

# Organizational and Management Features of the Automated Trip Payment System's Implementation in Public Transport of the Republic of Crimea

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**Abstract**—The article analyses the practice of the automated trip payment system's (ATPS) implementation in public transport of the Republic of Crimea in terms of its organizational and management peculiarities. In order to achieve the objective of the article, the following problems have been solved: the characteristics of the existing public transport system of the Republic of Crimea; review of the experience of such innovations in the cities of the Russian Federation; the identification of the peculiarities of the planning, organizing and management of the proposed system's implementation; analysis of management decisions and their expected results at the stages of system's development and testing. Methods of research include the analysis, the synthesis and the compilation of a wide range of data of scientific publications, statistics, mass media. The conclusions show that such regional nuances as the established structure of the public transport system, the transitional nature of administrative and legal relations, the functioning of several local banks, the seasonal nature of demand for public transport services, etc. form special requirements to the organization and management mechanism of ATPS in the public transport of the Republic of Crimea and to the algorithm of its operation, which is not always taken into account in practice by decision-makers.

**Keywords**—organization, management, management decisions, the automated trip payment system (ATPS), public transport, peculiarities, range of data special requirements, take into account, the Republic of Crimea.

## I. INTRODUCTION

Public transport is an important component of the logistic system of any region and settlement – be it either a village or a metropolis. Works of reputable scientists in the field of urban transport management, among which stands out the works of T. Litman [12] and V. R. Vuchik [22], as well as reports of Kh. L. Irigoyen [8] and G. Bruggeman [4] at international scientific and practical events, confirm the growing positive impact of efficient public transport in cities and the development of non-motorized modes of movement on population mobility and labor productivity. Positive results in improving transport services for the population in different countries of the world indicate a decrease in the growth of the private cars. But they are the main cause of traffic congestion,

environmental pollution and often a decrease in the urban environment quality, also they form so-called "vicious circle of urban transport" [8].

Experience of many countries around the world shows that the specificity of the public transport industry is that only the direct interest and participation of municipal and regional authorities in solving issues of increasing the efficiency of its work is able to give significant results in this area. Thus, according to the Colombian politician and successful urbanist-practitioner, twice the mayor of Bogotá E. Peñalosa, "the main problems of urban transport are more political than technical", and "the economy cannot create a better city, but a better city can create an economy" [4, 15]. At the same time, in addition to availability and punctuality of arrival, an important part of the public transport attractiveness, convenience of use and safety for the passenger travel is the process of travel payment, the way it is made.

Modern world is characterized by an intensive pace of innovation in all areas of activity, by high rates of business processes. In Russian Federation, these trends are reflected in the growing attention to digitalization and its introduction in all spheres of life. In this regard, the relevance of the use of automated trip payment systems (hereinafter – ATPS) in public transport is not in doubt. At the same time, we have accumulated sufficient experience of such implementation both abroad and in various regions of Russia. Therefore, in order to develop optimal organizational, managerial and technical solutions and to avoid repeating mistakes when introducing such systems, this experience should be used.

## II. METHODOLOGY

The problematics of introducing automated and contactless payment methods for transportation in recent years has been considered in the works of many Russian researchers, including F. Z. Aralbayeva and O. M. Kharkova [2], L. S. Arkhipov and V. V. Kosulin [3], E. V. Budrina and A. S. Lebedeva [5, 6], O. S. Kovalchuk and S. A. Yatsenko [9], B. A. Levin and L. B. Mirotin [7], A. V. Ryazanova [17, 18] and others.

E. V. Krikavskiy touched upon the problems of investing in transport infrastructure in different periods of time [10, 11]. The author also covered topical issues of the transport complex development of the Republic of Crimea, in particular transport support in tourism, as well as organization and improvement of urban transport [19, 20].

Based on the above-mentioned relevance and topicality of this issue for the Republic of Crimea, the purpose of this study is to analyze the organizational and management conditions for the ATPS implementation in urban public transport of the Republic of Crimea. The objectives of the study are to identify regional features and their impact on the planning, organization and management of the implementation of the proposed system, taking into account the accumulated experience of other regions/countries and the specifics of the Crimean region.

