4.2 Improved procedure for calculating tariff plans, compensation systems and the cost of a round trip

The problem of tariffing passenger transportation is one of the key issues in the development and improvement of tariff policy, affecting not only the infrastructure of the transport industry, the financial well-being of market operators, but also the interests of consumers of passenger transportation services.

The procedure of improving tariff plans in the system of passenger road transport is preceded by the issue of clarifying the essence of the concept of "tariff", as well as identifying exogenous and endogenous factors that affect the search for a tariff solution that helps harmonize the interests of all participants in the transport services industry.

The generalization of scientific approaches to determining the essence of the concept of "transport tariff" allows us to highlight its main characteristics in Fig. 1.

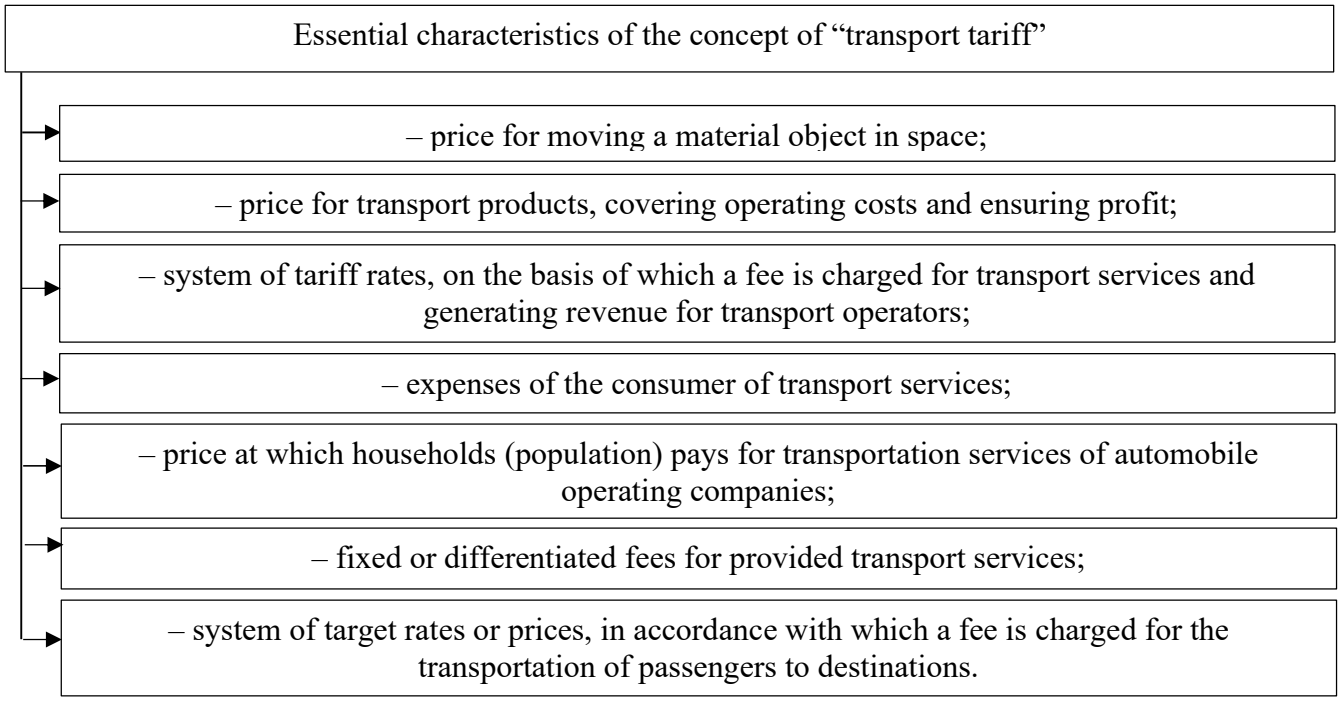


Figure 1 – The essential characteristics of the concept of "transport tariff" [1, p.21]

The analysis of the essential characteristics of the concept of "transport tariff" is required to be supplemented in terms of the legal support of this concept, as the tariffing of passenger transportation is the subject of state regulation. In accordance with paragraph 1.3 of the Methodology for calculating tariffs for passenger transportation services: "the fare on public bus routes is the cost of one-time travel of one passenger in a city connection or the cost of transporting a passenger per kilometer in suburban, intercity, international traffic" [5].

