



Development of measures for improvement of efficiency of Citi passenger conveyance

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Abstract: One of the main components of the urban passenger transport system is represented by bus services, the effective implementation of which depends on numerous factors. Passenger transport problems have been addressed mostly by upgrading the technical parameters of the buses and by adapting them to the urban operational conditions, which is no longer effective at present, and it is necessary to provide management of public transport of transportation by means of different models ensuring maximum comfort and quality of passenger traffic. The paper dwells on developing the measures required for the effective functioning of urban bus routes, which are of great practical importance. Based on this, it was carried out the analysis of factors affecting the urban bus services, and we have developed measures for improving efficiency of urban passenger traffic by transport companies. transport transports was carried out and we have developed measures to increase efficiency of city passenger transport in transport companies.

Keywords: bus; efficiency; comfort; model; service quality; passenger traffic; urban transport; system.

1. Introduction

One of the essential conditions for the country's socio-economic development is the efficient functioning of the transport system equipped with modern technologies, since there is no sector of economic or social sphere, the normal functioning and development of which would be independent of transport. Transport is a technological part of the functioning of these sectors. All this illustrates clearly the need to give priority to the development of the sectors involved in the transport system, and particularly the need for the development of road transport. Starting in the second half of the twentieth century, the world, including Georgia, is in the process of intensive development of motorization. Increase in the vehicle fleet has led to two clear trends and contradictory trends. In particular, the achieved high level of motorization shapes the development of the economic potential of society and ensures the maximum satisfaction of the needs of the population for transport. On the other hand, this has led to an increase in the negative impact on the

environment and society, which, in turn, has contributed to the deterioration of the environment [1, 7].

Transport allows city for functioning as an integrated system in its administrative, economic, cultural and educational areas. The demand for city transport is continuously growing, which leads to the development of passenger transport motive power in urban areas, as well as to increasing demands for them. However, often, the modern requirements exceed the technical capacities and the potential for the actual use of urban passenger transport.

Until a certain time, the transport problems were solved by improving the technical parameters of the motive power, but by this time, this direction is no longer very effective. It is necessary to promote a theory of organization of the circulation of vehicles and passenger traffic, that is, under conditions of rapid motorization, it is necessary to undertake rethink of the issues of transport process management itself. Therefore, in recent years the researchers' interest towards the urban transport system is increasing continuously, and the various aspects of theories of simulation of passenger transport have been created. They are aimed at establishing the systems of management of traffic safety and organization, improvement of road infrastructure, and high-quality passenger services, which will provide comfortable transportation of passengers using the minimum time [2].

2.The effective functioning of the urban passenger transport systems

The effective functioning of the urban passenger transport system depends on:

- legislation existing in the field and compliance with its requirements;
 - vehicles and their technical condition;
 - the provision of staff with appropriate qualification.
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One of the main components of the urban passenger transport system is a vehicle, or motive power. In general, the urban passenger transport system is a complex, multilevel system, the main elements of which are: motive power; road infrastructure with its equipment and devices; motive power storage, maintenance and repair facilities and equipment; facilities and equipment for the motive power's fuel-energy supply; transport process management tools and so on [3, 8].

The main activities for the efficient functioning of urban bus routes include choice of rational route using the operating parameters and correct methods for organization of road traffic. An option that perfectly covers the needs of the population and a high level of performance of passenger transport is considered to be rational and effective. In particular, there is a need for:

- the maximum safe road traffic speed;
- minimum time of servicing passengers;
- driver satisfactory working conditions;- maximum comfort in servicing passengers.

In addition, the route and moving vehicle should meet the following basic requirements:

- to be compatible with the volume of transported passengers;
- to coordinate with other types of urban passenger transport;
- to have adequate maneuverability and quick-response capability to the change in transport flow and obstructions of traffic;
- to be correctly adjusted to the length, direction and time of traffic flow, as well as to the rational distribution of destination and transfer stops.

3. The main goal of the urban passenger transport system

Passenger transport companies should meet high quality standards of service, for which they need to allocate appropriate funding and pay great

attention to the needs of passengers. It is necessary to take into account that: urban passenger transport should ensure the integrity of city as a geographical unit; the population's demands for transport should be predictable and manageable; fares for public transportation of socially vulnerable groups must be affordable for political reasons; operational indicators of the motive power should satisfy the customer's requirements, relevant level and comfort. Work is currently in progress on: developing the passenger transport system development programs, formation of social procurement, development and approval of the urban transport scheme, coordination of the types of transport, studying the requirements for passenger transport, formation of the route network, tariff determination, etc. As we have noted, the main purpose of the urban passenger transport system is to ensure timely, high quality and time-efficient transportation of passengers. One of the most important components of these mentioned activities is driver's qualification, which depends on the efficient methods of driving bus, and makes it possible to increase the efficiency of transport process. It should also be taken into account that driver is a central figure who affects the bus's proper maneuvering, speed-up, the effective use of the speed gearboxes and reduction of the amount of harmful substances in exhaust gases.[4, 9].

4. Studies of the city route operating parameters

We have carried out research investigation on the operational indicators of urban route with the participation of drivers with the differences in work experience and various levels of qualifications. The results of the experiments that reflect the influence of driver's qualification on the operational indicators of bus are given in Tab. №1.

Tab. №1

The influence of driver's qualification on the operational indicators of bus

Operating Indicators	Operating conditions	Drivers with less than 1 year work experience	Drivers with more than 5 year work experience
Average speed, km/h	Urban	21,1	22.6
The number of stops, km ⁻¹	Urban	5,9	3,8
Fuel consumption on the line	Urban	44,8	37.9

5. Analysis of the conducted experiment

Based on an analysis of an experiment we conducted, we can conclude that in case of operation of bus on the city route by drivers having different work experiences, the difference between the average speeds does not exceed 7%. This indicates that even with rapid growth transport volumes, the average bus speed is virtually determined not by driver, but by the traffic flow, and it is almost the same for drivers with different work experiences on the city routes, while the difference between the values of fuel consumption reaches 16% and it actually depends on driver's qualification. [5, 11].

