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Improving the Quality of Transport Services of Urban Public Transport

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Abstract

The modernization of urban transport requires new approaches not only in the organization of routes, but also the development of new forms of accounting for the number of transport services provided. Passengers expect from public transport to increase transport mobility, make trips more comfortable, and have routes that are convenient for them. To do this, it is necessary that it is also profitable for motor transport companies that serve the routes of urban public transport. The presence of low-demand and unprofitable urban public transport routes is not profitable for road transport enterprises and is an obstacle to their development.

Keywords: Urban Public Transport; Transport Services; Quality of Transport Services; Transport; Improving the Quality of Transport Services.

1. Introduction

Transport mobility plays an important role in urban life. Urban residents usually use public transport several times a day. Transport services are provided to residents of the city by buses, subways, trams, trolleybuses and minibuses. The quality of transport services provided depends on compliance with the schedule of public transport, the level of professional training of the carrier's personnel, the technical and sanitary condition of vehicles, the degree of congestion of public transport since rush hour. The transport service does not have a material form, but its quality has a great impact on passengers.

Conflict situations during the trip, the need to wait for public transport, shaking and noise during the trip, heat, cold lead to fatigue and reduced efficiency of passengers. Also, in public transport, there is a high probability of infection with various diseases that are transmitted by airborne droplets.

Thus, unsatisfactorily functioning public transport leads to a decrease in the level of labor productivity at the enterprises of the city.

According to (Liu, 2017) to assess the quality of transport services provided by public transport, regular monitoring of passenger satisfaction with the quality of their service should be carried out

According to (Polat, 2012), the criteria for the quality of services provided by public transport are (Fig. 1):

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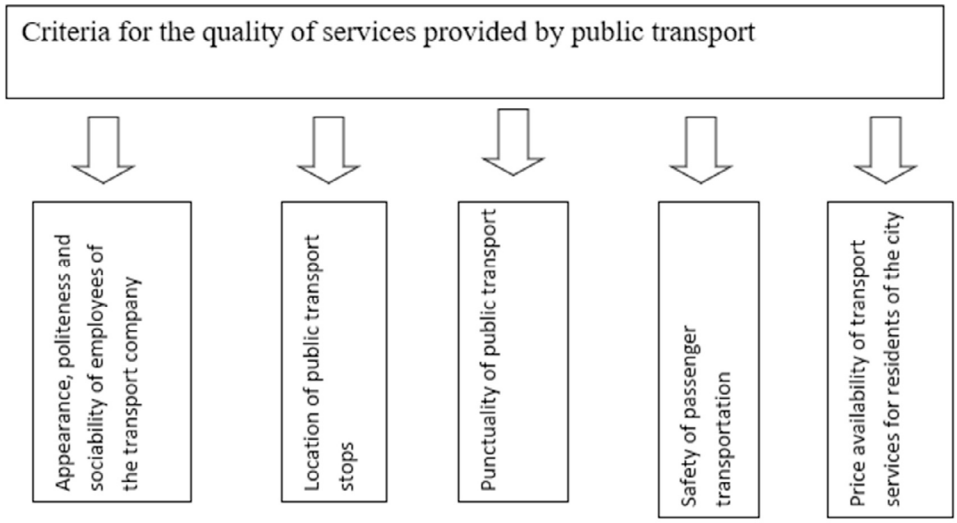

Fig 1. Criteria for the quality of services provided by public transport.

According to (Adarkwa and Poku-Boansi, 2010), improving the quality of public transport passenger service inevitably increases the carrier's cost level. Thus, there is a need, on the one hand, to achieve consumer satisfaction with the quality of transport services, and on the other hand, transport services should not be unprofitable for the carrier.

According to (Togaev, 2021), the products of public transport represent the transportation of people. A specific feature of the transport service is the inseparability of the production process of the transport service and its consumption. In this regard, it is impossible to create a stock of transport services. In addition, the need for urban public transport services depends on the time of day, day of the week and time of year.

