AMERICAN JOURNALS
Open Access, Peer Reviewed Journals

American Journal of Pedagogical and Educational Research
ISSN (E): 2832-9791| Volume 10, | Mar., 2023

DETERMINING THE INFLUENCE OF CHANGES IN THE QUANTITY, SPEED AND COMPOSITION OF VEHICLES AND HIGHWAYS IN THE CITY AND THE DISTRIBUTION OF TRANSPORT

Alisher Kholikov Isan o`g`li
Tashkent State Transport University, Technical Sciences
Doctor of Philosophy (PhD), Associate Professor,

Kasimkhodjaev Bokhodir Kuchkarovich
Associate Professor,

Ubaydullaev Farkhod Bakhtiyarullaevich
Tashkent State Agrarian University, Agricultural Sciences
Doctor of Philosophy (PhD), Associate Professor.

A B S T R A C T	K E Y W O R D S
Developing measures to reduce traffic noise by evaluating and forecasting the traffic-operational state of the city's main streets and ensuring the environmental safety of selected areas along the city's main streets is gaining urgent importance. In recent years, special attention has been paid to the elimination and prevention of existing environmental problems in large cities in our republic. At the same time, the speed of traffic on the main streets of Tashkent city has reached 15,000 vehicles per hour, causing the level of traffic noise in selected areas to exceed the norm by 15-20 dBA.	city highway streets, transport, operational condition, transport noise, noise impact, assessment and forecast

Introduction

In the 1980s, noise ranked fifth among environmental problems, and has now taken second place. In modern cities, noise pollution is the first among the factors that negatively affect the health of modern city dwellers. Also, 30-40% of the population of modern large cities live in acoustically unfavorable conditions. According to the World Health Organization, 16% of the world's population (~1 billion people) are affected by street noise, and according to the European Parliament's 2012 "Noise Management Strategy" report, 50,000 people die every year in the EU. a person dies from a heart attack caused by street noise, 200 thousand people suffer from cardiovascular diseases related to street noise. Developed countries of the world such as the USA, Norway, Sweden, England, France, Germany, Italy, Japan, China, the Russian Federation, Belarus are demanding to find and widely implement effective methods to solve the problem of traffic noise. It is important to take measures to reduce traffic noise by improving the transport-operational condition of relatively economical city highways both in our country and in the world.

According to world practice, modern engineering and architectural measures against traffic noise are the most important in solving the problem of traffic noise, and a lot of work is being done in this regard.

Material And Research Methods

Experiments, mathematical statistics, correlation-regression analysis and modeling, systematic and theoretical analysis, synthesis of main components were used in the research process.

Discussion of The Results

Statistical methods are often used to find their empirical relationship by processing the results of the observations.

The concept of the relationship between mathematical quantities is represented by the concept of the function y=φ(x) when one value of the argument x corresponds to only one value of the function y. Until now, FHWA model(USA), CoRTN(England), German standard: RLS90 model(Germany), Italian C.N.R. model (Italy), StL86+(Switzerland), ASJ RTN-Model 2008 (Japan), Nord 2000 Model (Norway) and created by P. Pospelov, S. Yu. Dresvyannikov, N. N. Minina, Z. Khudoyberdiev, V. In the models developed by Vasilova, E.S. Karnaux, T. Subramani, there is a linear relationship between the amount of movement and the level of noise, and most of the models proposed by them were based on a logarithmic relationship. To date, developed models have been developed based on the results of research conducted in various countries.

We used the "Excel" computer program to process the obtained research results, based on the results of the research conducted on A. Temur Street, the graph shown in Figure 1 was constructed, and the laws of the relationship between the amount of traffic and the level of noise are presented in Table 1. This study was conducted in the right section of A. Temur street in front of the "Tashkent" TV tower, and it will be possible to measure the traffic noise during the day when the amount and speed of traffic in this section varies.

