use of these waterways by digging some new canals, connecting key points of Dhaka. It will save time as well as money from being wasted. Introducing water transport options such as ferries, boats, or water taxis can provide an alternative mode of transportation for commuters.

Waterways can connect different parts of the city, offering a quicker and more efficient travel option, especially for areas near rivers or lakes.

Cargo Transport: Shifting cargo transportation from roads to waterways can significantly reduce the number of trucks on the roads, easing traffic congestion. Water transport is particularly useful for bulky or heavy goods, as it can accommodate larger loads and reduce the reliance on road-based freight transport.

Park and Ride Facilities: Establishing park and ride facilities near waterways can encourage people to park their vehicles and use water transport for commuting. This reduces the number of private vehicles entering the congested areas of the city and promotes a more sustainable and efficient transportation system (Huq, & Khan, 2011).

Integration with Existing Transport Modes: Integrating water transport with existing transportation modes such as buses, metro systems, and other public transport networks can provide seamless connectivity for commuters. This integrated approach allows people to easily switch between different modes of transportation, reducing the need for private vehicles.

Tourism and Recreation: Developing water-based recreational activities and tourism opportunities can attract visitors and residents to utilize water transport for leisure purposes. This not only promotes the use of waterways but also diversifies the transportation options available to residents and visitors.

Infrastructure Development: Investing in the development and improvement of water transport infrastructure, including terminals,
jetties, and docking facilities, is crucial to facilitate smooth and efficient operations. This ensures that water transport becomes a viable and attractive option for commuters (Beyer, & Verhaeghe, 2014).

Environmental Benefits: Utilizing waterways can help reduce air pollution and carbon emissions caused by vehicular traffic. Water transport is generally considered more environmentally friendly compared to road transport, as it has lower emissions and energy consumption per passenger or cargo unit.

It is important to note that the successful implementation of water transport systems requires careful planning, investment, and coordination among various stakeholders, including government authorities, transportation agencies, and the private sector. Additionally, public awareness campaigns and education about the benefits of water transport can encourage people to adopt this mode of transportation and reduce traffic congestion in Dhaka city (Shajahan, 2013).

On the other hand, if we notice that the railway line passes through Dhaka from Uttara to Kamalapur, it has several stations, which can play a very important role in reducing the traffic pressure on the road. The first train requires proper management.

Figure 11. Map Of Dhaka City
Efficient and Fast Transportation: Railways provide a fast and efficient mode of transportation, allowing people to travel quickly and conveniently between different parts of the city. This can reduce the number of private vehicles on the road, thereby reducing traffic congestion.

Increased Capacity: Railways have the potential to carry a large number of passengers at once, with trains having a higher capacity compared to individual vehicles. By encouraging more people to use the railway system, the overall demand for road space can be reduced, leading to less traffic congestion.

Dedicated Right-of-Way: Railways have dedicated right-of-way, which means they are not affected by other traffic or road conditions. This allows for smoother and uninterrupted movement of trains, avoiding the delays and congestion that can occur on roads.

Park and Ride Facilities: Establishing park and ride facilities near railway stations can encourage people to leave their private vehicles at these locations and use the railways for commuting. This reduces the number of vehicles entering the city center and helps alleviate traffic congestion.

Integration with Public Transportation: Integrating railways with other modes of public transportation, such as buses and metro systems, provides seamless connectivity and encourages commuters to use public transportation as a whole. This reduces the reliance on private vehicles and decreases traffic congestion.

Reducing Air Pollution: By reducing the number of vehicles on the road, the use of railways can contribute to a decrease in air pollution levels in Dhaka. This has the added benefit of improving air quality and public health.

However, it is important to note that the implementation of an efficient and reliable railway system requires significant investment in infrastructure, proper planning, and coordination with other modes of transportation. It also requires the availability of adequate rail services and sufficient coverage to attract commuters.

Traffic Jam Solutions

Traffic jam is a major problem in Dhaka. Solutions can be found for some of these reasons, which can reduce traffic jams by 50%. One of the main reasons for traffic jams is the daily increase in the number of private cars. A private car does not carry as many passengers as the road it needs. A private car carries 1-2 passengers and most of the time it does not carry any passengers, to move from one place to another. It creates unnecessary traffic. This problem becomes most serious during the opening and closing hours of the office. Because at this time, most private cars enter the road but the capacity of the road is not so much, it starts a serious traffic jam. To solve this problem, reduce private cars on the road during these two times and increase the use of public transport such as buses, double-decker buses. For this purpose, various bus services can be introduced, both general and special (for large groups of individuals). Also, special bus service for students can be done. And for teachers too, special bus arrangements for garment workers at the start and end of this office. Whereas a private car can carry 2-3 passengers, a bus on the other hand can carry 50-100 people. So it is better to use bus instead of private car during these two times. Separate buses based on offices, can be used for their staff. To reduce the movement of private cars, take special laws and measures for this.