Systematization of scientific and legislative approaches to determining the transport tariff allows it to be defined as a combination of tariff rates, which include the cost and profit of motor transport enterprises providing passenger transportation services to the population, ranked by type of transport (urban, suburban, intercity and international).

Thus, in the process of development proposals for improving the procedure for calculating tariff plans, we will consider the specifics of a set of factors affecting the cost of services and profit of carriers, as well as the conformity of the stated recommendations on changing tariffs to the solvent demand of consumers of transport services, as well as social expectations of the population, because this problem is in the economic, and infrastructural and social planes of study.

The main attention, in the conditions of introducing the Smart Transport System in urban passenger transport, will be paid to improving the tariff for passenger transportation services on public bus routes that are carried out in the usual mode of operation, as the research project provides a gradual transition from the "route taxi" to transfer all buses to normal driving mode.

The methodology for calculating the tariff is fixed at the legislative level and involves the calculation of the tariff for passenger transportation services on public city bus routes according to the following formula:

$$T_r = [(S_p + P_p) - I_i] / Q_p, \ (UAH/pass.), \quad (1)$$

T_r – tariffs for passenger transportation services on city public bus routes, which are carried out in the usual mode of movement;

S_p – the planned annual cost of services, UAH;

P_p – planned annual profit from the provision of services, UAH;

I_i – planned annual net income from other activities, and which are related to the provision of services;

Q_p – planned annual passenger traffic, pass.

Elements of the tariff require revision regarding the implementation of smart innovations and the current situation in the field of passenger transportation.

The analysis of the carrier's profit is viewed in dynamics through the prism of indicators of the economic efficiency of the functioning of entities providing passenger transportation services (Fig. 2).

