

# Financing Public Transportation of Passengers

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**Abstract:** Public transportation of passengers has very important role in the life and functioning of urban areas. Public transportation of passengers stimulates effective economic activities, improves the life standard and increases the mobility of the population. Such system is difficult for financing. The revenue that the system brings is not sufficient to compensate for the operational costs. This research presents the possible ways of financing the system of public transit. There are various experiences in financing the public transit in European cities, but this problem has been also identified in the cities all over the world. The system of public transit in the Republic of Serbia has recently started to implement activities related to the improvement in the quality of work and services, as well as rationalization of the system in all aspects of business and operation, improvement of organization and maintenance at all levels, and increase in the efficiency and reputation.

**Key words:** financing, public transportation of passengers (or public transit).

## INTRODUCTION

Public transportation of passengers has a vital role and unique position in urban areas. The service of public transit contributes to the better life standard of certain area, by providing personal mobility. On a macro level, public transportation of passengers stimulates effective economic activities, promotes equal social conditions and creates humane oriented urban environment. Thus, public transit is important matter of public policy and effective tool for achieving public goals.

High quality of public transit can provide various economic, social and environmental benefits. This includes direct user benefits, as well as different indirect and external benefits. Residents of communities with high quality transit are less prone to use motor vehicles in public transport and they spend less on transport. This can support economic development. As a result, the improvements in the public transportation services are important component of strategic plans and political decisions, and they also improve the life in cities.

In order to achieve their goals, public transportation of passengers must compete with private cars and other means of transport in the cities. Different means of transportation widely differ in financial structure, including user costs and price, as well as government funding. Financing public transportation of passengers is very complex in its nature and depends on the polity of the country.

The revenue from the transit fares represents payments from direct users of public transit and that is the main source of income. One of the main goals of every

public transit company is to improve business and to increase the revenue from the transit fares in relation to the overall business income. If the operation ratio is bigger than one, the company has operating profit and no other resources are necessary. However, since 1960 the operation ratio in public transit companies has been ranging between 30-90% in many countries. In order to acquire the necessary resources for maintenance, as well as for capital investment in public transit, the state leadership at all levels (local, regional or republic) must provide the resources from their budgets, or develop new mechanisms for collecting revenues. [1]

This research deals with resources in the system of public transit, as well as with possible models of financing. Also, this research presents the mechanisms which represent the sources of income. The examples of government funding from some countries in the world are given, as well as the examples of some European cities and examples and experiences from Serbia.

## SOURCES OF INCOME IN THE SYSTEMS OF PUBLIC TRANSIT

There are various private and public resources for financing the systems of public transit, which can be grouped in three categories. This research defines them respectively, starting from the direct payments from the users to special funds and resources from state budgets. [1]

- a. Revenues from the direct payments from service users:

The main resources in the system of public transit are resources from direct payments from service users, such as fares, tickets and different charges and fees. These revenues can sometimes cover only for one part of the operating costs, which is the case with the most of the public transit systems.

b. Special state funds:

The state leadership at all levels (local, regional or republic) sometimes uses resources from special funds for financing certain public services. If the system user is taxpayer and if the collected revenue is used for financing, maintaining and functioning of the system, than this is called tax on use.

a. Government budget resources:

Many public systems, objects and services are available without direct charges (tickets, reception costs, etc.) Their construction and maintenance is completely financed by the state from its budget. Some other services are available at prices that are not regular market prices and users do not pay the full amount for the service. In this case, the state compensates the difference between the prices. Such services are partially or completely financed from the city budgets, or by the local government, republic or a union (European Union). [2]

Considering the given data, public transportation of passengers belongs to the category of systems that are financed by the combination of revenues from the users of the system, special funds and budget resources. Potential resources for the income of the public transit systems are:

a) Primary, the income from the main activity, i.e. the income from selling the tickets in the system of public urban and suburban transit. These incomes include tickets bought in the vehicle, tickets bought outside the vehicle, different types of season tickets, etc. This income is an operative income in the system of public transit and it can cover only for one part of the system functioning expenses. Depending on the system, the income is 30-60% of the system functioning expenses.

b) Secondary, the income from subsidies of the city budget, local government, republic or European Union. In order for the public transit system to function in the scope and content that fulfills the needs of contemporary life (reliability, availability, comfort, speed, time of service, etc.) the founder or owner of the market must be prepared for the cost of the service, as well as for the fact that the market price is acceptable for a small number of users. Thus, the incomes from subsidies of budgets are intended to compensate the expenses for some categories of users and make the system of public transit available for them. On the other hand, these incomes are used for capital investments in the system of public transit. These investments are: infrastructure construction, procurement of rolling stock, works on the network lines, maintenance of the stations, turntables, etc. These investments cannot be financed from the main activity incomes

because they represent the interests of the founder or market owner.