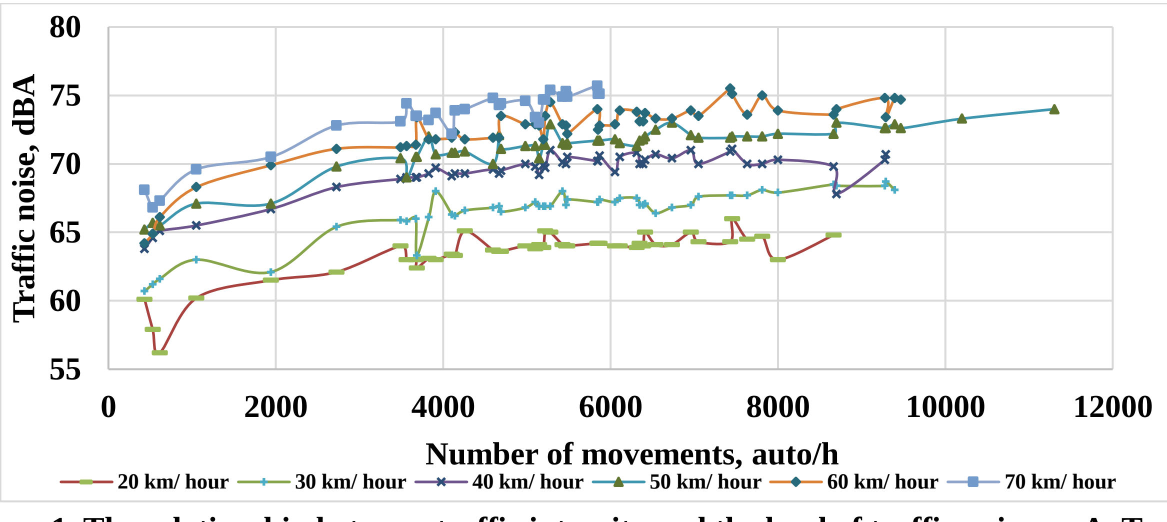

Figure 1. The relationship between traffic intensity and the level of traffic noise on A. Temur Street.

In order to determine the regularity of the data in the graph, trend lines were drawn, where the noise level increases with the increase in the amount of movement, indicating that there is a linear relationship between them (table 1).

Table 1 Linear relationship between traffic volume, speed and traffic noise

№	Average speed of movement, km/h	Dependency Type	
		Linear	Logarithmic
1	20	*Y=0,0007x+59,791; R^2=0,65*	*Y=2,38lnx+43,537; R^2=0,82*
2	30	*Y=0,0007x+62,593; R^2=0,75*	*Y=2,56lnx+44,91; R^2=0,88*
3	40	*Y=0,0006x+66,278; R^2=0,60*	*Y=2,2lnx+50,85; R^2=0,85*
4	50	*Y=0,0007x+67,355; R^2=0,75*	*Y=2,61lnx+48,957; R^2=0,91*
5	60	*Y=0,0009x+67,76; R^2=0,72*	*Y=3,23lnx+45,181; R^2=0,92*
6	70	*Y=0,0014x+67,701; R^2=0,88*	*Y=3,15lnx+47,613; R^2=0,92*

In order to manage complex phenomena through many observations, it is necessary to implement their specific connection and forecasting, i.e., mathematical modeling of processes. One of such opportunities is implemented through correlation-regression analysis.

Using the methods of correlation-regression analysis, it is possible to measure the density of connections between indicators using the correlation coefficient. If the correlations are very significant, then it will be possible to find a mathematical expression of the appropriate regression model.

From the data in the traffic volume and traffic noise level graph on A. Temur Street, the change in the noise level by traffic speed and traffic volume composition was expressed through the graphs in figures 2 and 3 below, and the effect of traffic speed and traffic volume composition on traffic noise was analyzed correlationally, and the results are presented in Table 2 .