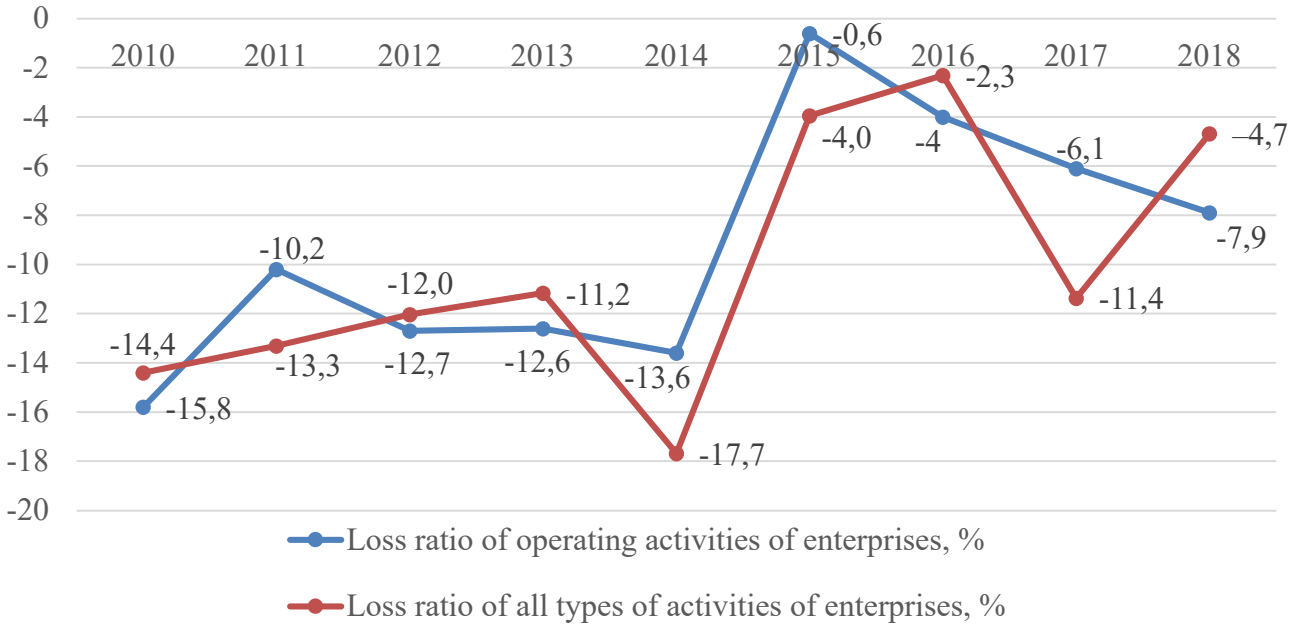


Figure 2 – Analysis of the economic efficiency of enterprises of passenger transport of urban and intercity connections by land for the period 2010-2018 [6]

Consideration of the results of economic efficiency of enterprises of passenger transport of urban and intercity connections by land allows us to conclude that the

industry was unprofitable during 2010-2018, which indicates the shortcomings of profit planning processes, as well as a set of problems in the infrastructure sphere.

Factors directly affecting the decline in financial results are both a reduction in the number of carriers in the transport sector (Table 1) and passenger traffic (Table 2).

Table 1 – Analysis of the number of business entities in the field of activity 49.31 – Passenger land transport of urban and suburban traffic, units []

Period	Number of business entities				
	Large business entities, units	Medium-sized businesses, units	Small businesses, units	Including microentrepreneurship, units	Total, units
2010	2	249	14550	13856	28657
2011	2	290	9645	8967	18904
2012	2	313	8433	7739	16487
2013	2	338	8816	8043	17199
2014	2	281	10191	9696	20170
2015	2	300	8076	7621	15999
2016	2	305	7328	6885	14520
2017	2	284	6209	5797	12292
2018	2	273	5569	5104	10948

The decrease in the number of carriers operating in the field of urban passenger transport in 2015 is due to the exclusion from the calculations of participants providing services in the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and part of the temporarily occupied territories in Donetsk and Lugansk regions.

The number of business entities providing passenger transportation services decreased by almost a third over the period 2015-2018 mainly through the medium and small businesses, incl. microentrepreneurship. Only 2 large operators function on the market throughout the research period.

The decrease in passenger traffic also significantly reduced the financial result in the field of urban passenger transportations (Table 2).

The study of the number of passengers carried by the main types of urban transport shows the largest reduction in passenger traffic by bus and trolleybus modes of transport.

Table 2 – Analysis of the number of transported passengers by type of transport, thousand pass [6]

Period	Types of urban passenger transport				
	Car (bus)	Tram	Trolleybus	Metro	Total
2010 г.	3726288,6	713809,7	1203551,2	760551,2	6404200,7
2011 г.	3611829,9	797993,6	1346431,5	778253,4	6534508,4
2012 г.	3450173,1	799688,8	1345544,9	774057,6	6369464,4
2013 г.	3343659,5	757382,8	1306228,5	774794,0	6182064,8
2014 г.	2913318,1	769911,1	1096884,8	725819,9	5505933,9
2015 г.	2250345,3	738603,2	1080772,6	700369,5	4770090,6
2016 г.	2024892,9	694009,4	1038746,0	698367,3	4456015,6
2017 г.	2019324,9	675841,4	1058072,1	718886,9	4472125,3
2018 г.	1906852,1	666271,1	1016241,2	726585,1	4315949,5
2019 г.	1804929,3	627515,1	945694,5	714982,1	4093121,0

For the period 2010-2019 the overall reduction in the number of passengers carried by all modes of transport was 36.1%. The factors that affect the reduction of passenger traffic and require consideration during calculating tariffs are summarized in Fig. 3.

Each of the factors presented in Fig. 3 has an impact on the planned annual volume of passenger traffic, which is an element of the formula for calculating the tariff for services for the transportation of passengers on public city bus routes,

which are carried out in normal traffic. Let's consider some of the given factors in more detail to develop recommendations for improving the procedure for calculating tariff plans.