c) The income from other sources: taxes on parking fees, taxes for using cars in the city areas, etc. In some cases, earmarked taxes are gathered from the resources of indirect users of public transit system. This is the case when special taxes are collected from the population or companies that are located along the lines of public transit, near the stations and turntables, or around the metro stations. This is the case because their owners have direct or indirect benefits from the location of such objects. These incomes are used for functioning expenses or capital investments in the system of public transit. The idea of such taxes that are paid by residents of city areas goes in two directions. In the first direction, they have impact on reducing the usage of cars in favor of the public transit systems, because they are less competitive. In another direction, the resources gathered in this way are used to increase the quality of the system and to reduce the budget financing. A good example of such resource is a policy of giving a part of the state lottery income for the compensation of fares for senior citizens in the USA. [1]

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## THE REASONS FOR FINANCING THE SYSTEMS OF PUBLIC TRANSIT

In cities, local authorities have the main role or full responsibility in maintaining public objects such as streets, pedestrian zones, parks, historical objects, etc. Authorities also finance public services such as safety and security, health, clean and nice environment in the cities. They are also included in the financing of transit systems. The main reasons and explanations for the usage of public resources in financing the systems of public transit are summed up here: [1]

- a. Public transit is a service that provides mobility for the population of all ages and categories of people (residents, visitors, invalids and others). Systems of public transit have different positive influences and results which are qualitative in great deal and they are not plausible for measuring in monetary units.
- b. By its nature and function, public transit together with its infrastructure, represents a public object.
- c. With its high capacity and reliable services, public transit enables the development of numerous urban activities.
- d. The railway system of public transit with its side objects and structures, represents the basic urban infrastructure, together with streets, water, sewerage and other municipal systems.
- e. Transit networks in the system of public transit, especially railway systems, can contribute to the urban development by decreasing the potential for uncontrolled city expansions.

- f. Public transit serves the city centers and suburban areas and it is oriented towards people. Thus, it improves life in the cities, which is not possible in the cities that are dependent on cars.
- g. Public transit also helps to avoid great potential expenses. For example, people who travel by cars will face traffic jams, negative environmental influences and lack of parking spaces.
- h. The height of charges is limited by the fact that the ticket price must be competitive with marginal costs of driving a car.
- i. If the charging systems would increase the incomes of public transit, numerous users of public transit could start using cars instead of public transit. This would cause the increase in social and ecological expenses.
- j. Since the benefits from the public transit is not only for those who use it, it is logical that the system is not financed only from the pockets of its users, but also throughout different taxes and from the state budget.
- k. The most of transit systems demand central and coordinate control over certain objects and operations. Thus, even though the majority of vehicles (as well as planes and ships) is private property, they operate over the public places, such as highways, streets, airports, terminals, etc.
- l. All transit systems (land, air or water traffic), especially those which deal with transport of passengers are very important for state economy and life standard. Financing the transit systems stimulates the development and mobility of population, and this is the reason why financing the transit systems is one of the most important economic and social policies.

In certain capital investment cases such as constructions of metro systems, it was usual from the start for local authorities to take part in financing such projects partially or completely. Streets, underground tunnels and metro lines should be treated as objects with the same function, and that is the function of public object. Thus, authorities should finance constructions of metros, railways and other types of infrastructure for transit in the same way as construction of the streets.

Since 1930s and 1940s, the increase in competition of private vehicles and other means of transport has started. The transition of transit systems from private to public ownership has influenced the authorities to finance transit systems in greater deal. Thus, all governments accepted to finance transit systems, especially those involving transport of passengers, from the state budget in different ways and amounts, in order to achieve social goals.

Unlike the private companies, all public services financed from the state budgets, including the public transportation companies, have complex mechanisms of financing and rigorous measures for operational efficiency.

