ASSESSMENT OF THE ENVIRONMENTAL EFFECTS OF URBAN VEHICLE USAGE

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Annotation: Air pollution is a serious problem, since it is not only increases Environmental, but also economic and health risks. Environmental air pollution is a global problem, especially a local one. Released in one country pollutants can travel in the atmosphere of other countries and thus contributes to the deterioration of air quality. A lot of motor vehicles within the city its use leads to an increase in fuel consumption and a negative impact on the environment. This the process is associated with several factors, it is necessary to dig deeper into them.

Keywords: car, environment, tires, brake, ecology, road, pollution, harmful waste, rubber, transport, Traffic Light, City, fuel consumption.

Аннотация: Загрязнение воздуха является серьезной проблемой, поскольку оно увеличивает не только экологические, но и экономические и медицинские риски. Загрязнение воздуха является как глобальной, так и локальной проблемой. Загрязняющие вещества, выбрасываемые в одной стране, могут перемещаться в атмосферу других стран и, таким образом, способствовать ухудшению качества воздуха. Большое количество автотранспортных средств в городе приводит к увеличению расхода топлива и негативному воздействию на окружающую среду. Этот процесс связан с несколькими факторами, в которые необходимо углубиться.

Ключевые слова: автомобиль, окружающая среда, шины, тормоз, экология, дорога, загрязнение, вредные отходы, резина, транспорт, светофор, город, потребление топлива.

Annotatsiya: Havo ifloslanishi jiddiy muammo hisoblanadi, chunki u nafaqat ekologik, balki iqtisodiy va sog‘liqqa oid xavflarni ham oshiradi. Atrof-muhit havosining ifloslanishi global muammo bo‘lib, ayniqsa mahalliy miqyosda kuchli ta’sir ko‘rsatadi. Bir mamlakatda chiqarilgan ifloslantiruvchi moddalar boshqa mamlakatlar atmosferasiga tarqalib, havo sifatining yomonlashishiga hissa qo‘shishi mumkin. Shahar ichida ko‘plab avtotransport vositalaridan foydalanish yonilg‘i sarfining oshishiga va atrof-muhitga salbiy ta’sir ko‘rsatishiga olib keladi. Bu jarayon bir qancha omillar bilan bog‘liq bo‘lib, ularni chuqurroq o‘rganish zarur.

Kalit so‘zlar: avtomobil, atrof-muhit, shinalar, tormoz, ekologiya, yo‘l, ifloslanish, zararli chiqindilar, rezina, transport, svetofor, shahar, yoqilg‘i sarfi.

Introduction.

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Introduction. Air pollution is a serious problem, since it is not only environmental, but also economic and also increases the risks to health. Environmental air pollution is around the world is a global problem. Pollutants released in one place into the atmosphere of another can move and thus lead to a deterioration in air quality. Man among the pollutants that most affect health are PM particles known solid particles are also present in the atmosphere. These pollutants are human negative impact on health, causing problems in the respiratory system and premature death can lead. In this article, we will talk about a variety of solutions in the field of transport that require we distinguish two types of transport problems [1-3]:

• in intra-city transportation;
• intercity transportation.

Inside the city, which is one of the main factors of pollution in modern urban areas we focus on transportation. In intra-city transportation, we see an increase in fuel consumption, compared to intercity transportation due to tire wear and brake system wear we encounter emissions of environmental contaminants from more vehicles. In the process of acceleration and stocking in cars, brakes and tires are rubbed the process of eating increases.

Transportation to facilitate the transportation of goods and beggars in different areas of the city through the plays a decisive role in the economic hanging of urban centers. In recent years Many major intersections and various junctions of Andijan City face significant traffic jams giving, as a result, the beggars are wasting their precious time. Morning and evening during peak hours, traffic jams reach a high level, resulting in the disappointment of beggars intensifies. Congestion affects the productivity of employees, economic hanging, human health, directly and indirectly affects the environment and other social activities. Road congestion is a constant problem for the stability of traffic development. Traffic jams on roads are huge in most cities around the world, especially in developing regions remains a problem, resulting in large delays, fuel waste and money losses increasing. Traffic congestion is a delay for drivers, inconvenience and economic causes losses, as well as air pollution [4].