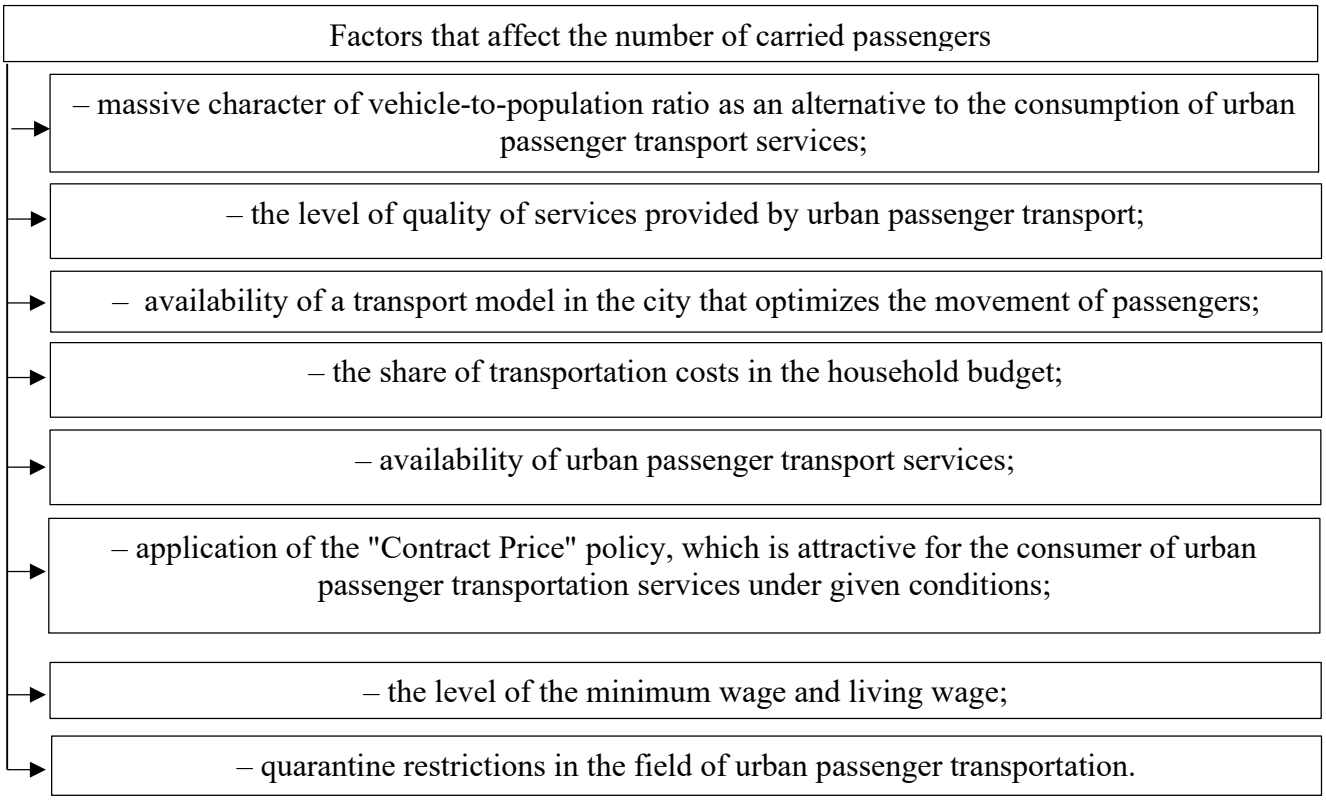


Figure 3 – Factors that affect the number of passengers carried in the urban passenger transport system

The presence of a transport model in the city, which optimizes the movement of passengers due to an extensive network of various types of passenger transport, allows solving a certain number of tasks systematized in Fig. 4. It should be noted that at the moment the transport model exists only within certain large cities of Ukraine.

In our opinion, it is necessary to establish an economic relationship between the tasks of the city's transport model and the application of the contractual pricing policy as part of the improvement of the tariff plan for the transportation services of passengers on public city bus routes, which are carried out in normal traffic.

To the current conditions of pricing on the Ukrainian market of urban passenger transportation, the name of the “costs plus charge” approach is applicable, which has significant errors in profit planning.