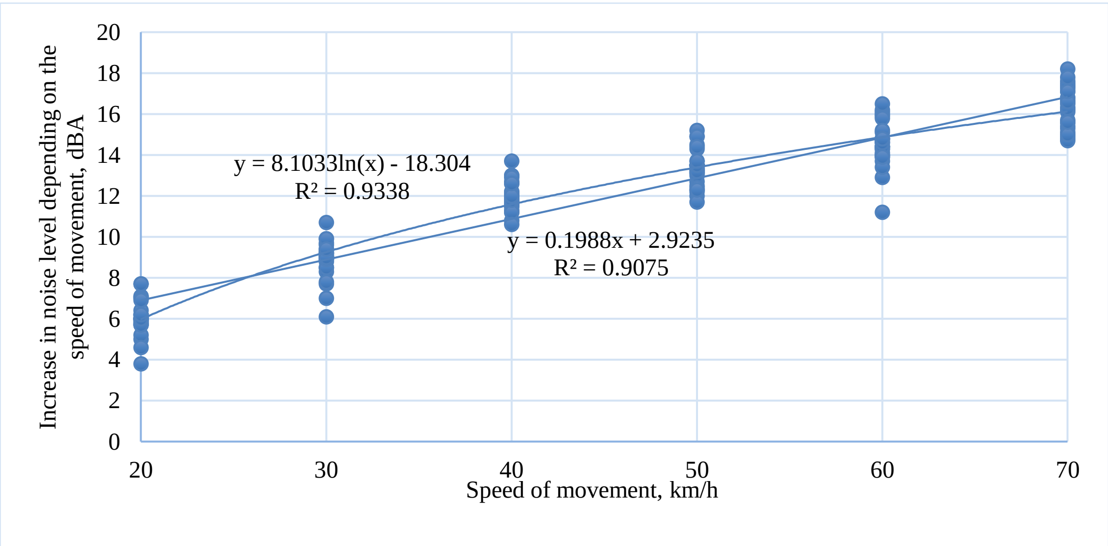

Figure 2. A graph of the increase in noise level with a change in speed

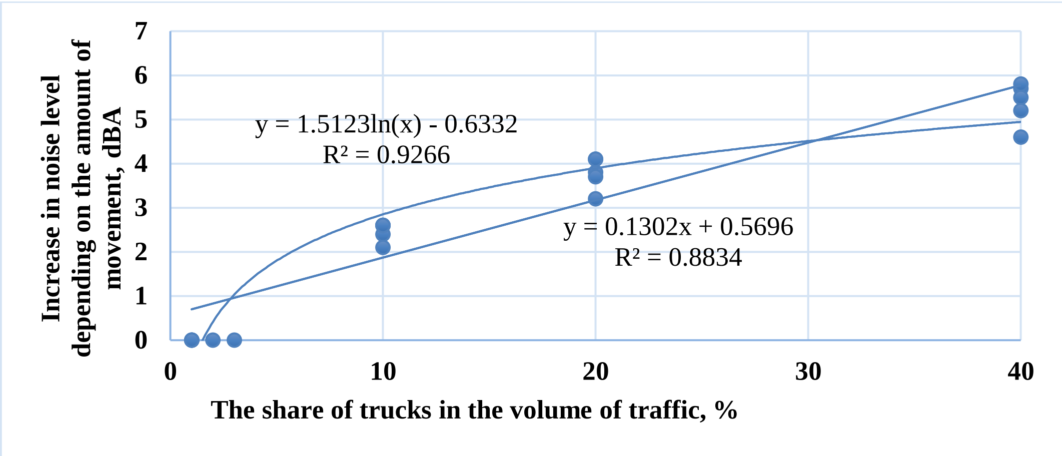

Figure 3. A graph of the increase in noise level with changes in the composition of the amount of traffic

Table 2 Results of correlational analysis of the influence of traffic speed and composition on traffic noise

	V	*Lэкв*
V	1	
Lэкв	0,952601898	1

Z	1,859167939
N	180
Tz	24,73462068
A	5
K	178
Tкр	1,973380889
Tz>tкр	

	P	*Lэкв*
P	1	
Lэкв	0,93987	1

Z	1,73695
n	20
Tz	7,16162
α	5
k	18
tкр	2,10092
Tz>tкр	

When the effect of traffic speed and traffic volume composition on traffic noise is analyzed by correlation, the fulfillment of the condition Tz>tkr shows that there is a close relationship between them.