According to (d'Ovidio et al., 2014), the specific features of transport services provided by urban public transport are (Fig. 2):

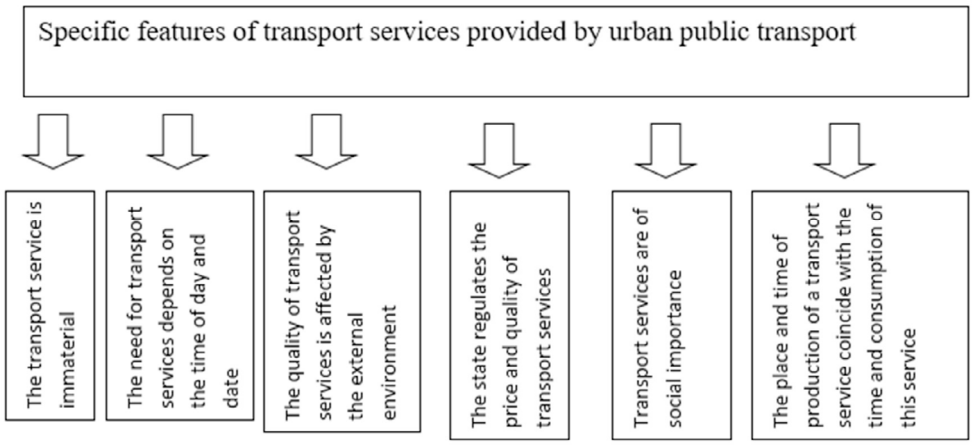

Fig. 2. Specific features of transport services provided by urban public transport.

According to (Borysova et al., 2019), the transport service from the point of view of the carrier and from the point of view of the consumer of the transport service are not equivalent to each other, despite the fact that these two services are in close correlation. So, from the carrier's point of view, a transport service is a flight along a certain route in accordance with the approved rules of

transportation and the schedule of movement of the carrier's vehicles. However, the provision of a transport service does not mean that this service has found its consumer, this may occur during hours with a reduced demand for transport services.

According to (Chernii, 2021), the number of passengers transported can be used as an indicator of the volume of services rendered. However, if passengers will have to transfer to other modes of transport during the trip, then in this case the indicator of the number of passengers transported loses its meaning as an indicator of the quality of transport services received.

The number of passengers varies depending on the time of day. During rush hour, more passengers will be transported per unit of time than in other time intervals, so the mileage of the vehicle can also not be an indicator of the amount of transport services rendered.

The authors (Ninomiya et al., 2017) suggest using the place-kilometer indicator as the volume of transport services provided, which is defined as the product of the number of occupied places in public transport by the mileage of this transport.

According to the opinion, when calculating the quality of transport services provided, it is necessary to take into account the rationality of the transport network from the point of view of passengers, and the number of transfers that passengers make during their trip.

In addition to ordinary passengers, there are also passengers who have certain benefits for traveling on public transport. From the point of view of the state, travel benefits are of social importance, and from the point of view of the carrier, passengers who have benefits for travel in public transport bring losses to the carrier.

Thus, for effective planning of the required number of transport services provided by urban public transport, it is necessary to correctly measure the number of services consumed by passengers of urban public transport. Moreover, these measurements should be made at different times of the day, on different days of the week and on different dates.

Only with the correct assessment of the necessary transport services, it is possible to achieve the optimal number of transport services offered.

According to (Yin et al., 2009), urban public transport from the point of view of passengers should be (Fig. 3):

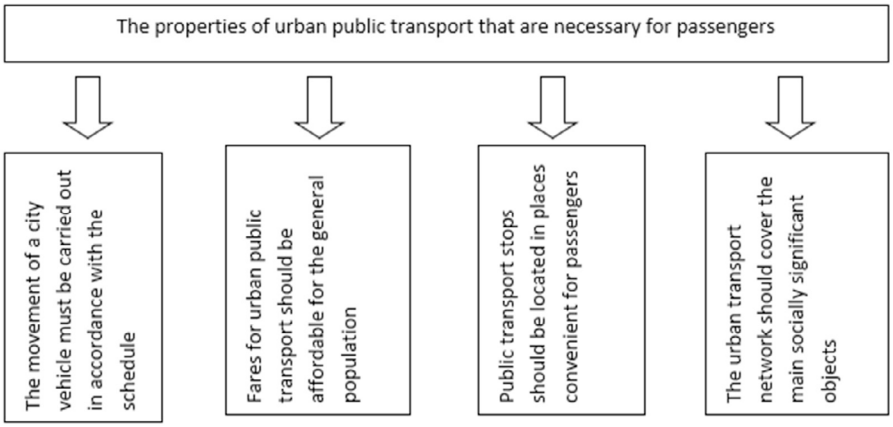

Fig. 3. The properties of urban public transport that are necessary for passengers.

2. Methods

In carrying out this scientific work, the authors used an analytical method, which gave us the opportunity to study the problems studied in the work, in their unity and development.