In the work of I.M. Aksenov [7], the essence of the concept of "contractual price" is substantiated, adapted to the field of passenger transportation, that allows to increase the volume of sales of services by transport companies.

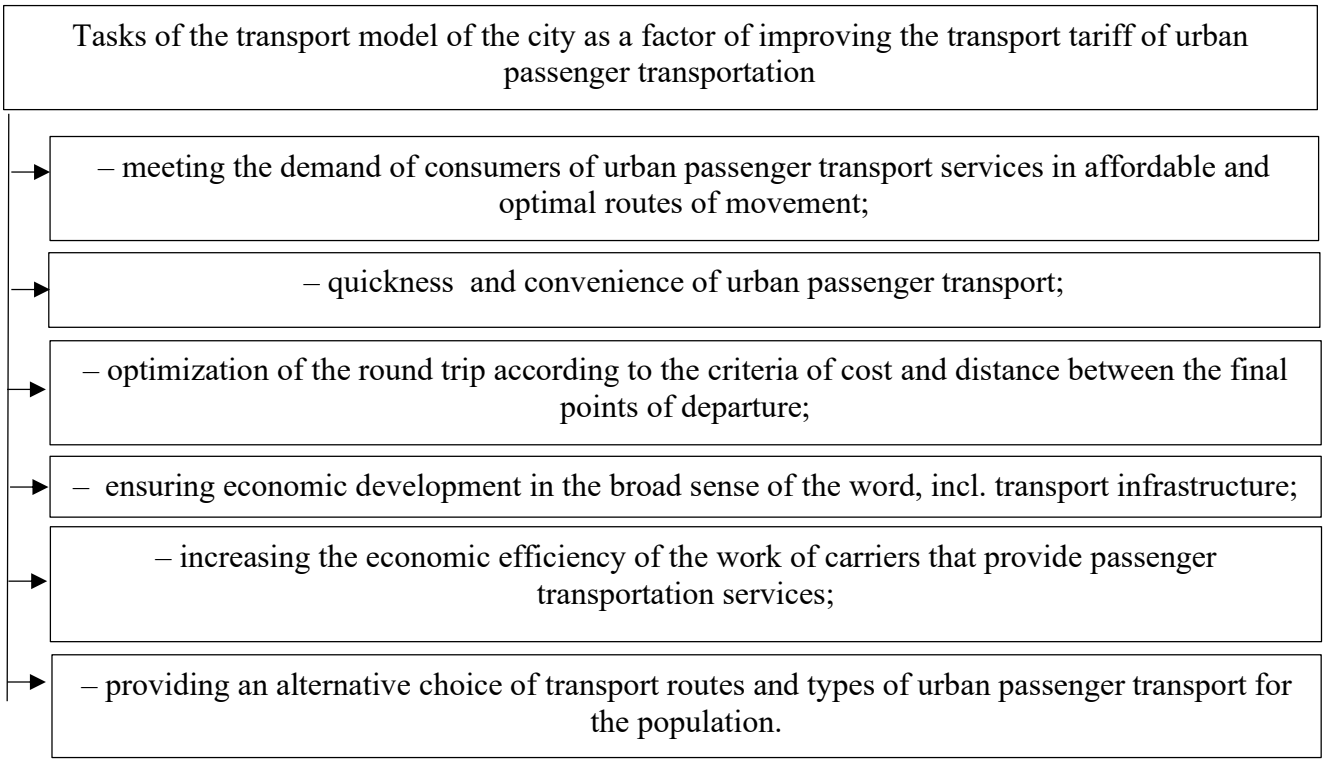


Figure 4 – Tasks of the transport model of the city as a factor of improving the transport tariff of urban passenger transportation

Proposals for the implementation of the "Contract Price" forms in the terms of the tariff plan for services for the transportation of passengers on public city bus routes, which are carried out in the usual mode of movement, are set out in Fig. 5.