The analysis of a wide range of sources on the research topic, the use of logical and comparative analysis methods, as well as the author's knowledge of regional features and local specifics, permit to count on the reliability of the results, the validity of conclusions and recommendations.

### III. RESULTS AND DISCUSSION

First and foremost, we should admit that since the implementation of ATPS in urban passenger transport is nothing more than a project, it requires an appropriate competent and balanced approach using effective project management tools. An important role is assigned to the development of the project concept itself and to its planning.

It is obvious that the choice of the ATPS implementation concept, strategy and payment technology directly depends on how successfully the system will work. If management

decisions are wrong, the system itself may not bring profit, will not facilitate the carriers activities, but is likely to create additional difficulties [17, 18]. Therefore, the choice should be thorough and substantial, and the transition to intelligent trip payment systems should be incremental. For this purpose, it is important to have a clear understanding of the situation in industry and in the region.

The dynamics of the main indicators of automobile transport activity in the Republic (table 1) reflect the political and economic situation.

According to the table. 1 it is obvious that passenger traffic and passenger turnover fell in 2015, followed by a gradual increase in these indicators, which may be explained by the instability of the political situation at that time. Simultaneously we can note a significant increase in the volume of transport services in monetary terms in general and per capita during the entire period under review, which is due to the termination of railway communication between the peninsula and the mainland, the reorientation of passenger traffic to automobile and air traffic, and partly to rising prices due to the crisis in the economy.

We should notice a stable positive trend in the absolute number of passengers transported in 2015-2018, which cannot be said about the passenger turnover indicator for the same period. This indicates a decrease in the travel distance of passengers. According to the author, we can expect a downward change in these indicators due to the opening of the railway service on the Crimean bridge at the end of 2019, but it will be possible to reliably judge this only by the end of 2020. We should also note that these statistics do not distinguish between external, inter-municipal and intra-city transport.

TABLE I. THE MAIN INDICATORS OF AUTOMOBILE TRANSPORT ACTIVITY IN THE REPUBLIC OF CRIMEA IN 2014-2018 [16]

Indicator	2014	2015	2016	2017	2018
Passengers were transported by public buses <sup>a</sup> ), thousands of people	127217,4	92092,2	102001,8	132721,4	149715,5
Passenger turnover of public buses <sup>a</sup> , million passengers per km	2607,2	2150,2	2385,8	2383,8	2458,4
Availability of organizations' own moving vehicles (passenger buses), units	1679	2748	1994	2527	2476
Number of public buses per 100,000 population, by the end of the year, units	72	134	104	132	...
Volume of transport services to the population, million RUB	1135	6995	7255	12538	...
Volume of transport services per capita, RUB	602	3679	3799	6554	...
Passengers were transported by public buses <sup>a</sup> ), thousands of people	127217,4	92092,2	102001,8	132721,4	149715,5

<sup>a</sup> Taking into account the activities of individual entrepreneurs engaged in passenger transportation on a commercial basis.

According to official statistical data, the Republic of Crimea ranked 25th among the regions of the Russian Federation in terms of passenger transportation by public buses in thousands of people, as well as in terms of the number of public buses per 100,000 people at the end of 2018 [16], and it ranked 20th by passenger turnover of public buses in million pass-km, this indicates the sufficient development of this industry in the Republic. By the volume of transport services rendered to the population in millions of rubles at the beginning of 2018, the Republic of Crimea was on the 30th place among the regions of the Russian Federation, according to the same indicator calculated per capita in rubles – only on the 44th place.

It is important to pay attention to that fact that according to the Simferopol administration, "with general motorization, passenger traffic decreases every year. This is evidenced by data on the number of passengers transported on regular routes, submitted by representatives of carriers annually for route passports. At the same time, the number of buses is not reduced, which leads to an increase in the number of routes, as well as operating time with low profitability" (Simferopol administration, 2016).

According to official data of the Ministry of transport of the Republic of Crimea, the total number of road carriers that carry out passenger transportation on regular routes on the Peninsula is 71, among them 38 are legal entities and 33 are individual entrepreneurs [Ministry of transport of the

Republic of Crimea, 2020]. It should also be noted that out of the number of legal entities, 32 enterprises are registered in the form of limited liability corporation. Thus, the dominance of private capital in the sphere of passenger transportation can be traced in the territory of Crimea. These data reflect the typical development of the public transport industry over the past 20-25 years. Moreover, among state and municipal transport companies the municipal unitary enterprise of the Republic of Crimea "Goravtotrans" and the state unitary enterprise of the Republic of Crimea "Krymtrolleybus" take leading role, both of them are located in Simferopol, the administrative center of the Republic and its largest city by population.

