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The “Journal of Transport” publishes the most significant results of scientific and applied research carried out in universities of transport profile, as well as other higher educational institutions, research institutes, and centers of the Republic of Uzbekistan and foreign countries.

The journal is published 4 times a year and contains publications in the following main areas:

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- Materials Science and Technology of New Materials;
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- Car Service;
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- Air Traffic Control;
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- Traffic Organization;
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Tashkent State Transport University had the opportunity to publish the scientific-technical and scientific innovation publication “Journal of Transport” based on the Certificate No. 1150 of the Information and Mass Communications Agency under the Administration of the President of the Republic of Uzbekistan. Articles in the journal are published in Uzbek, Russian and English languages.

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Problems and solutions for organizing public transport in dedicated lanes on urban streets

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Abstract: In both developed and developing countries, increasing the efficiency of public transport and addressing the challenges of passenger transportation are pressing issues. In major cities worldwide, including the United States, Canada, Russia, China, and South Korea, researchers have conducted various studies and initiatives to improve public transport efficiency. As a result, significant progress has been made by implementing dedicated lanes for public transport, which has led to increased transit speeds and reduced route times. However, there are no specific standards or regulations outlining the conditions and scenarios for implementing dedicated lanes for buses. This article focuses on the issues affecting bus operations and their solutions. The research object is the dedicated bus lanes organized in the streets of Tashkent.

Keywords: Dedicated lane, Traffic congestion, Density, Intensity, Traffic flow, Buses, cars, traffic lane

1. Introduction

In today's rapidly developing automotive industry, various types of vehicles are being produced to bring distant places closer to people. This growth not only serves to meet the increasing needs of the population but also leads to a rise in the number of vehicles on the streets, which in turn causes traffic congestion and related issues. As a result, problems related to the disruption of public transport schedules arise. Specifically, public transport (buses) facing such issues leads to significant time and fuel losses and potentially increases the emission of harmful gases into the environment. Preventing and addressing these problems ensures the effective operation of public transport systems in cities. By utilizing international experiences, such as Bus Rapid Transit (BRT), we can address the congestion problems occurring on urban streets in our country.[7] Currently, dedicated lanes for buses are being established on several streets in Tashkent, and research observations are being conducted. Based on the results, the speed of buses operating in dedicated lanes has increased in accordance with their route times. This indicates that implementing and justifying dedicated lanes for public transport plays a crucial role in increasing passenger transport efficiency in cities. Figure 1 illustrates the characteristics of the BRT system [3].

Figure 1: Characteristics of Bus Rapid Transit

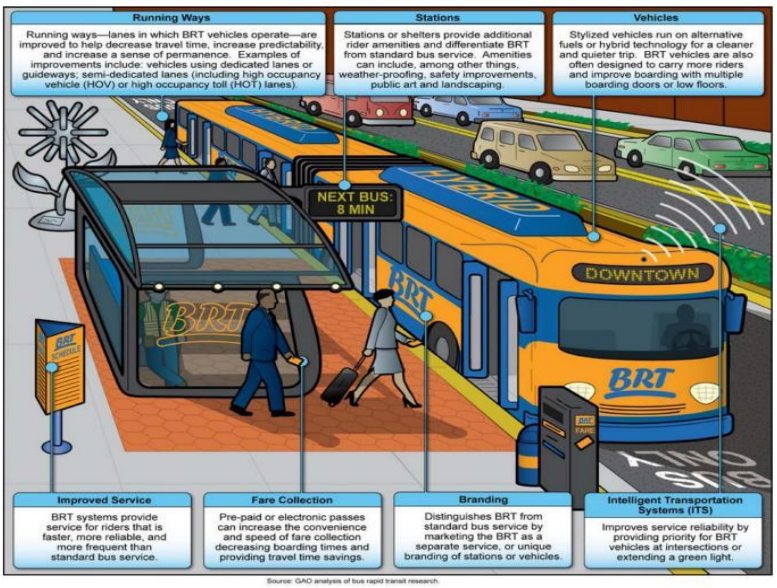

Figure 1. BRT systems are similar to rail systems and are described as follows

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Bus Rapid Transit (BRT) is an urban transportation system designed to ensure the fast and efficient movement of buses. The system typically utilizes dedicated lanes or busways, pre-scheduled routes, and other advanced infrastructure.[4]

2. Methods and materials

BRT systems generally have the following features:

Dedicated Lanes: Specially designated lanes or busways for buses. This ensures that buses are separated from other vehicles and can move faster.

Fast Payment System: The ability to pay for tickets in advance or before boarding, which speeds up boarding and alighting processes.

Regular Schedule: Buses operate according to a set timetable, allowing passengers to plan their journeys in advance.

Speed and Efficiency: Dedicated lanes and payment systems reduce obstacles in the overall transport system, enabling buses to provide faster and more efficient service. BRT systems are often implemented in large cities or densely populated areas because they offer a fast, reliable, and cost-effective transportation option.