It is of great importance to choose the best forms of connection of the considered factors in the modeling of the conducted studies with the methods of correlation-regression analysis.

As a result of the regression analysis, it was found that the double regression obeys the law of the non-linear (curve) model (Table 3):

Table 3 Non-linear (curvilinear) model law of pairwise regression

Form of communication	**The regression equation**	**System of equations**
Semi-logarithmic	*y=a+b*lgx*	$\begin{cases} a\cdot n + b\cdot\sum_{i=1}^{n}\lg x_i = \sum_{i=1}^{n} y_i \\ a\cdot\sum_{i=1}^{n}\lg x_i + b\cdot\sum_{i=1}^{n}(\lg x_i)^2 = \sum_{i=1}^{n}(y_i\cdot\lg x_i) \end{cases}$

Regression analysis is a group of methods aimed at identifying and mathematically expressing the changes and relationships that occur in a system of random variables. As a result of the regression analysis, it was found that the double regression obeys the law of the non-linear (curved) model. This type of relationship is represented by the expression M(Y│x)= f (x), the regression of Y and X, that is, the relationship of two random variables is a pair regression, when it depends on more than one variable, M(Y│x1,x2,…..,xm) =f(x1,x2,…..,xm) is called multivariate regression [93].

The fact that the level of traffic noise depends on the amount, speed, and composition of traffic at the same time requires multifactorial regression analysis of the research results, which also shows the logarithmic dependence of the amount and speed of traffic on the level of noise.

A logarithmic trend has the following properties:

1. If a1,2,...,n > 0, then the levels increase with attenuation, if a1,2,...,n < 0, then the trend levels decrease with attenuation.
2. The absolute changes in levels by module decrease over time.
3. The values of acceleration of absolute changes have the opposite sign to the sign of absolute changes and gradually decrease by module.
4. The rate of change (chained) gradually approaches 100% as t → ∞.

In a logarithmic trend, the fading process continues very slowly without limit.

The multivariate regression equation can be expressed as follows:

Y=f(b,X)+e (1)

Here X = (X1, X2,..., Xm) is a vector of independent (explanatory) variables; b is a vector of parameters (to be determined); ε - random error (deviation); Y is the dependent variable.

The most commonly used theoretical linear regression equation of multivariate regression models is:

Y=b_0 〖+b〗_1 X_1 〖+b〗_2 X_2+... 〖+b〗_m X_m+e (2)

or for individual observations i, i = 1,2, ..., n:

y_i=b_0 〖+b〗_1 x_i1 〖+b〗_2 x_i2+... 〖+b〗_m x_im+e_i (3.3)

Here b=(b0, b1,…..bm) is the (m+1) dimensional vector of unknown parameters, bj is the coefficient, j=1,2,.....,m, j is the theoretical regression coefficient. This coefficient describes the effect of the value of Y on the change of Xj.

Based on n observations, the model regression equation is estimated as follows:

y ̂=b_0 〖+b〗_1 x_1 〖+b〗_2 x_2+... 〖+b〗_m x_im (4)

Here: b0, b1, …, bm – estimation of parameters b0, b1, …, bm.

The Least Squares (Least Squares) method is used to estimate the regression parameters. According to the EKK method, the sum of the squares of the residuals tends to a minimum:

F(b_0,b_1,b_2,…,b_m=∑_(i=1)^n▒〖e_i=∑_(i=1)^n▒(y_i-(y_i) ̂)^2 〗 =∑_(i=1)^n▒〖(y_i-b_0-b_1 x_i1-b_2 x_2-...-b_m x_im)^2→min〗 (5)