## POTENTIAL MECHANISMS FOR FINANCING PUBLIC TRANSPORTATION OF PASSENGERS

Local and state authorities have developed numerous options for financing public transportation of passengers. Characteristics of the public transit system in the area of realization, as well as local policy and economic conditions, influence tax options for financing public transportation of passengers. Financial mechanisms can be classified in several groups, according to the types of their sources. This chapter offers eighteen types of potential mechanisms for financing public transportation of passengers: [1], [2]

- a. Fare increases – in order to increase the income;
- b. Discounted bulk transit passes – it is given to a certain number of passengers or bigger group;
- c. Property taxes – increase of property taxes because of the attractiveness of the location under the influence of public transit;
- d. Regional sales taxes – special type of sales taxes;
- e. Fuel taxes – additional taxes for fuel;
- f. Vehicle levy – additional fee for registering vehicles in the region;
- g. Utility levy – a special transit levy to all utility accounts in the region;
- h. Employee levy – a levy paid by employers located in a transit service area, because of the positive impact of the public transit nearness;
- i. Road tolls – fees for driving on a particular road, bridge, or in a particular area;
- j. Vehicle-km tax – a form of road pricing that charges motorists per kilometer travelled;
- k. Parking sales taxes – a special tax on parking transactions in certain area;
- l. Parking levy – a special property tax on non-residential parking spaces throughout the region;
- m. Expanded parking pricing – parking price is determined by the location, as well as the duration of the parking time;
- n. Development cost charges or transportation impact fees – a fee on new development to help fund infrastructure costs, and allow existing development fees to be used for public transit infrastructure investments;
- o. Land value capture – a special property tax imposed in areas with high quality public transit;
- p. Station rents – revenues from public-private developments on publically-owned land in or near transit stations;
- q. Station air rights – a tax for using the space above the transit station;
- r. Advertising – additional advertising on vehicles and stations.

## THE STRUCTURE OF INCOMES IN PUBLIC TRANSIT SYSTEM IN THE CHOSEN EUROPEAN CITIES

Considering the structure of incomes in public transit systems in different European cities can help us understand how economic situation influences financing the public transportation of passengers.

On average, the main activity income covers for 50% of the operating costs in European cities, with significant differences between the cities (ex. 30% in Paris and Warsaw, but 60% in Vienna). Local and regional authorities usually compensate for the lack of resources and differences between revenues and expenses of the system functioning. In Italy, regional authorities finance about 90% of lacking resources, while local authorities finance about 10%. In Spain, local and regional authorities finance more than 80% of the resources in the largest cities, while the rest is provided by the national government. [3], [4]

In Poland, local authorities finance 100% of the resources and differences between main activity incomes and costs of the system functioning.

Generally, public transportation of passengers is financed from the local, regional or state budget. However, in some cities, the required amount or a part of it is provided by certain taxes, fees or charges. Employee levy in France is collected by the local government and covers for 38% of the costs for the system functioning in Paris. Road tolls income in Oslo represents 8% of the costs of the system functioning.

In Italy, regional authorities get most of the incomes from fuel taxes, and it is used to finance public services under its authority, including public transit. National government is usually uninvolved in financing public transit. In many countries (such as Germany, Italy, Poland, countries of Scandinavia except for Norway), not even a capital city gets resources from the national government for the public transit. If the national government finances the public transit, this financing is usually very small (for example, it is 2% of the costs for the system functioning in Paris, or 9% in Madrid). In these cities, financing from the national government comes from the state budget. In Paris, employers must compensate for at least 50% of the price tickets for the employed. This income represents about 11% of the costs for the system functioning.

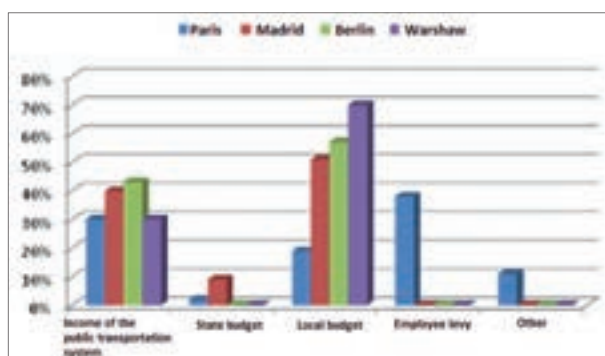


Figure 1. The structure of incomes in public transit system in the chosen European cities.

## ANALYSIS OF INCOMES IN THE PUBLIC TRANSIT IN THE REPUBLIC OF SERBIA

Recently, the system of public transit in the Republic of Serbia has been conducting significant activities such as: improvement of the system work and services quality, rationalization of the system in all aspects of business and functioning, improvement of organization and maintenance at all levels, increase of efficiency, improvement of reputation, etc.

After systematically implemented activities related to improvement of regulations, network lines, organization structure and management processes, conditions for significant improvement of economic efficiency of the system are created.

Activities related to improvement of cost and economic efficiency of the system should be managed at all levels, but that demands detailed analysis of incomes and expenses of the system, as well as planning and operating relations between the processes in function of acquisition and distribution of incomes. The final goal of these activities should be viability of the system for all key participants in it (local authorities, operators and users). Incomes and expenses of the public transit system are influenced by many factors (quality and structure of the rolling stock, type and price of operating power, price of spare parts, level of the salaries of employees, prices of transport services, organization and maintenance, etc.) which directly influence on the achieved financial results.