But in recent years, there has been a tendency to revise and reduce the routes of urban transport served by private carriers, in favor of working municipal ones on them, because of the greater passenger capacity of vehicles, comfort and better technical condition of the auto park.

As for the strategy and technology of trip payment in urban public transport, the Republic of Crimea by the end of 2019 had a fixed fare and a mixed payment technology – mainly cash, moreover without providing a travel ticket by private carriers. It was also possible to pay for the trip with a bank card and transport cards in buses and trolleybuses of municipal enterprises using the driver's validator located in his cabin, in that case passengers could get a receipt. Passengers entitled to preferential trip were required to present a corresponding certificate, with the exception of old-age pensioners in municipal trolleybuses. On suburban routes, there were conductors who accepted payment and gave out tickets.

Obviously the evolutionarily developed system of payment for public transport in the Republic of Crimea did not meet the modern needs of passengers, municipalities and society as a whole, it required revision and improvement. The main reasons for that are:

- non-transparency of carriers' revenue when accepting cash trip payment from passengers and as a result, the shortfall in tax revenues to the regional budget, the need to account the number of privileged passengers and the total number of passengers on routes;
- non-compliance with the schedule on urban public transport;
- need to improve traffic safety;
- inconsistency of management decisions while implementing APTS in the Republic of Crimea, in particular, an attempt to introduce a single transport card in 2019 in parallel with the approval of the Project concept "Multifunctional card for the resident of the Crimean Republic for 2019-2024" [14]. This last document may be considered a serious and concrete step towards the implementation of APTS in the Republic of Crimea.

#### IV. CONCLUSIONS

Main conclusions and recommendations concerning the organization and management features of the APTS implementation in public transport of the Republic of Crimea may be formulated as follows:

1. The public transport industry in the Republic of Crimea has significant regional features – continuing transformation

of the road network both in and outside localities due to the construction of the "Tavrida" highway; a significant segment of private carriers in the structure of passenger transport companies; marked seasonal fluctuations in the nature of work, especially in coastal cities, caused by the resort season; non-transparency of carriers' income and lack of a clear picture of the transported passenger number, including preferential categories; increasing traffic congestion in Simferopol and other cities due to the growing number of private cars, that makes it difficult to keep up with public transport schedules;

2. An attempt to introduce a transport card for non-cash trip payment in 2019 on municipal and suburban routes in Simferopol, Alushta and Yalta is sure not to be considered as successful for passengers. This is connected with non-optimal organizational, managerial, and tactical decisions: the high cost of the card, the limited period of funds usage on the card, an inconvenient system for purchasing and replenishing the card, and weak information support for this innovation.

3. Analysis of management decisions on the APTS implementation in Crimea has shown that the following steps are necessary for the successful project completion and the effective system functioning:

- broad information support for this innovation in the mass media, active advertising in public places, at bus stops, on billboards and other advertising media, especially in public transport, equipped with video screens, in the format of videos explaining the features of the implemented system;
- priority usage of APTS on the routes of municipal and state carriers and strict compliance with the rules for transportation of privileged categories of passengers using multifunctional cards;
- due to the significant segment and high social significance of routes that are served by private carriers, it is possible to encourage them to join the APTS by compensating for the transportation of exempts and introducing stricter competitions for route maintenance;
- while implementing APTS, the public good in the form of high-quality transportation services should become a priority in making management decisions, that will increase the attractiveness of public transport and its profitability. Therefore, it is reasonable to review the salary system for drivers, taking into account compliance with the traffic schedule and traveled mileage, and timely compensation to carriers for preferential categories of passengers;
- successful experience shows that the greatest effect of the APTS implementation may be achieved in conjunction with the optimization of public transport in cities by analyzing passenger traffic and allocating lanes for public transport, following the example of many cities in Russia, Europe, and the world.

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