A necessary condition for its minimum degree is that all its partial derivatives are equal to zero. As a result, we bring (m+1) unknowns to (m+1) system of linear equations, which is called system of normal equations. Its exact solution is usually written in matrix form. Estimates of model parameters and their theoretical differences in matrix form are determined by the following expressions:

$$b = (X^T X)^{-1} X^T Y \quad (6)$$

$$D(b_i) = (X^T X)^{-1}_{ii} \cdot \sigma^2 \quad (7)$$

Here: b–vector b0, b1, …, bm components; X–explanatory variables of matrix value; Y–variable value depending on the matrix; ϭ2–random error variance.
Residual dispersion:
$S^2=1/(n-m-1) \sum e_i^2$ (8)
The value of C is called the standard error of the regression. We determine the standard errors of the regression coefficient estimates by taking the square root, replacing the unknown ϭ2 variance in the theoretical variances with its S2 estimate.
$S_{b_i}=S\sqrt{((X^T X)_{ii}^{-1})}$ (9)
If the random error estimates are met, the estimates of the multivariate regression parameters will be unbiased, consistent, and efficient.
Based on the results of measuring the traffic volume, composition and speed of the main streets of the city, we obtained the following model as a result of the regression analysis using the "Excel" program:
$L_{eq}=19.9+2.5 \ln(N)+7.5 \ln(V)+1.1 \ln(P)$ (10)
Here: N-movement amount, avt/h; V-movement speed, km/h; The share of trucks in the amount of P-movement, %;
The basis of this obtained model was proposed by N.I. Smolyar[94] in determining the level of traffic noise according to the results of a multi-level study:
$L_{10}=18.1+16.2V+8.9Q+0.117P$ (11)
$L_{50}=-3.0+13.0V+15.0Q+0.096P$ (12)
$L_{90}=-24.2+9.8V+21.3Q+0.075P$ (13)
In the model presented in the work of N.I Smolyar, it is valid for 10, 50, 90% aggregate density. Traffic noise models have improved over the years, and in 1977, the concept of equivalent noise level of 1 Leq was introduced in Sydney, Australia, and is still in use today. The models in use today and the improved model for forecasting the traffic noise specific to the city of Tashkent are based on the equivalent level of traffic noise.

As can be seen from the resulting expression, the speed of movement is the main indicator of the level of noise. The speed of movement and the amount of movement are inversely related, as the amount of movement increases, the speed of movement decreases.
Traffic noise propagates pointwise and linearly from the noise source along city streets or highways. Point and line propagation of noise from the sound source is determined as follows:
$L_{ch}=10lg R/R_0$ (14)
$L_n=20lg R/R_0$ 15)
Here: the distance from the R0-noise source to the measurement point is 7.5 m; R-the distance from the calculation point to the measurement point, m
As a result of our research, the existing formula for the point and line distribution of the noise level appeared as follows:

$$L_{\text{тар}}^{\text{ч}} = 13lg\frac{R}{R_0} \quad (16)$$

$$L_{\text{тар}}^{\text{н}} = 24lg\frac{R}{R_0} \quad (17)$$

Conclusion:
As a result of the research, the influence of traffic volume, speed composition, smoothness and roughness of green pavement on traffic noise was determined.

REFERENCES

1. Ubaydullaev, Farxod, et al. "Irrigation regime Influence on the growth and seedlings development of common fake chestnut (Aesculus hippocastanum L.) and Japanese safflower (Sophora japonica L.) in the highways landscaping." E3S Web of Conferences. Vol. 264. EDP Sciences, 2021.

2. Kholikov, Alisher I., and Kudratulla Kh Azizov. "Traffic noise forecasting on Tashkent city main streets." Journal of Siberian Federal University. Engineering & Technologies 15.2 (2022): 248-260.

3. Azizov, K., and A. Xoliqov. "ЎЗБЕКИСТОН РЕСПУБЛИКАСИ АВТОМОБИЛЬ ЙЎЛЛАРИ ВА ШАҲАР МАГИСТРАЛ КЎЧАЛАРИДА ҲАРАКАТ ЖАДАЛЛИГИНИ ТРАНСПОРТ ШОВҚИНИГА ТАЪСИРИ." Science and innovation 1.A8 (2022): 450-457.