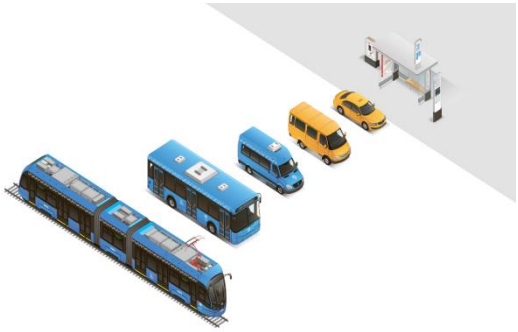

Figure 2. Passenger Transport Vehicles

Passenger transport vehicles come in various types, each designed to meet the transportation needs of different cities or regions. Below is a brief description of the most common types of transport vehicles:[6]

Buses:

City Buses: Serve short distances within the city, typically following designated routes.

Intercity Buses: Operate over longer distances between cities or within a city.

Special Buses: Operate in dedicated lanes as part of BRT systems.[7]

Trolleybuses: Electric buses that receive power via overhead wires, serving short distances within the city.

Trams: Vehicles operating on fixed rails, usually serving short distances within or around a city.

Metros: Rapid transit systems operating on underground or elevated tracks, suitable for large cities, providing fast and efficient transport.

Minibuses: Smaller buses serving short distances within a city or surrounding areas, and often used for informal or specialized services.

Light Rail Transit (LRT): Light rail systems serving short distances within a city or between cities, often operating on dedicated tracks.

Airport Taxis and Shuttle Services: Special taxi and shuttle services that connect airports to city centers or other key locations.

Taxis and Ride-Sharing Services: Services providing private or shared transportation, such as Uber, Lyft, or local taxi services.

Each of these transport modes has its own advantages and limitations, and they work together to improve the efficiency of urban and regional transportation systems.

3. Results and discussions

Challenges and Solutions in Passenger Transport Vehicle Operations:

1. Traffic Congestion:

Problem: Traffic congestion in city centers or major roads leads to slower movement of vehicles, increasing travel times for passengers.

Solutions: Dedicated lanes, BRT systems, and intelligent traffic management systems.

2. Capacity and Speed:

Problem:Delays or deviations from schedules for buses, trams, and other vehicles.

Solutions:Fast payment systems, automated control systems, and schedule adherence monitoring.

3. Safety Issues:

Problem: Safety concerns on buses or other vehicles, including accidents, crimes, or personal safety issues.

Solutions: Implementing robust safety standards, monitoring systems, and hiring security personnel.

4. Comfort and Convenience:

Problem: Lack of comfort or poor condition of vehicles, causing inconvenience to passengers.

Solutions: Introducing new and modern vehicles, improving interior design and ergonomics.

5.Payment Systems:

Problem: Complexity or inefficiency of payment systems causing difficulties for passengers.

Solutions: Adopting new technologies, electronic payment systems, and simplifying payment processes through mobile apps.

6. Service Quality:

Problem: Lack of professionalism in service, low staff qualification.

Solutions:Staff training, developing customer service standards.

7. Environmental Issues:

Problem:Environmental impact of transport vehicles, pollution, and energy efficiency.

Solutions: Introducing electric or hybrid vehicles, using green energy sources.

8. Infrastructure Issues:

Problem: Insufficient or outdated road infrastructure limiting the efficient movement of vehicles.

Solutions: Road repairs, creating new lanes, and modernizing transport infrastructure.

9. Social Issues:

Problem: Transport services not catering to the needs of various social groups, such as a lack of facilities for disabled individuals.

Solutions: Implementing universal design in vehicles, providing special services for disabled passengers.

10. Information Accessibility:

Problem: Lack of or incorrect information for passengers, disrupting travel plans.

Solutions:Improving information provision systems, real-time data delivery, and simplifying user interfaces.

Addressing these problems requires improving and modernizing transport systems. Each issue can be tackled individually or collectively to provide quality and efficient service to passengers.

Challenges in Organizing Bus Movement in Dedicated Lanes:

1. Drawbacks of Dedicated Lanes:

Problem: Dedicated lanes may be underused or obstructed by other vehicles. For example, other vehicles (cars, trucks) may sometimes park or travel in dedicated lanes.

Solutions: Ensuring full lane dedication through strict markings and enforcement, and implementing measures to restrict access to dedicated lanes.

Lane Usability Issues:

Problem: Dedicated lanes may be poorly designed or ineffective, such as inadequate signage or poor condition.

Solutions: Regular maintenance and updating of lane markings, proper signage and indicators.

3. Compatibility Issues:

Problem: Dedicated lanes may not integrate well with other transport systems, reducing the efficiency of the vehicles.

Solutions: Ensuring compatibility with other transport systems, establishing good connections between transport modes.

4. Understanding and Compliance Issues:

Problem: Rules or signs for bus movement in dedicated lanes may be unclear.