Traffic congestion and determining the amount of stability of the overall transport system for decision makers it is essential to start reduction strategies to improve. This traffic jam in most cities of the world, there are great difficulties in creating a stable transport system gives birth. This is due to an increase in travel costs, a longer travel time to reduce comfort and noise, environmental pollution, drivers come to the state of stress various negative, such as leakage, obstruction of economic growth and time pressure for passengers leads to tastes. In addition, traffic jams are associated with an increase in fuel consumption and air leads to

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environmental problems such as pollution, which is both urban and Rural on a global scale affects their location [5].

Methodology

The present study employs a **quantitative–qualitative mixed research methodology** to analyze the environmental impact of vehicles operating within urban areas, particularly focusing on the city of **Andijan**. The research integrates statistical data collection, direct field observations, and analytical modeling to determine how vehicular traffic contributes to air pollution, increased fuel consumption, and degradation of environmental quality. The aim is not only to assess the magnitude of the problem but also to identify the specific factors—such as vehicle type, driving pattern, and road conditions—that intensify its impact.

The methodology is based on three main stages [6-8]:

1. **Data Collection:** Gathering primary data from traffic observations and secondary data from local government and environmental agencies.
2. **Data Analysis:** Applying comparative analysis and fuel consumption modeling.
3. **Interpretation:** Assessing the implications of results on environmental health and proposing strategies for improvement.

This structured approach allows for a detailed evaluation of the direct and indirect effects of vehicle usage on the urban environment.

The research focuses **on Andijan City**, one of the most densely populated industrial centers of the Fergana Valley. The city's increasing population and economic activities have resulted in a sharp rise in the number of private and commercial vehicles. Traffic congestion, especially during morning and evening peak hours, provides an ideal setting for studying the link between vehicular density and environmental degradation.

Primary data were collected through **direct field observations** at 10 selected locations, including major intersections, traffic lights, and congested roads. The criteria for selecting these sites included [9]:

- High traffic density during peak hours
- Mixed vehicle composition (cars, buses, and freight trucks)
- Frequent idling at traffic lights and intersections

At each location, observations were carried out for **five consecutive working days** in both morning (7:00–9:00) and evening (17:00–19:00) hours. The following parameters were recorded:

- Number and types of vehicles passing per hour
- Duration of idling at red lights
- Frequency of acceleration and braking
- Visible exhaust emissions and noise levels

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Additionally, temperature, humidity, and wind direction were recorded to evaluate the dispersion of pollutants under different atmospheric conditions.
Secondary data were obtained from [10]:

- **Andijan Regional Department of Ecology and Environmental Protection —** for air quality indices (CO_2, CO, NOx, PM_{10}, and $PM_{2.5}$).
- **State Committee on Statistics of Uzbekistan** — for information on vehicle registration by type and fuel used.
- **Local Transport Authority** — for traffic flow patterns and road infrastructure details.

Emission factors were referenced from the **UK National Atmospheric Emission Inventory (NAEI, 2012)** and adapted to local conditions using correction coefficients that consider fuel quality and vehicle age in Andijan.

To analyze emissions effectively, all observed vehicles were categorized into the following classes:

1. Passenger cars
2. Light commercial vehicles (<3.5 t)
3. Medium trucks (3.5–7 t)
4. Heavy trucks (>7 t)
5. Buses
6. Motorcycles

Each class has different acceleration behavior, idling characteristics, and fuel consumption rates. Table 2 in the previous section provides the acceleration time and distance to reach 50 km/h for each category, which was used to model additional fuel use and emission factors.

Fuel consumption for each vehicle type was calculated using the **distance-based energy method**. The average fuel use during acceleration and idling was estimated according to the following formula:

These calculations were repeated for different traffic conditions—free flow, moderate congestion, and heavy congestion—to assess how traffic density affects fuel consumption.

