IMPROVEMENT OF QUALITY INDICATORS OF PUBLIC TRANSPORT SERVICES

Kuziyev Abdimurot Urogovich[1]
[1]Termiz State University, candidate of technical sciences, docent
Mirzayev Alisherjon Shamsutdin ugli[2]
[2]Termiz State University 2nd year master in transport logistics (by types of transport)
Kholboyev Shakhrambek Kholikmat ugli[3]
[3]Termiz State University 2nd year master in transport logistics (by types of transport)
https://doi.org/10.5281/zenodo.7593545

Abstract: Due to the expansion of the urban area, the growth of the population and the establishment of new production enterprises and educational institutions, the demand for public transport also increases. Effective organization of city public transport services is important for the productive activity of other production enterprises, organizations and educational institutions in this area. The article analyzes whether the area under study is provided with a bus transport network and makes recommendations for its improvement.
Keywords: passenger transportation; public transport; passenger transport quality; route coefficient, density of the transport network, arrival time to the stop, distance, exit to another transport.

I

On January 19 of this year, President Shavkat Mirziyoyev got acquainted with a presentation on measures for the development of public transport in Tashkent and noted that convenient public transport is one of the most important conditions of the city. He said that public transport in cities today is becoming an urgent problem and causing inconvenience to the population.

Today, one of the most urgent problems facing city bus transport is getting passengers to their destinations on time, which is an important indicator not only of existing traffic jams in the street-road network, but also of the level of provision of city public transport.

It is known that the priority feature of the scientific and research work aimed at increasing the quality of transport services to the population in our Republic is the issue of improving urban public transport based on comprehensive approaches. The issue of public transportation depends on many factors, each of which requires a separate approach and a complex solution.

2. Literature review.

Currently, public transport is being popularized among the population in foreign countries. Neither in Europe nor in the United States was it possible to transfer the transport to private carriers. Therefore, state control of public transport activities is growing in these countries (E.Krinitsky, 2008).

Mobility and availability are two main requirements in every country and city, the availability of which can bring economic benefits and contribute to the modernization and development of any region (Int. J. Adv. Sci. Angl. Inf. Technology. (2011), p. 618 - 623)

In order to provide the transportation needs of passengers in the city public transport, as well as to provide them with quality service, the vehicles should have information, ease of movement, high speed of movement, adherence to the route time, safety, regularity, sufficient

heating in the autumn-winter season and hakazo characteristics (I.V. Spirin, 2006) is necessary.

Taking into account the expansion of the city territory, public transport plays an important role in meeting the needs of the population. Due to the expansion of the city area, it is necessary to organize convenient bus routes on a scientific basis.

As urbanization grows, the urban lifestyle merges with urban patterns and improves the environment, creating ever-increasing needs for commuters (J. Runji, 2015).

The main indicator for evaluating the quality of service in buses is the capacity utilization coefficient, which has been improved as an integral evaluation criterion (B.I.Abdullaev, 2019).

Urban mobility in many developed countries is one of the main challenges facing the world's urban population. It has been shown that an effectively organized public transport system is a good alternative option for this problem, i.e. ensuring the mobility of a large number of people (W. H. M. Bins Ely, J. M. Oliveira, L. Logsdon, 2012).

The socio-economic quality of passenger transport is largely determined on the basis of the following parameters (Sh.A. Botaev, et al., 2012): route network density, route coefficient indicating the ratio of the length of passenger transport routes to the total length of the network, vehicles per 1000 people number, traffic plane, travel time, use of the capacity of the vehicle, coefficient of changing directions during the arrival.

Proper organization of passenger transportation is one of the indicators determining the standard of living of the population (I.V.Spirin, 2008).

In the mentioned scientific works, they presented several models and methods of solving the issues of improving the quality of public transport services. However, territorial issues related to this issue have not been covered. For example, transportation availability of the studied area, the density of the transport network, re-boarding of passengers to another transport when reaching their destination, and the time spent by the passenger to arrive at the station and travel in the transport, are not analyzed.

3. Research methodology.

The most common types of transport in the territory of our country are ground - road and rail transport. Car transport takes the leading place in urban and suburban transportation in our country. The high competitiveness of motor transport in passenger transport is explained by its advantage, transport availability, high maneuverability and mobility compared to other types of transport, ease of delivery to the destination and autonomy of movement. That is why the share of public transport in the total volume of passenger transportation in our Republic is more than 62% (Table 1).