Taking into account the goals of the task and the research, the authors used a functional-structural method of scientific cognition.

In the end, the authors were able to consider a number of problems related to improving the quality of transport services of urban public transport.

3. Results

The prerequisite for writing this work was an appeal to us by representatives of the meri of the city of Dnipro, who wanted to improve the transport system of the city of Dnipro.

The public transport of the city of Dnipro is represented by municipal and private carriers. Municipal transport includes the metro, trams and trolleybuses.

Private carriers are represented by fixed-route taxis and buses. Private carriers are selected on the basis of tender procedures.

We have proposed to use an electronic travel document with the possibility of contactless payment as a payment for travel. The vehicle must be equipped with the necessary number of terminals for servicing plastic cards of this type.

According to our proposal, the passenger must register his travel document at any of the vehicle terminals at the entrance to the vehicle, and then re-register his electronic travel document at any of the vehicle terminals before the end of the trip.

We proposed to charge for travel depending on the time spent by the passenger in the vehicle, in our time this is the time interval between two registrations in the terminals of the vehicle.

In the future, when the passenger would transfer to another vehicle, the procedure would have to be repeated. Thus, passengers would pay only for the time spent on the train. In addition, it would be possible to track the routes of the passengers themselves and, based on the average values, change the schedule of urban passenger transport and, if necessary, add new routes or remove those that are not in demand.

The innovation also interested private carriers. Carriers could not independently set the fare without the consent of the city authorities. But in order to increase the price of travel on their route to reasonable values, it was necessary for private carriers to justify this, which was difficult to do before that. In turn, the city authorities, in an effort to please their voters, prevented the increase in prices for public transport in the city, which in turn affected the safety of passengers, since carriers were forced to save on drivers ' wages and vehicle maintenance.

The introduction of payment using plastic cards with the possibility of remote payment also made it possible to keep records of beneficiaries who use urban public transport.

The payment system described above was tested in a test mode on two minibus routes. In the future, the city authorities plan to extend this form of payment to other types of public transport in the city of Dnipro.

The use of contactless forms of payment for travel will reduce the volume of the shadow market of transportation by urban public transport. If the driver performs the role of a cashier at the same time, then this increases the psychological burden on him and he pays less attention to road safety. Another disadvantage, when the driver is a simultaneous cashier in urban public transport, is the need for the driver to first of all fulfill the daily plan for the cash register. This leads to the fact that urban public transport moves in violation of the schedule, which is very inconvenient for passengers in the morning and in the evening.

4. Discussion

The modernization of modern urban transport requires new approaches not only to the organization of routes, but also new forms of accounting for the number of transport services rendered

Passengers demand greater transport mobility from public transport, increased travel comfort, and the availability of convenient routes.

However, for this it is necessary that it would also bring benefits to motor transport enterprises serving urban public transport routes.

The presence of unprofitable and low-demand routes of urban public transport is a burden for motor transport enterprises and an obstacle to their development, including the opening of new routes and the purchase of new equipment.

Payment for the actual time of using the vehicle allows you to reduce the travel costs of city residents and the excessive costs of motor transport enterprises associated with incomplete loading of vehicles by passengers.

The transition to a new form of payment for public transport requires additional costs associated with the purchase of new equipment. But this will solve important problems of urban transport:

- It will reduce the number of fixed-route taxis and expand the fleet of large-capacity buses, which means that the level of congestion and accidents on city roads will decrease.
- The disappearance of small private carriers on the market will enable a municipal transport company to increase profits and establish economically reasonable fares for public urban transport.
- The additional profit received by the municipal city transport enterprise can be invested in vehicles powered by electric traction. This will improve the environmental situation in the city.
- The withdrawal of small carriers from the urban passenger transportation market will allow the use of trams with more than two cars in their composition.
- Urban passenger transport will become a single integrated system
- The disappearance of small carriers from the market will help to get rid of corruption during tenders among carriers.

The problem of improving the quality of passenger transportation in urban public transport can not always be solved with the help of competition. Competition cannot solve all the economic and environmental problems of a modern city.

5. Conclusions

Urban public transport has a great impact on the socio-economic development of cities. The successful functioning of enterprises and institutions of the city largely depends on the rhythm of its work.

Urban public transport should provide the urban population with access to cultural, health, educational facilities, and places of work. At the same time, the prices for travel should be available to all segments of the population.

Urban public transport should be reliable and safe, and this requires periodic modernization of the fleet. In turn, the modernization of the fleet requires the break-even of motor transport enterprises of urban public transport.

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