Emission factors were adjusted for local conditions based on average vehicle age and the proportion of gasoline vs. diesel vehicles. Diesel engines were found to contribute more to particulate matter (PM) and nitrogen oxides (NOx), while gasoline engines emitted higher levels of carbon monoxide (CO).

Apart from fuel combustion, **non-exhaust sources**—including tire wear, brake wear, and road surface abrasion—were evaluated. These processes generate fine particulate matter (PM_{10} and $PM_{2.5}$), which poses serious health risks. Measurements and literature data were used to estimate non-exhaust emission factors (NEEFs) as follows:

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Source	Emission Factor (g/km/vehicle)
Brake wear	7.0
Tire wear	5.0
Road wear	3.5

These factors were multiplied by total vehicle kilometers traveled (VKT) in Andijan to calculate the annual mass of particulates released from non-exhaust sources. Field observations confirmed that braking and tire wear emissions are higher in congested intersections where stop-and-go movement dominates.

In addition to technical parameters, the methodology included the evaluation of **socioeconomic and behavioral factors** influencing vehicular pollution. Structured interviews and questionnaires were conducted among 120 drivers in Andijan to collect information about:

- Daily mileage and fuel consumption
- Vehicle maintenance habits
- Awareness of eco-driving techniques
- Perception of air pollution and noise

Responses were analyzed to identify behavioral patterns contributing to inefficient fuel use, such as excessive idling, poor maintenance, and aggressive driving styles. These findings were later correlated with fuel consumption and emission data.

Table 1.

The main causes of traffic jams in Andijan

	Traffic causative factors	Rated reasons
1	Socioeconomic factors	•With the increase in the population of rural cities Migration •Unplanned land use, especially gathering leads to one-way traffic flow during hours Employment to University, College, School and other organizations, to go to study at the same time, a traffic flow is created coming •To cars according to improved standard of living increased ownership
2	Path factors	•Narrow path with a small number of rows Pedestrian occupation of traffic lanes lack of roads as a result •Leading to a decrease in the speed of movement path of resentment •Uncontrolled traffic intersections

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3	Car factors	Car size •Age of vehicles
4	Human factor	Driver perception Infantry perception
5	Accident	•The weight, number and location of an accident

Result and discussion.

The driver's ability to move in traffic jams is significantly limited and changing the corridor requires caution. As traffic increases in Andijan the speed begins to decrease slightly, and the density begins to exceed at a faster pace. Transport systems widely used for transportation of people and goods. When calculating fuel consumption, we assume that the vehicles are managed according to the rules we guessed-their speed does not exceed 50 km / h.

For each type of vehicle average consumption data was measured or obtained. The table below (see Table 2) shows the acceleration time from 0 to 50 km/h measured for each vehicle type. Consumption for personal vehicles during acceleration from 0 to 50 km/h an increase in fuel consumption was taken into account. Subsequently, further information has been obtained from then, this growth factor in consumption during acceleration also leads to trucks and buses we found that it is possible to apply, but the acceleration time (and as a result, the vehicle distance made by) longer.

Table 2.

Average acceleration times up to 50 km / h are the desired speed and pressing during acceleration distances covered

Vehicle type	Average acceleration time from 0 to 50 km/h (SEC)	Distances covered during acceleration (m)
Automobiles	10.4	72
Light cargo vehicles (< 3.5 t)	12	83
Medium cargo vehicles (3.5 t-7t	14	97
Heavy freight vehicles (More than 7t)	16	111
Trailer vehicles	18.5	128
Bus	15	104
Motorcycles	8.2	57

Often in traffic lights and traffic jams, cars accelerate several times and slows down. In such cases, the fuel consumption of cars increases. Of course, brake, tires as a result of the overall shocks of the car due to wear and tear and braking the