4. Убайдуллаев, Фарход Бахтияруллаевич, and Фарҳод Джураевич Хаитов. "АВТОМОБИЛЬ ЙЎЛЛАРИ ВА ШАҲАР КЎЧАЛАРИДАГИ САЙИЛГОҲ ҲУДУДИНИНГ ТОШКЕНТ ВОҲАСИ УЧУН БАЛАНСИ ВА ЯШИЛ ЭКИНЗОРЛАРИГА ТАВСИЯ ЭТИЛАЁТГАН МАНЗАРАЛИ ЎСИМЛИК ТУРЛАРИ." Dbiology: 95.

5. Bakhtiyarullaevich, Ubaidullaev Farkhod, and Majidov Abdulaziz Norqobilovich. "Vegetative propagation of black mulberry (Morus, nigra L) recommended for landscaping roads and city streets." Texas Journal of Agriculture and Biological Sciences 12 (2023): 37-40.

6. Bakhtiyarullaevich, Ubaydullaev Farkhod, Xaitov Farhod Djuraevich, and Ubaydullayev Abbosjon Azimjon Ogli. "TOSHKENT SHAHAR MIRZO ULUG'BEK TUMANIIDAGI DAHALARNI KO'KALAMZORLASHTIRISHDA DARAXTLARNING SANITAR GIGIENIK VA XUSUSIYATLARI." Conferencea (2023): 149-153.

7. Bakhtiyarullaevich, Ubaidullaev Farkhod, and Ubaydullayev Abbosjon Azimjon OGLi. "SANITARY-HYGIENIC PECULIARITIES OF GREENING OF STREETS AND AUTOMOBILE STATIONS AND NATIONAL POINTS." Galaxy International Interdisciplinary Research Journal 11.2 (2023): 53-58.

8. Bakhtiyarullaevich, Ubaidullaev Farkhod, Majidov Abdulaziz Norqobilovich, and Khudaybergenov Sardor Kamaraddinovich. "AGROTECHNICS OF CULTIVATION AND USE OF MULBERRY SEEDLINGS FOR PICTURESQUE LANDSCAPING OF HIGHWAYS." Galaxy International Interdisciplinary Research Journal 11.1 (2023): 363-370.

9. Убайдуллаев, Фарход Бахтияруллаевич, and Фарҳод Джураевич Хаитов. "TYPES OF ORNAMENTAL PLANTS RECOMMENDED FOR BALANCE AND LANDSCAPING OF PARKING AREAS ON HIGHWAYS AND WALKS IN CITY STREETS FOR TASHKENT OASIS." Science and Innovation 1.4 (2022): 95-100.

10. Убайдуллаев Ф. и Гаффаров Ш. «Селекция урожайных сортов шиповника (rosa L.) и их семенная продуктивность в Ташкентском оазисе, Узбекистан». Сеть конференций E3S . Том. 258. EDP Sciences, 2021.

11. Bakhtiyarullaevich, Ubaydullaev Farkhod, et al. "LANDSCAPE COMPOSİTİONS BASED ON EVERGREEN SHRUBS İN THE LANDSCAPİNG OF CİTY STREETS." American Journal of Research in Humanities and Social Sciences 10 (2023): 40-43.

12. Khatamovich, Yuldashov Yakubjon, Ubaydullaev Farkhod Bakhtiyarullaevich, and Khatamov Bakhramjon Yakubjanovich. "FEATURES OF PRODUCTIVITY, RIPENING AND GERMINATION OF JUNIPER SEEDS." American Journal of Pedagogical and Educational Research 10 (2023): 85-82.

13. Убайдуллаев, Фарход Бахтияруллаевич, and Фарҳод Джураевич Хаитов. "АВТОМОБИЛЬ ЙЎЛЛАРИ ВА ШАҲАР КЎЧАЛАРИДАГИ САЙИЛГОҲ ҲУДУДИНИНГ ТОШКЕНТ ВОҲАСИ УЧУН БАЛАНСИ ВА ЯШИЛ ЭКИНЗОРЛАРИГА ТАВСИЯ ЭТИЛАЁТГАН МАНЗАРАЛИ ЎСИМЛИК ТУРЛАРИ." Dbiology: 95.