

## PUBLIC COLLECTIVE TRANSPORT IN CITY FUNCTIONING

*Constant communication problems, increasing urban pollution and increased passenger demand make it a priority for every major city to have a well-integrated and well-integrated public transport system that provides residents with access to all major facilities, areas and infrastructure. The work is of theoretical and cognitive nature. The first part presents the problems encountered in the functioning of urban transport and the factors of attractiveness of urban transport. The second section presents the structure of urban transport, based on the example of MPK in Rzeszów, depending on various aspects and the results of surveys on the evaluation of urban transport. Research has shown that residents of Rzeszów are satisfied with the operation of urban transport, but the quality of services offered to passengers should be constantly monitored and adjusted to their needs.*

### INTRODUCTION

The existence and functioning of public transport in a given urban center is a response to the transport needs of the local community. An access to services such as education, health care and commerce requires travel from home to the destination. At short distances this trip can be done on foot or by bicycle, but as the distance increases, the need for faster and more convenient forms of transport becomes necessary [1].

Due to the high costs associated with individual transport (purchase of means of transport, fuel, repairs), and often also its low attractiveness on crowded roads, public transport is popular. Without it, a large part of the population would have very limited access to many services, including those necessary to survive.

Imposing on local authorities an obligation to provide residents with transport connections shows that mobility is one of the basic needs of society and decisively determines the level and quality of life. Communication needs of the people of the city make it possible to talk about the demand for public transport. The most important features of this demand [2]:

- focus on a spatially limited area - it follows that demand is concentrated in the city (agglomerations);
- universality - means that the need for movement occurs throughout the inhabited area of an urbanized center;
- unevenness in space - is related to uneven population density of the urbanized area and the location of destinations (workplaces, schools, hospitals);
- unevenness in time - results from temporary migrations (within one day or one week) and in the long run from demographic change of the local community;
- mass - is a consequence of the unevenness of demand over time and space and is revealed by the creation of passenger flows on specific routes in certain directions.

Improving the competitiveness of public transport is the task of the transport undertaking, but it is also in the interest of the city or the municipality where it operates and in addition the passengers who use it. Especially in the areas of large urban centers this is a significant problem due to the large share of individual journeys, and

consequently road congestion and rising air pollution. Greater competitiveness of public transport is, therefore, in the interest of car drivers and passengers of transport companies, as (by reducing car traffic) it leads to improved mobility of both groups. With the reduction of emissions and noise this translates into higher quality of life and the development of the urban center itself.

The aim of the study is to analyze the collective transport system in Rzeszów and neighboring municipalities in terms of and expectations of people using this type of transport, because understanding the needs and expectations of both present and potential passengers can improve this process. Well-functioning, friendly passengers, public transport is important not only for social and economic reasons.

### 1. PROBLEMS OF TRANSPORT IN CITIES

One of the main causes of problems in urban transport operations is the excessive number of individual vehicles that leads to traffic congestion during peak times and more often also in other hours. This phenomenon, called congestion, initially only covers the main communication routes, and then spreads to the rest. As a result of congestion transportation routes become impassable for both public transport vehicles (buses, trolley buses) as well as individual vehicles, and the occasional travel time is transformed into a permanent phenomenon accompanying urban journeys. Problems in the operation of urban transport the concept of a vicious circle is aptly illustrated. According to this concept, with the growth of individual motorization in cities, there is an increase in street congestion, thus blocking traffic in urban traffic, which results in lack of punctuality of the carrier. As a result some passengers resign from public transport services for individual transport. The only way to solve this problem is to increase the attractiveness of urban transport (Fig. 1). It can be done in various ways, for example through systematic promotion of car transport, traffic safety, the use of eco-friendly means of transport, the elimination of unnecessary links in the chain of people and the use of door to door solutions. An effective incentive to use public transport are innovative system solutions combining the advantages of individual transport and the advantages of public one [3].