In order to get real and reliable information for this research, the analyzed incomes are taken from available annual business reports for period from 2009 to 2012. Besides key indicators, the reports show management based on the data from financial reports. The data from these reports is grouped and presented according to the needs of this research. As an example, three cities with their characteristics are shown in the tables below:

Table 1. Basic city information

No.	City	Number of operators (public + private)	Number of lines City + Suburbia	Network length City + Suburbia (km)	Number of vehicles in use
1	NIŠ	1+4	15+36=51	122,5+599,04=721,54	77+31=108
2	SUBOTICA	1	10+11=21	88+264=352	30+42=72
3	PANČEVO	1	7+11=18	98,0+107,5=205,5	15+52=68

Table 2. Transit system information

No.	City	Number of residents City	Number of residents City + Suburbia	Area (km <sup>2</sup> )	Average population density (resident/km <sup>2</sup> )
1	NIŠ	183.164	260.237	597	435
2	SUBOTICA	105.681	148.124	1007	147
3	PANČEVO	76.203	123.414	148	512



**Table 3.** Realized incomes in the transit system in the Republic of Serbia for the period from 2008 to 2011

Income - City	2008		2009		2010		2011	
Proper income NIŠ	726.251.264	76%	778.249.270	77%	886.355.395	82%	942.192.500	84%
Participation of the owner of the market NIŠ	232.571.748	24%	226.283.539	23%	190.596.624	18%	180.917.737	16%
Total revenue NIŠ	958.823.012	100%	1.004.532.809	100%	1.076.952.019	100%	1.123.110.237	100%
Proper income SU	547.881.000	96%	479.112.000	95%	521.514.000	95%	531.677.000	89%
Participation of the owner SU	20.650.000	4%	23.137.000	5%	26.892.000	5%	66.752.000	11%
Total revenue SU	568.531.000	100%	502.249.000	100%	548.406.000	100%	598.429.000	100%
Proper income PA	361.773.017	67%	361.604.637	61%	348.573.003	57%	403.437.792	59%
Participation of the owner PA	175.274.104	33%	227.267.326	39%	260.975.412	43%	277.474.478	41%
Total revenue PA	537.047.121	100%	588.871.963	100%	609.548.415	100%	680.912.238	100%

The data about realized incomes in the system of public transit are copied directly from the business reports in the years that are included in the analysis.

According to structure, total revenue consists of incomes from transportation service sales (ticket sales, bus stop services, subsidies, etc.), financial incomes (interest and exchange gains) and other incomes (recovered bad debts, waste material sales, charged damages, etc.). Total revenues and their structure is presented in the table below, with amounts in local currency (dinar).

Total revenue in the given period, according to analyzed years, was always on the level of realized total costs (expenses) in the public transit system. When compared to costs, the amount of incomes practically shows that the system spends as much as it earns.

In the following section, the relation between realized incomes from the participation of the owner and realized transportation work is analyzed. That represents the revenue from the participation of the owner by the

unit of realized transportation work in the public transit system. The presented revenue practically shows ineffectiveness of the transit market.

The following table shows the incomes from the participation of the owner in the Republic of Serbia by unit, compared to four selected criterions (realized transportation work (vehicle per km), inventory number of vehicle, number of passengers and number of employed).

For good managing in the system of public transit, it is necessary to register and balance all categories of revenues and expenses according to subsystems. This should be done in a way suitable for analysis of business in the transit companies with similar systems, because the existing way of registering is not offering this in the previously mentioned reports. The analysis of the incomes by unit from the participation of the owner leads to conclusion that those in Nis have falling trend which is positive, and that they are equal to the unit values in Subotica for the year 2011. In this period, Subotica got

**Table 4.** The incomes from the participation of the owner in the transit system in the Republic of Serbia for the period from 2008 to 2011

No.	Participation of the owner - City	2008	2009	2010	2011
PTR 1.	dinars / veh km NIŠ	26,93	26,20	22,71	21,81
PTR 1.	dinars / veh km SUBOTICA	6,65	7,65	8,88	22,33
PTR 1.	dinars / veh km PANČEVO	31,76	41,18	47,52	49,75
PTR 2.	dinars / passenger NIŠ	11	10	8	7
PTR 2.	dinars / passenger SUBOTICA	2	3	3	8
PTR 2.	dinars / passenger PANČEVO	26	33	36	38
PTR 3.	dinars / inventory vehicle NIŠ	1.875.579	1.824.867	1.537.070	1.459.014
PTR 3.	dinars / inventory vehicle SUBOTICA	254.938	285.642	336.150	834.400
PTR 3.	dinars / inventory vehicle	2.218.660	2.840.841	3.262.192	3.468.361
PTR 4.	dinars / employed NIŠ	312.597	304.145	256.178	243.169
PTR 4.	dinars / employed SUBOTICA	55.214	6.2196	72.290	188.034
PTR 4.	dinars / employed PANČEVO	351.956	438.740	510.715	550.545

bigger subsidy (148% higher) compared to the previous business year. The highest subsidies are in Pancevo, having positive growth which indicates bad management and urgent actions for the necessary improvement.