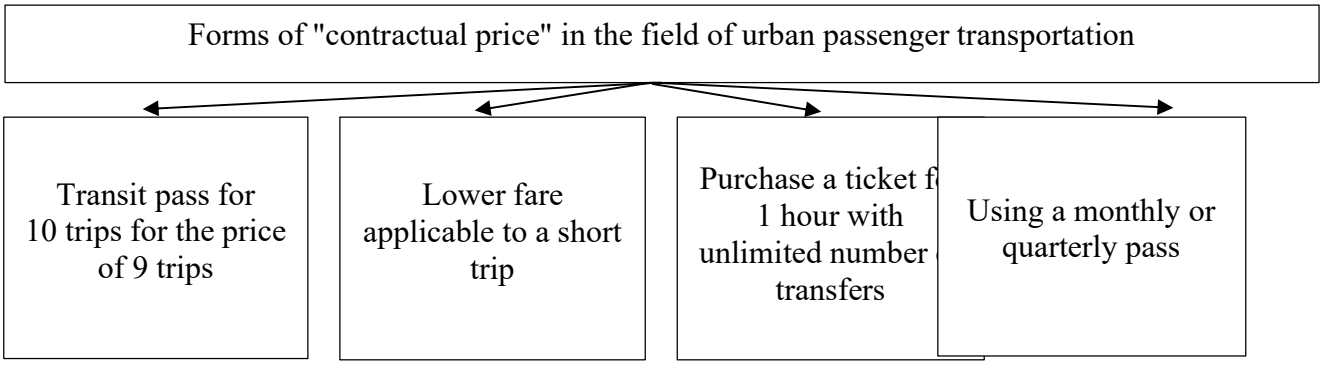


Figure 5 – Implementation of " contractual price" forms in the sphere of urban passenger transportation

The introduction of smart accounting systems within the transport model of the city will allow to supplement the information for a more accurate calculation of the cost of a travel ticket, travel passes, so that the level of economic efficiency of the work of carriers will be higher than in terms of calculating the cost of travel using the cost plus charge which is relevant for the transport of passengers on public city bus routes, which are carried out in normal traffic.

The use of a flexible approach to pricing and differentiated transport tariffs allows us to meet the population's demand for urban passenger transportation, and meets the solution of specific logistics problems.

One of the proposals for improving the procedure for calculating tariffs for passenger transportation services on public city bus routes, which operate in normal traffic, is the application of a reduction factor during peak hours for alternative routes of passenger traffic. Thus, in order to unload the central city highways during peak hours, it is advisable to organize routes that lengthen the route of passenger traffic, but at the same time at a lower price, taking into account the reducing coefficient.

Thus, it is possible to supplement formula (1) taking into account the reduction factor as follows:

$$T'_r = T_r * K, \ (UAH./pass.), \qquad (2)$$

T'_r – tariffs for passenger transportation services on city public bus routes, which are carried out in the usual mode of movement, taking into account the reducing coefficient;

T_r – tariffs for passenger transportation services on city public bus routes, which are carried out in the usual mode of movement;

К – reducing coefficient during peak hours for alternative routes of passenger traffic.

When the city council introduces a system of compensation for the cost and profit of carriers, this proposal is updated and provides an opportunity to both redistribute traffic flows during peak hours, and increase the comfort of movement, take into account consumer demands in the context of a partial reduction in transport costs. However, it should be noted that the effective use of reducing coefficients is possible if there is an existing transport model of the city, which involves the organization of transport hubs to ensure mobility of movements and the convenience of changing types of urban transport when carrying out passenger traffic.

Features of the application of reducing coefficients to tariffs for passenger transportation services on public city bus routes, which are carried out in normal traffic, are presented in Table. 3.

Two possible variants of the reducing coefficients used during peak hours are proposed, depending on the length of the alternative route and the type of urban transport.

Table 3 – Features of the use of the reducing coefficients on urban routes

Organization of passenger transportation	К= 0,8	К=0,75
On a public city bus route	$T'_r = T_r * 0,8$	$T'_r = T_r * 0,75$

The availability of alternative route options during busy traffic hours also solves the problem of reducing the share of household transport costs in the total

aggregate of their average monthly costs, which is an especially actual problem for those whose average monthly income per capita is below the actual subsistence minimum. The dynamics of changes in the part of transport costs in the general structure of household expenditures by groups is shown in Fig. 6.