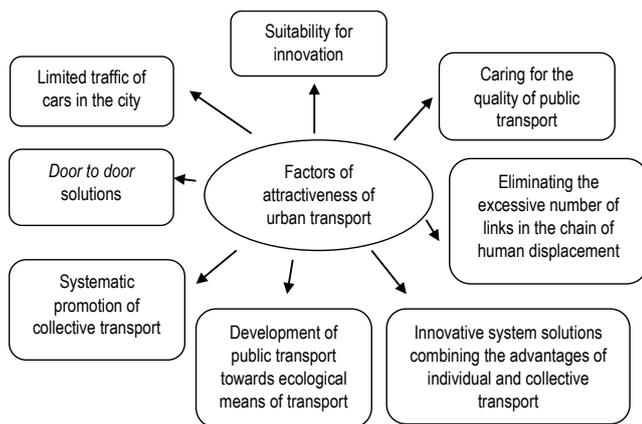


Fig. 1. Attractiveness factors of urban transport, (based on [3])

Urban transport is highly innovative but it limits the high cost of implementing communication innovation, as well as the usual fear of the decision makers before implementing innovative solutions that are not proven yet.

## 2. ORGANIZATION OF PUBLIC TRANSPORT IN RZESZÓW

The structure and organization of public transport in a city center depends on many factors. Apart from a number of external determinants, the internal organization of collective communication is also important, resulting from various types of administrative decisions and legal solutions. It largely determines the direction of transport development in a given area and determines the rules of its operation.

Particularly important is the number of people using public transport including children and young people. In the school year 2011/2012 in Rzeszów and municipalities serviced by Rzeszów municipal transport, there were altogether 300 schools and educational institutions, attended by 34,300 students and 6,2 thousand preschoolers. Rzeszów is a large academic center. In January 2014, 9 colleges were operating, with 52,000 students saved in the 2011/2012 academic year. The largest universities are the Rzeszów University of Technology and Rzeszow University [4].

In turn, the structure of the trips in Rzeszów municipal transport - depending on the ticket held by the passenger - is shown in Figure 2. The structure of ticket sales - divided into normal, reduced and statutory discount tickets - presented in Figure 3 [4].

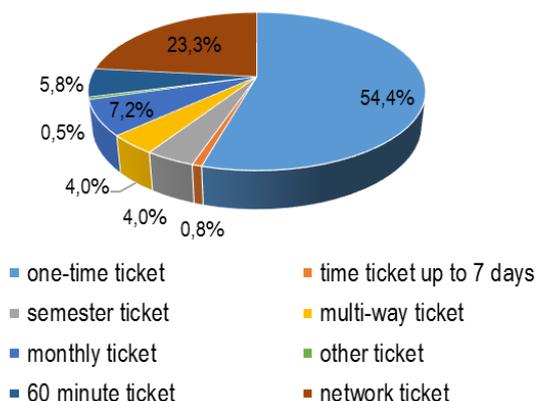


Fig. 2. The structure of the trips in Rzeszów municipal transport - on the basis of ticket sales in 2013

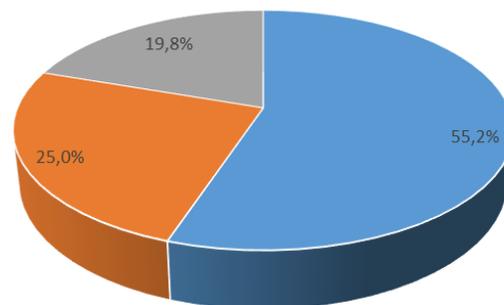


Fig. 3. The structure of revenues from ticket sales in Rzeszów city transport by type of tickets in 2013 (data of ZTM in Rzeszów)

In the structure of passengers of Rzeszów municipal transport, the very high share of people traveling on the basis of a one-way ticket is noted. On the other hand, the share of passengers traveling on a monthly, network and semester basis 34.5% of the total number of passengers - compared to the ticket sales structure in other cities over 100 thousand inhabitants is quite low. Over the past year, the share of one-way tickets in sales has decreased by 6%, and the share of monthly and longer-term tickets increased by approximately 5%. The tendency of changes in the sales structure is correct.