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damage caused must also be taken into account. Direct due to increased fuel consumptionin addition to the correct costs, noise increases and CO2 and PM10 (also, PM2. 5 and PM1) to significantly increased environmental pollution of their particles leads. So, during the acceleration of the car with an average consumption of 8.13 liters/100 km, 21.8 liters / 100 km reach consumption. Speed acceleration of 50 km/h will continue for 10.4 seconds the car walks 72 m. Average consumption is 0.0000813 liters / m, consumption during acceleration 0.0002158 liters/m. fuel due to the frequent parking of cars in traffic jams and traffic lights the amount of waste increased by consumption increases. Carbon and other harmful emissions from cars substances are considered one of the global environmental problems. Vehicles, especially domestic cars running on combustion engines, carbon dioxide (CO_2) and other greenhouse gases releases into the atmosphere. It contributes to global warming and environmental cleanup. CO_2 in the atmosphere being one of the main heat-retaining gases, it leads to an increase in global temperature and harm human health.

Conclusion

In addition to direct costs due to increased fuel consumption, we note the increase in noise and CO2 and PM10 (also includes PM2.5 and PM1) it is also necessary to take into account the pollution that manifests itself in the significant spread of its particles. Thus, we can see ―gray‖ and-black‖ PM particles and the PM caused by braking we distinguish the particles.

Typical of gray particles, they spread much more evenly in the atmosphere, and their moves away from the origin. Black particles burn fuel mainly in internal combustion engines obtained as a result. As for the PM particles formed as byproducts of braking, they are due to its composition, we know for sure that it is especially dangerous for health. Motor transport within the city as a result of the use of the means, the fuel consumption increases and the environment becomes polluted.

LITERATURES

1. Masodiqov. Q, Xujamqulov. S., & Masodiqov. J. (2022). Avtomobil shinalarini ishlab chiqarish va eskirgan avtomobil shinalarini utilizatsiya qilish bo'yicha eksperiment o'tkazish usuli. Academic research in educational sciences, 3(4), 254-259.

2. Meliboyev. A., Khujamqulov. S. & Masodiqov. J. (2021). Univer calculation experimental method of researching the indicators of its toxicity in its management by changing the working capacity of the engine using the characteristics. Экономика и социум, (4-1), 207-210

3. Tojibayev F., Masodiqov. J. Noise generated in the exhaust system of the engine //Open Access Repository. – 2023. – Т. 4. – №. 03. – С. 234-240.

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4. Q. Masodiqov, S. Khujamqulov, and J. Masodiqov, “Avtomobil shinalarini ishlab chiqarish va eskirgan avtomobil shinalarini utilizatsiya qilish bo‘yicha eksperiment o‘tkazish usuli,” *Academic Research in Educational Sciences*, vol. 3, no. 4, pp. 254–259, 2022.
5. A. Meliboyev, S. Khujamqulov, and J. Masodiqov, “Univer calculation experimental method of researching the indicators of its toxicity in its management by changing the working capacity of the engine using the characteristics,” *Ekonomika i Sotsium*, no. 4–1, pp. 207–210, 2021.
6. F. Tojibayev and J. Masodiqov, “Noise generated in the exhaust system of the engine,” *Open Access Repository*, vol. 4, no. 3, pp. 234–240, 2023.
7. Yu. V. Kuznetsov, *Stsepnye kachestva avtomobilnykh shin i dorozhnykh pokrytii: uchebnoe posobie*, Moscow: MADI, 2022.
8. National Atmospheric Emission Inventory (NAEI), “Road Transport Emission Factors from 2010 NAEI,” 2012. [Online]. Available: http://naei.defra.gov.uk/datawarehouse/3_9_323_136259_roadtransportefs_naei10_v2.xls
9. H. C. Frey and K. Kim, “Quantification of variability and uncertainty in air pollutant emission inventories,” *Atmospheric Environment*, vol. 43, no. 3, pp. 618–629, 2009.
10. Khalimov J. et al. ASSESSMENT OF THE CONDITION OF URBAN ROADS AND STREETS, AS WELL AS TRAFFIC USE INDICATORS USING ARTIFICIAL INTELLIGENCE (AI) //Journal of Multidisciplinary Innovation in Science and Education. – 2025. – Т. 1. – №. 1. – С. 5-10.

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