The share of transportation costs in the structure of total household expenditures on average per month per one urban household has been increasing since the end of the 1st half of 2018 from 3.5% to 5.5%.

In the group of households whose average monthly income is below the actual subsistence level, the share of transportation costs in the total amount of expenses is 2.3% at the end of the third quarter in 2019, which is 0.2% more than the same reporting period in 2017, which indicates about the constant level of expenses and the use of privileged travel.

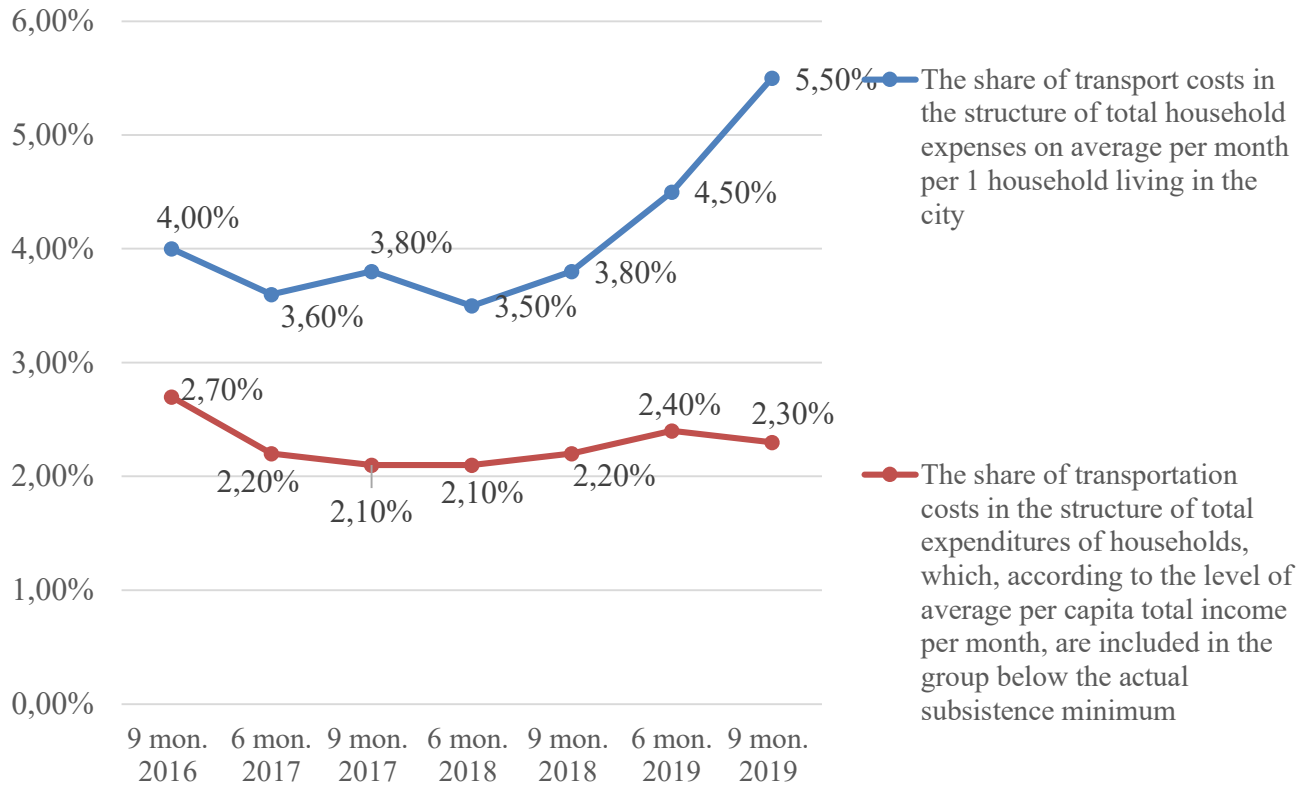


Figure 6 – Dynamics of changes in the part of transport costs of households in the structure of their total costs by groups

As a result of the introduction of an automated accounting system in urban passenger transport, it is possible to expand the information base for optimizing routes and introducing reducing coefficients on urban routes during rush hours, which will take into account the interests of socially vulnerable groups of the population. Thus, consumers of passenger transportation services will have an alternative: "pay at a higher transport tariff and arrive faster or pay at a discount due to a reduction factor, but take a detour and facilitate unloading of city-wide transport routes during peak hours".