Table 1

Passenger transportation by public transport type of the Republic of Uzbekistan during 2017-2021, mln. passenger

By types of	Years

transport	2017	dynamics	2018	dynamics	2019	dynamics	2020	dynamics	2021	dynamics
Passengers carried, million people	5 679,0	1	5 951,5	1,04	6 025,1	1,06	5 295,9	0,9	6 029,7	1,06
railroad	21,1	1	22,1	1,04	22,9	1,08	6,2	0,29	7,9	0,37
car	5 591,3	1	5 852,8	1,04	5 915,2	1,05	5 248,5	0,93	5 914,2	1,05
trolleybus	0,5	1	0,5	1	0,7	1,4	0,3	0,6	0,5	1
tram	2,3	1	4,4	1,91	3,8	1,6	1,2	0,52	2,3	1
metropolitan	61,6	1	69,1	1,12	79,2	1,28	38,8	0,62	101,8	1,65
airway	2,2	1	2,6	1,18	3,2	1,45	0,9	0,4	3,0	1,36

The methodology of writing the article consists of the Decree of the President of the Republic of Uzbekistan on the quality indicators of passenger service in urban public transport and their improvement, works of local and foreign scientists devoted to the problems of the development of this field. In the research process, economic statistics, expert assessment, statistical grouping, monographic works and scientific observation are widely used.

4. Analysis and discussion of results.

Assessment of the regional transport network. The convenient movement of passengers in any type of transport will depend on the improvement of the urban route system.

The main requirement for the city route system is to ensure that the number of passenger transfers to another transport (peresadka) in one trip within the city territory and the time spent on one trip in any direction of the city are minimal (Kuziev A.U., Komilov A.L., 2019).

The improvement of the urban route network is evaluated according to established indicators. The higher the density of the city's passenger transport network, the greater are the opportunities for passengers to reach their destination without having to transfer to other transport during their journey. Below is an analysis of the provision of the public transport network of Termiz city.

The branching level of the routing network is determined by the routing coefficient. This coefficient shows the average number of routes passing through each section of the network and reflects the estimated number of routes that passengers can take from each point of the network. The route coefficient ($k_{ü}$) is determined by the ratio of the sum of the length of all routes ($\sum l_{ü}$) to the sum of the length of the streets passed by the passenger transport routes ($\sum l_{к}$), and in the case of the studied area, the value of this coefficient, i.e.

$$k_{й} = \frac{\sum l_{й}}{\sum l_{к}} = 1{,}5.$$

For a well-developed transport network in the city, the value of this coefficient is 2.0-3.5, and for a poorly developed network - 1.2-1.3 (M.D. Blatnov, 1973, V.S. Mun, 1990 , V. D. Gerami, 2001, V. M. Buneev, 2008). The direction coefficient is the main characteristic of the direction system, but at the same time it cannot characterize it more fully.

For example, the city has two opposite diametrical highways, each 20 km long. A bus route passes through them. The total length of all routes is 200 km, the total length of the highway is 40 km. In this section, the coefficient of direction is 7-a very large value, but this does not characterize the fact that passengers go to any direction comfortably and spend little time.

In order to fully assess the city's route network, an indicator reflecting the provision of the city area with a bus transport network, i.e. transport network density (ρ), is used. This indicator is determined by the ratio of the total length of all routes ($\sum l_{й}$) to the total area of the city (the area of parks, stadiums and large organizations is deducted) (F) and is equal to the following for the studied area:

$$\rho = \frac{\sum l_{й}}{F} = 0{,}079, \frac{км}{км^2}.$$

According to the calculations, the degree of branching of the route network in the studied area is insufficient.

The density of the network characterizes the bus coverage of the city area.