Since the income in the system depends directly on the service price policy (ticket prices) and structure of the tickets, it is very important to carefully form the structure of the tickets and their values. Otherwise, disproportion can appear between the parameters of the production of transportation service and realized incomes (considering that inadequate prices of transportation service can cause decrease in the number of transported passengers).

The following tables show social and commercial discounts according to valid pricing policy in use.

**Table 5.** Values of social discounts for certain user groups

No.	City/user category	Employed	College students and high school students	Elementary school students	Retired persons and invalids
1	NIŠ	0%	30%	40%	30%
2	SUBOTICA	0%	36,15%	36.15%	61,15%
3	PANČEVO	0%	45-60%	45-60%	0%

Due to the analysis of pricing policy in these three cities, it was difficult to make comparison, considering the differences in the approach.

**Table 6.** Values of commercial discounts for certain user groups

No.	City/user category	Employed	College students and high school students	Elementary school students	Retired persons and invalids
1	NIŠ	43,75%	43,75%	43,75%	43,75%
2	SUBOTICA	23,85%	23,85%	23,85%	23,85%
3	PANČEVO	40%	0%	0%	0%

Due to the analysis of pricing policy in these three cities, it was difficult to make comparison, considering the differences in the approach. Analysis shows that in Nis and Subotica ticket prices for certain user groups depend on mobility per month of the characteristic groups, number of zones, percentage of commercial discount and percentage of discount approved for certain user groups. The difference between these two cities is mobility per month, which is 64 rides in Nis and 104 rides in Subotica. In Pancevo, tariff and ticket systems are not projected in accordance with transportation needs and requests. There are significant deviations in the rights of usage and ticket prices for the same length of rides on different lines in the city and suburban transit. Lack of coordination in tariff zones is inadequate for short-distance travelers who pay the same price as travelers who travel almost 14 kilometers (which is almost three

times longer than middle ride length for city lines). This violates one of the most important principles in public transit: equality for all users of the system.

## CONCLUSION

Improvement of public transit services is an important component of transportation plans for improvement of the transit system in a specific area. High quality of transit services can provide different economic, social and ecological advantages, including direct benefits of revenue increase from the activity. The implementation of plans for improvement often demands additional resources. These resources often exceed the possibilities of local and city budgets, sometimes even state budgets, so they have to be financed from various funds which are in domain of higher levels of governing.

This research offers eighteen options for financing, including some that are already in use as well as others that are considered innovative.

The research does not discover any new options for financing, which would be very profitable and easy for implementation. Every existing option for financing has flaws and limits. The point is that different options for financing should be used to help financing the local part in the functioning, to improve public transit and ensure stability, as well as to distribute expenses in the wide area which the system covers. Even the residents who do not use public transit have benefits from the system. Those benefits are: decreasing traffic jams, increasing public security and health, enabling better options for mobility of the residents and regional economic development. All these lead to better quality of life and environment.

Further research in this field should analyze every new option for financing better. It is necessary to maximize benefits and minimize problems which such option brings. Certainly, the potential lays in accessibility, preservation of the environment, alternative types of transportation, which leads to sustainable public transit.

## REFERENCES

- [1] Vučić, V. *Urban Transit Operations, Planning and Economics – John Wiley & Sons*, 2005.
- [2] Litman, T. *Local Funding Options for Public Transportation, Victoria Transport Policy Institute*, 17 (1), 2014, 43-74.
- [3] Litman, T. *Transit Price Elasticities and Cross-Elasticities, Journal of Public Transportation*, 7 (2), 2004.
- [4] Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, *Financing Sustainable Urban Transport, International Review of National Urban Transport Policies and Programmes*, July 2013.
- [5] Gladović, P. *Tehnologija drumskog saobraćaja, treće izdanje*, FTN, Novi Sad 2010.
- [6] Pourbaix, J. *Revenue streams for public transport operation in selected cities, Knowledge & Membership Services Department, UITP*, March/April 2012.