From the environmental point of view, the right solution is to plan the public transport network to minimize pollution emissions from public transport. In this regard, positive results can be achieved by planning to purchase buses equipped with engines with the highest purity of exhaust gas - allocating them to transport jobs with the highest number of kilometers. As of 10 January 2014, for the transport of public transport, MPK - Rzeszów. It employed a total of 181 vehicles, 86% of which were adapted for the transport of people with disabilities. The average age of rolling stock was 8.4 years. Structure of the bus fleet operated by MPK - Rzeszów according to the age criterion, shown in Figure 4, and according to the criterion of the exhaust gas standard in Figure 5 [4].

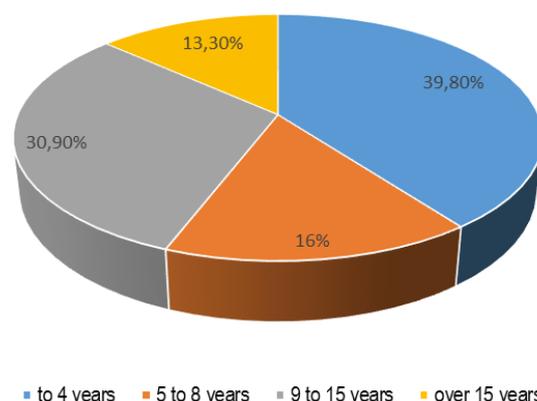
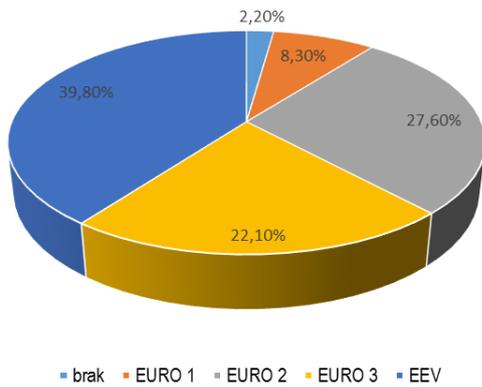
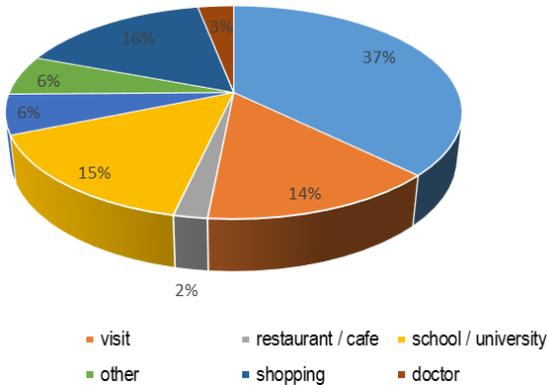


Fig. 4. Age structure of the bus fleet MPK - Rzeszów - as of January 10, 2014 (data from ZTM in Rzeszów)



**Fig. 5.** Structure of the bus fleet MPK - Rzeszów due to the standards of cleanliness of the exhaust gases - as of 10.01.2014 (data of ZTM in Rzeszów)

An important aspect of public transport is the number of people who use public transport and the purpose of their travel. Figure 6 shows the distribution of destinations for residents of Rzeszów [4].