Another indicator of quality service to passengers is the re-entry (peresadka) coefficient of passengers arriving at their destination. This coefficient ($K_{пер}$) is determined by the ratio of the number of walks in the direction ($N_{йўнал}$) to the number of walks in the network ($N_{тарм}$).

$$K_{пер} = \frac{N_{йўнал}}{N_{тарм}}.$$

Population, thousand people	Above 1000	501-1000	251-500	up to 250
$K_{пер}$	1,3-1,4	1,23-1,30	1,15-1,20	1,10

Passengers' travel time is also considered one of the main factors in the evaluation of route networks, and it is recommended to follow these criteria when determining stops in the studied area and it is determined as follows:

$t_{йўл} = t_{бек.кел} + t_{кутиш} + t_{хар}$, min.

Йўловчининг бектга келиш вақти ($t_{бек.кел}$) автобус тармоғининг зичлиги ва икки қўшни бекат орасидаги масофа (перегон) $l_{перег.}$ га боғлиқ,

The passenger's arrival time at the station ($t_{бек.кел}$) depends on the density of the bus network and the distance between two neighboring stations (peregon) $l_{перег.}$,

$$t_{бек.кел} = \frac{60 \cdot l_{бек.кел.}}{V_{йўл}} = \frac{60}{V_{йўл}} \cdot (\frac{1}{3\sigma} + \frac{l_{перег}}{4}), \text{ min},$$

where $l_{бек.кел.}$ is the distance to the bus stop, km (the bus stop has a passenger catchment area within a radius of 500 m, $l_{бек.кел.} \le 500м,\ \sigma = 2км^{-1}$); $V_{пиёда}$ – is the speed of pedestrian movement (5 km/h for large cities, 4 km/h for medium and small ones).

In order for a passenger to get into a vehicle, he must travel an average distance of $\frac{1}{3\sigma}$ km from the internal lanes to the street where the route is taken. It then travels an average distance of $\frac{l_{перег}}{4}$ along the route to the nearest stop. $l_{перег}^{рац} = 400-500м, l_{перег}^{мин} = 300-400м, l_{перег}^{мах} = 800-1000м,$ for high-speed routes-1500 m.

5. Conclusions and suggestions.

Based on the above analysis, it is recommended to increase the supply of the city area with the bus transport network, that is, to open new routes and organize the activities of stops, and this measure will lead to the improvement of the following indicators:

- passengers' arrival time to the station is saved;
- cases of passengers re-entering another transport on reaching their destination are reduced;
- the branching level of the route network in the region will increase; the total time of passengers traveling to their destination by public transport is saved;

quality indicators of transport services will improve.

References:

1. P. Stoett, J. Davies, D.A. Pascual, J. Hills, L. McRae, C. Zastavniouk, et al.Biodiversity-global environment outlook (GEO-6): healthy planet, healthy people/

2. A. Ismail, A.E. Elmloshi (2011), Logistic regression models to forecast travelling behaviour in Tripoli City Int. J. Adv. Sci. Eng. Inf. Technol., pp. 618-623

3. И.В. Спирин, (2006) Перевозки пассажиров городским транспортом: Справочное пособие для специалистов / И.В. Спирин. – М.: ИКЦ «Академкнига», 413 с

4. J. Runji (2015) Africa Transport Policies Performance Review- the Need for More Robust Transport Policies

5. V. H. M. Bins Ely, J. M. Oliveira, L. Logsdon, (2012) Bus Stop Shelter Evaluated from the User's Perspective, Work 41. pp 1226-1233.

6. Бутаев Ш.А., Сидиқназаров Қ.М., Муродов А.С., Қўзиев А.Ў.(2012) Логистика (етказиб бериш занжирида оқимларни бошқариш).-Тошкент: Extremum-Press pp.580 б.

7. Кузиев А.У., Комилов А.Л. Ҳудуд жамоат транспорти хизматларининг сифат кўрсаткичлари таҳлили ва уларни яхшилаш усуллари/ Логистика ва иқтисодиёт илмий электрон журнали №3, 2021.-185-190 б.

8. Кузиев А.У., Комилов А.Л. Етказиб бериш занжирида оқимларни моделлаштириш ва оптималлаштириш. Термиз, "Сурхон полиграф-нашр", 2019.-195 бет

9. Kuziev A.U, Suyunov O.D. Issuing the Plan for the Development of the Automobile Road Network. International Journal of Inclusive and Sustainable Education Volume 1 | No 5 | Nov-2022 Page 195-200. http://go.microsoft.com/fwlink/p/?LinkId=255141