Traffic Jam Solutions in Construction Time in Dhaka Bangladesh

Dhaka, the capital city of Bangladesh, is known for its severe traffic jam, and this problem is further exacerbated during construction work. Here are some solutions that can be implemented to alleviate traffic jam during construction work in Dhaka:

Use of Technology: Construction companies can use technology such as real-time traffic monitoring systems, GPS-enabled equipment, and automated traffic control systems to manage traffic flow more efficiently. This can help to reduce congestion and minimize delays for commuters.
Coordination with Local Authorities: Construction companies should coordinate with the local authorities to obtain the necessary permits and approvals, plan for traffic diversions, and implement measures to minimize the impact on traffic flow.

Public Awareness Campaigns: Construction companies can conduct public awareness campaigns to inform commuters about the construction work and the measures being taken to reduce the impact on traffic flow. This can help to minimize frustration and complaints from commuters.

Use of Alternative Transport Modes: Construction companies can encourage their employees to use public transportation or carpooling to reduce the number of vehicles on the road during construction work. This can help to reduce congestion and minimize delays for commuters.

Planning and Scheduling: Construction companies should plan and schedule their work during off-peak hours to minimize the impact on traffic flow. This can help to reduce congestion and minimize delays for commuters (Ashrafur, & Hoque, 2018).

Conclusion
In conclusion, this thesis conducted a comprehensive evaluation of urban traffic management in Dhaka city, focusing on identifying challenges, assessing current strategies, and proposing recommendations for improvement. The research findings shed light on the complex nature of traffic congestion in Dhaka and highlight the need for effective traffic management measures.

The analysis of the traffic situation in Dhaka revealed the alarming levels of congestion and its detrimental impact on the city’s overall transportation system. The assessment of infrastructure and road networks identified various deficiencies, including inadequate road capacity, poor road conditions, and lack of pedestrian-friendly infrastructure. The evaluation of traffic control systems and technologies highlighted the need for advanced signal optimization and intelligent transportation systems to improve traffic flow.

Stakeholder perspectives provided valuable insights into the challenges faced by commuters, transport authorities, and the public in managing urban traffic. These perspectives emphasized the importance of integrated public and non-motorized transport modes, enforcement measures, and public awareness campaigns to alleviate congestion.

The effectiveness analysis of current strategies revealed both successes and areas for improvement. Traffic signal timing and synchronization, when optimized, demonstrated positive impacts on traffic flow. However, public transportation systems require further enhancement to attract more commuters and reduce reliance on private vehicles.

Based on the research findings, several recommendations have been proposed to improve urban traffic management in Dhaka. These include infrastructure upgrades and expansions, implementation of advanced traffic control systems, integration of public and non-motorized transport modes, public awareness campaigns, and policy and regulatory reforms.

Implementing these recommendations will require strong commitment and collaboration among government authorities, transportation agencies, and stakeholders. Short-term measures can be implemented immediately to provide immediate relief, while medium-term strategies should focus on sustainable traffic management solutions. A long-term vision must be developed to transform the urban traffic landscape in Dhaka, taking into account evolving technologies and changing urban dynamics.

Overall, this thesis contributes to the understanding of urban traffic management evaluation in Dhaka city and provides practical recommendations for improving traffic flow and reducing congestion. It is hoped that the findings of this study will inform decision-makers, urban planners, and transportation authorities in implementing effective traffic management strategies.
measures to enhance the overall mobility and livability of Dhaka city.

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Author Contributions

Prodhan Md Safiq Raihan: investigation, funding acquisition, and writing – original draft preparation; Mithun Biswas: writing – original draft preparation, data analysis, writing – review and editing, and checking the original draft; Mir Fazle Rabbi: writing – review and editing and checking the original draft; Md Mahmudul Hasan: investigation, funding acquisition, checking the original draft, and writing – review and editing; Md Tohidul Islam and Md Rakibul Islam: checking the original draft and data analysis. All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

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