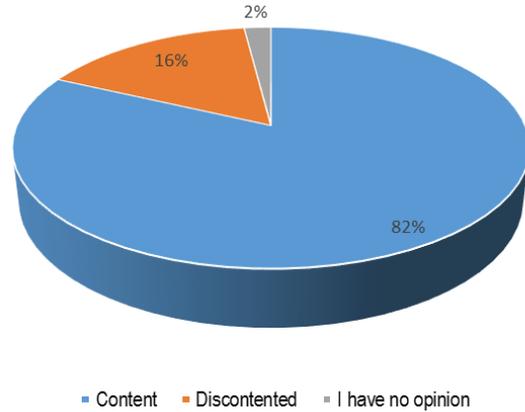


**Fig. 6.** Destinations by public transport of residents of Rzeszów - November-December 2009 (based on [4])

Among the declared travel destinations, in Rzeszów dominated: work (37%), shopping trips (16%), university / school (15%) and visits to friends (14%). These objectives accounted for 82% of all declared travel purposes. Workers (26%) and shopping trips (23%) were the dominant schools in the surrounding municipalities - they accounted for 84% of all declared trips [4].

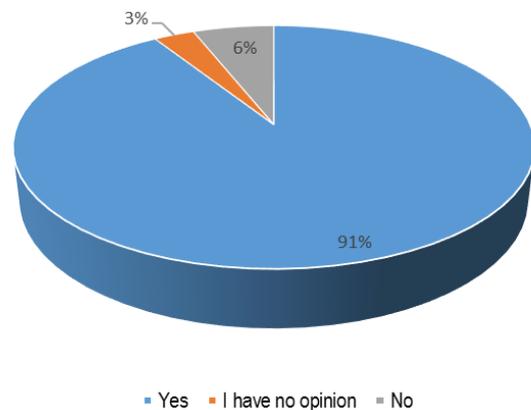
### 3. ESTIMATION OF PUBLIC TRANSPORTATION - RESULTS OF RESEARCH

The study involved the evaluation of public transport from the perspective of people using this type of communication in Rzeszów. 100 people participated in the study. Of these, 73 are women, while 27 are men. The largest group of respondents are people over 43%. 28% of the respondents are between 26 and 35 years of age, and 15% of the population are between 36 and 45, while 10% are between 19 and 25 years old. The lowest age group was 18 years old - 4%. The largest group of respondents are working people and pensioners, respectively 40% and 35%. Students unemployed 6%, students 5%. The largest group of passengers travel once a week - 63%, daily travels 13% of respondents. Once a month, 2% of the respondents travel to the city, while 22% occasionally travel. Of the surveyed 86 people did not own a car [5].



**Fig. 7.** Evaluation of the frequency of buses traveling by public transport

The current structure of the communication line meets the expectations of the majority of the respondents, as much as 91%. Only a small percentage of respondents considered this structure unsatisfactory (Figure 8).



**Fig. 8.** Assessment of passengers' expectations regarding the course of communication lines

Information on timetables and other information related to public transport is not passed in the opinion of the respondents, neither good nor bad - as many as 71 people gave such answers. The respondents did not respond in unambiguous manner. The minority evaluates well the transmission of information (Figure 9).



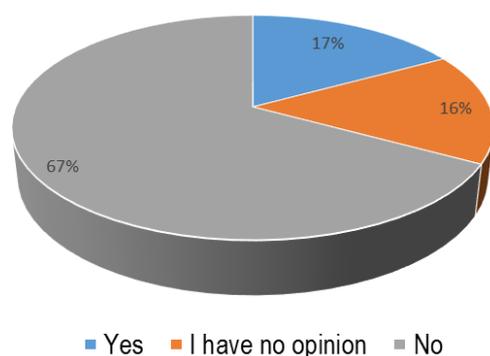
**Fig. 9.** Providing information on timetables and other information related to public transport

The question of three most important features of communication services is: punctuality of buses, travel safety and information on timetables. When analyzing the responses of women and men separately, it is noted that the majority of the women who participated in the study were satisfied or rather satisfied with the communication services provided by MPK Rzeszów. Men were most often dissatisfied with MPK services or abstained from the evaluation.