Solutions: Making road signs and indicators clearer, preparing bus drivers for operating in dedicated lanes.

5. Demand and Usage Imbalance:

Problem: Dedicated lanes may be underused or experience temporary congestion.

Solutions: Dynamic management of traffic, adjusting routes according to demand, and evaluating the effectiveness of dedicated lanes.

6. Safety Concerns:

Problem: Dedicated lanes might pose safety issues, such as the risk of collisions with other vehicles.

Solutions: Enhancing safety measures in dedicated lanes, installing automatic stop systems, and safety barriers.

7. Construction and Maintenance Issues:**

Problem: Temporary limitations or problems during the construction or maintenance of dedicated lanes.

8.Solutions: Efficient planning of construction and maintenance work, making temporary adjustments to minimize passenger inconvenience.

To resolve these issues, road management and transport organizations need to develop and implement effective strategies, as the successful operation of dedicated lanes helps provide better and higher-quality service to passengers.

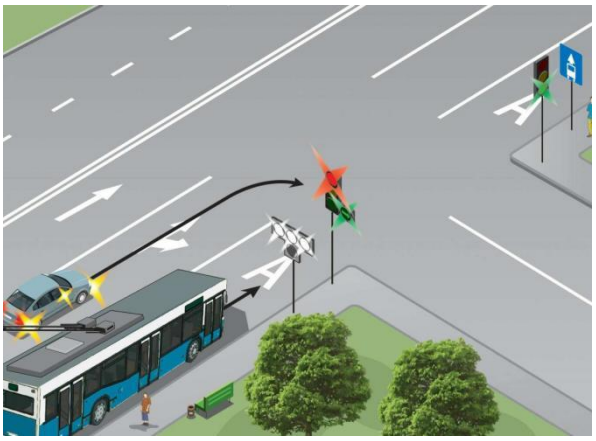

Figure 3. Organizing Bus Movement in Dedicated Lanes

Problems of Bus Movement in Dedicated Lanes:

While organizing buses to move in dedicated lanes (special road lanes) has various advantages, this system can also introduce several problems. Detailed information about these problems and potential solutions is provided below:

1. Poor Maintenance of Road Lanes:

Problem: Dedicated lanes require regular maintenance and good upkeep. If they are not properly maintained, it can reduce the efficiency of buses.

Solutions: Regularly inspect, repair, and maintain dedicated lanes to ensure they are in good condition.

2. Disruption of Dedicated Lanes:

Problem: Other vehicles (e.g., private cars or trucks) may stop or travel in dedicated lanes, causing delays and obstructions for buses.

Solutions: Implement cameras and enforcement measures to monitor lane usage. Introduce specific signage to prevent unauthorized use.

3. Traffic Congestion:

Problem: Congestion or delays can occur within dedicated lanes or at their entry and exit points, leading to delays for buses.

Solutions: Properly plan lane usage and improve the efficiency of traffic management systems.

4. Insufficient Dedicated Lanes:

Problem: Dedicated lanes may be limited in number or only available on certain routes, hindering the efficient service of buses.

Solutions: Expand the network of dedicated lanes and introduce them on more routes.

5. Convenience and Compactness Issues:

Problem: Dedicated lanes often provide limited space, which can complicate interactions with other transport vehicles.

Solutions: Modernize road infrastructure and optimize dedicated lane design.

5. Safety Concerns:

Problem: Safety issues can arise in dedicated lanes, such as the risk of collisions with other vehicles or passenger safety concerns.

Solutions: Ensure proper lane markings, strengthen safety measures, and ensure security within dedicated lanes.

7.Environmental Issues:

Problem: The construction or maintenance of dedicated lanes can lead to environmental issues, such as pollution or resource usage.

Solutions: Use environmentally friendly materials and technologies, and focus on preserving the environment.

9. Implementation Difficulties:

Problem: Difficulties in properly implementing or understanding dedicated lane regulations, such as unclear signage.

Solutions: Make lane markings and indicators clearer, and provide training to bus drivers and passengers.

9. Financial Issues:

Problem: Building, repairing, or maintaining dedicated lanes can be expensive.

Solutions: Reduce inefficient costs and seek additional financial resources from government or private sectors.

Addressing these problems involves developing and implementing effective strategies for road management and transport organizations to ensure the successful operation of dedicated lanes, which contributes to providing better and higher-quality service to passengers.

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4. Conclusion

Addressing the issues related to public transportation operations can enhance the effectiveness of dedicated road lanes and provide better service to passengers. Well-planned and managed dedicated road lanes can significantly improve the overall efficiency of the transportation system. Organizing public transportation in dedicated lanes in city streets involves addressing a range of issues and solutions. These problems and their solutions contribute to the effective management of the transportation system and provide better service to passengers. The organization of public transportation in dedicated lanes is crucial for effective transportation management and delivering quality service to passengers. Dedicated road lanes help reduce congestion, shorten route times, and improve the overall transportation system by ensuring the swift and efficient movement of public transport.

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