The most important factor is the impact of a number of stops on the operational performance of buses. As can be seen from the analysis of values given in Table 1, in case of drivers with different work experiences on the city routes, the difference between the values of the number of stops is significant and reaches 36%..

It must be clear from the above analysis how important is the influence of driver's qualification having different work experiences, and how it affects the operating parameters and the performance of transport company.

Considering the above, the urban passenger transport companies are required to pay maximum attention to the ways of improving professional skills of drivers and use methods of material incentives.

The correctly chosen city route is no less important for the effective operation of the transport process. The main purpose and selection criterion is to provide rapid transport of passengers. Experience shows that in major cities, the transport network routing is a very complex and ambiguous process.

6.Route selection

Route selection is carried out in conformity with the following requirements: the bus service lines are to be routed through the specified and required for passengers points located at a minimal distance from one another. They must ensure the minimum time transportation of passengers, as well as by providing the safety conditions, it shall be possible for passengers to have comfortable conditions for making transfers to another type of transport. Proper design of the stops is of high importance on the city route. Stops help passengers to get on the bus and make transfer from one to another route. As a rule, a stopping place must be provided with a covered waiting pavilion for protecting from rain, snow and wind, and preferably with sitting places and equipped with infrastructure required for persons with disabilities. Each stopping place must be equipped with signs luminous at night and they must contain the necessary information for passengers. These signs shall bear layout of route, information on the stop names and the terminal stopping place. They must also indicate route numbers, which run through this bus stop, the intervals between services on the route throughout the day, and so on. [6, 10].

7. Commercial viability of passenger traffic

The commercial viability of passenger traffic depends largely on the correct choice of motive power. First of all, prior to choosing a bus with rational capacity, it is necessary to recall that the buses are classified according to the following two major signs - the purpose and capacity. During the urban route traffic, the preference is given to the city buses and the large-capacity buses.

An important parameter is a capacity of the bus, which primarily affects the bus filling coefficient and passenger comfort. When determining this parameter, there should be taken into account the volumes of passenger flows (in one direction) and its uneven distribution according to working hours throughout the day, as well as the intervals between services.

Thus and so, analysis indicates that a large number of factors affect the effective functioning of urban bus routes, maximum account of which will ensure safe, quality and timely transportation of passengers.

8. Conclusion

Analysis suggests that the systematicization and generalization of the efficiency criteria of urban passenger transport companies allow us for highlighting indicators, which characterize the quality of urban transport services for passengers, as well as the effectness of the functioning transport companies and the specificity of routes.

It has been established that when creating a management model the urban passenger transport system, the municipal authorities are required to study people's demand, explore passenger flows and on that basis to develop the routes and bus tables, as well as to ensure the monitoring of these bus tables and introduce system of motivation of transport companies to keep these bus tables.

There has also been determined that the nature of modifications in the operating parameters of the buses running on the urban route lines (the average

speed of movement, fuel consumption, etc.) that is due to: frequent stops, an increased number of obstacles, increased frequency of the unsettled traffic conditions, and so on. As a result, it has been justified the need for improving professional skills of drivers and providing material incentives for them, in terms of increased efficiency of transport companies.

It has been revealed that the number of the bus stops in urban areas on 1 km in length of the route is large, that leads to the increase in the share of buses running in the unsettled traffic conditions, and as a result, to a significant increase in fuel consumption, an increase in the amount of hazardous exhaust gases and the deterioration of the environmental situation in the city.

References

1. Gelasdhvili, O., Bezhanishvili P. Modes of vehicles traffic condition and fuel effectiveness. International scientific journal “Problems of Mechanics”. 2012. 85-89 pp.
2. Velmozhin, A.V., Mirotin L.B., Gudkov V.A., Road passenger transport. Moscow. Transport. 2006. 448 p. In Russian.
3. Botsvadze L., Gelashvili O., Meburishvili M. Management of international transport logistics. Tbilisi. Georgian Technical University. 2007. 339 p. In Georgian.
4. Gelashvili O., Butkhuzi N. Effective functioning of container transport and logistics system. In: Proceedings of International Scientific-Technical Conference “New Technologies in Modern Industry”. 2010. pp.262-264
5. Larin O.N. Organization of passenger traffic. YURGU publishers. Chelyabinsk. Russia. 2005. 104 p.
6. Gelasdhvili O., Bezhanishvili P. Calculation of city routes fuel consumption according to bus traffic conditions. International scientific journal “Problems of Mechanics”. Nr 4(49). Tbilisi. 2012. pp.35-40.



7. Inner urban freight transport and city logistics portal. Transport teaching material. Written Material. 2003. 112 p.
8. USD. From the American people. Role of transportation and logistics on international trade. The Developing Country Context. September 2003. Prepared by Carana Corporation Delivering Global Development Solutions. 85 p.
9. Donald Waters. Logistics. An introduction to Supply Chain Management. Palgrave macmillan. 2003. 369 p.
10. Eliceeva T.A., Plaxotnikova E.B. Colobiob C.I. Inženernyj vestnik Dona (Rus), 2016, №3. URL: ivdon.ru/ru/magazine/archive/n3y2016/3681.
11. Kuznecov K.K. Inženernyj vestnik Dona (Rus), 2009, №1. URL: ivdon.ru/magazine/archive/n1y2009/250/.