When analyzing passenger ratings on bus frequencies, it is possible to see that the most satisfied with this aspect are working people and students. Retirees do not have a clear position on this issue. The dependence of MPK passengers' travel frequency on their satisfaction with bus frequencies was also compared. The most satisfied are people who travel by bus once a week and every day.

Based on the research conducted, it is important to note that respondents are mostly satisfied with the level of services provided by public transport in Rzeszow. Passengers are satisfied with both the frequency of bus traffic and the structure of the communication lines. They consider that there is no need to create new bus lines or change existing routes. Passenger MPK Rzeszów as quality features, which are most important in the implementation of communication services, mention bus punctuality, travel safety and information at timetables. On the other hand, they are not particularly happy with the information at timetables. Passengers are also not satisfied with the behavior of drivers, difficulty in purchasing tickets, travel time, direct connection. The aspects of which are most satisfied are the punctuality of the buses as well as the cleanliness and aesthetics of the vehicles.

Particular attention should be paid to the fact that the passengers do not pay attention to aspects of innovation, modernity in the field of urban transport, i.e. modern bus stops or the purchase of tickets in vending machines (Fig. 10). The vast majority of surveyed people believe that modern aspects of urban transport are not important. More than half do not pay attention to innovation in public transport. A decisive minority draws attention to these aspects (17% in total) [5].



**Fig. 10.** Passengers' attention to aspects of modernity in urban transport

It is noted that these aspects are currently devoted to the most attention and financial resources of the city. Rzeszów's urban transport has developed very recently. It has recently introduced warm-up stops, ticket machines, electronic timetables. This, however, involves raising ticket prices. The analysis of survey responses shows that passengers do not attach much importance to these innovative solutions. This may be due to the age of the respondents as most of the respondents are over 45, who may not always be able to handle electronic systems and do not like the changes.

## CONCLUSIONS

The transport network, which is an integral part of the urban structure, plays a particularly important role. Ensuring the ability of easy, fast journeys within a given center seems to be one of the key problems encountered by city managers and individuals today. That is why it is important to carry out urban transport research and analysis that can be used to plan the development and shaping of the modern city.

The analysis and evaluation of the collective transport system conducted on the example of the Municipal Communication Company in Rzeszow showed that residents of Rzeszow are satisfied with the functioning of urban transport. Satisfaction and content are all influenced by what the passenger points to and is important to him or her. The information that they carry out can be a hint of what action must be taken to achieve the desired level of customer satisfaction. Creating the right quality of transport services is a complex and long-term process, and it does not only cover the aspects with which the passenger contacts, but also covers the entire process of managing the City Transport Company. The quality of services offered to passengers of MPK Rzeszów should be systematically monitored and adjusted to the needs of its passengers.

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### Publiczny transport zbiorowy w aspekcie funkcjonowania miasta

*Nieustanne problemy komunikacyjne, zwiększające się zanieczyszczenie obszarów miejskich oraz rosnące potrzeby przewozowe mieszkańców powodują, że sprawą priorytetową dla każdego dużego miasta jest sprawna i dobrze zintegrowana komunikacja zbiorowa, zapewniająca mieszkańcom możliwość dostępu do wszystkich najważniejszych obiektów, terenów i infrastruktury. Praca ma charakter teoretyczno-poznawczy. W pierwszej części przedstawiono problemy występujące w funkcjonowaniu transportu w miastach oraz czynniki atrakcyjności transportu miejskiego. Natomiast w drugiej przedstawiono strukturę transportu miejskiego na przykładzie MPK w Rzeszowie w zależności od różnych aspektów oraz wyniki badań ankietowych dotyczących oceny komunikacji miejskiej. Badania wykazały, że mieszkańcy Rzeszowa są usatysfakcjonowani funkcjonowaniem transportu miejskiego niemniej jednak jakość usług oferowanych pasażerom powinna być ciągle monitorowana oraz dopasowywana do ich potrzeb.*

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