Taking into account the interests of various groups of the population in the process of calculating the transport tariff supposes the introduction of an upper limit or cap-limitation to the estimated value of the cost of urban passenger transportation. The sequence for calculating the maximum tariff size is summarized in Fig. 7.

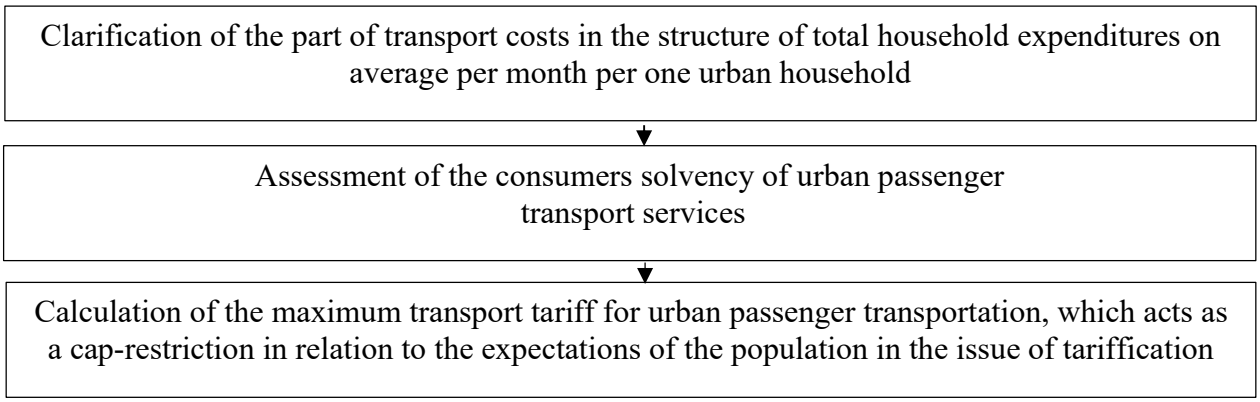


Figure 7 – Sequence for calculating the maximum rate

Taking into account the correlation between the average subsistence level, which determines the level of effective demand of the population, and the size of the transport tariff, it is advisable to calculate the maximum cost of passenger transportation using the following method (Fig. 8).

As the result, the main goal of calculating of the maximum tariff size lies both in the economic sphere, namely, the validity of the carrier's marginal level of profitability, and the social sphere – to ensure a transport tariff level that is affordable for all categories of the population.

The maximum size of the transport tariff for the public urban passenger transport system

$$T_r^{max} = \frac{\%C * P}{Q_a}, \ (UAH./pass.), \quad (3)$$

T_r^{max} – the maximum size of the tariff for passenger transportation services on public city bus routes, which are carried out in the usual mode of movement, UAH./pass.;

$\%C$ – part of transportation costs of households in the structure of their total costs, %;

P – average per capita total monthly income of one household, UAH.;

Q_a – the average number of trips by urban passenger transport.

Figure 8 – Calculation of the maximum size of the transport tariff for the public urban passenger transport system

For households that can be attributed to the group with an average and high level of average per capita equivalent income, the emphasis is shifted to considering such a factor that affects the total number of passenger traffic as ensuring the comfort of movement in urban passenger transport as an alternative to mass motorization. This criterion should be considered within the framework of the features of the system of compensation to carriers from the city government.

The system of compensation for carriers should be based on the fulfillment of a certain number of criteria that apply to market operators providing urban passenger transportation services, partially described in [8, p.23] and supplemented taking into account modern Ukrainian realities of the passenger transportation market in Fig. 9.

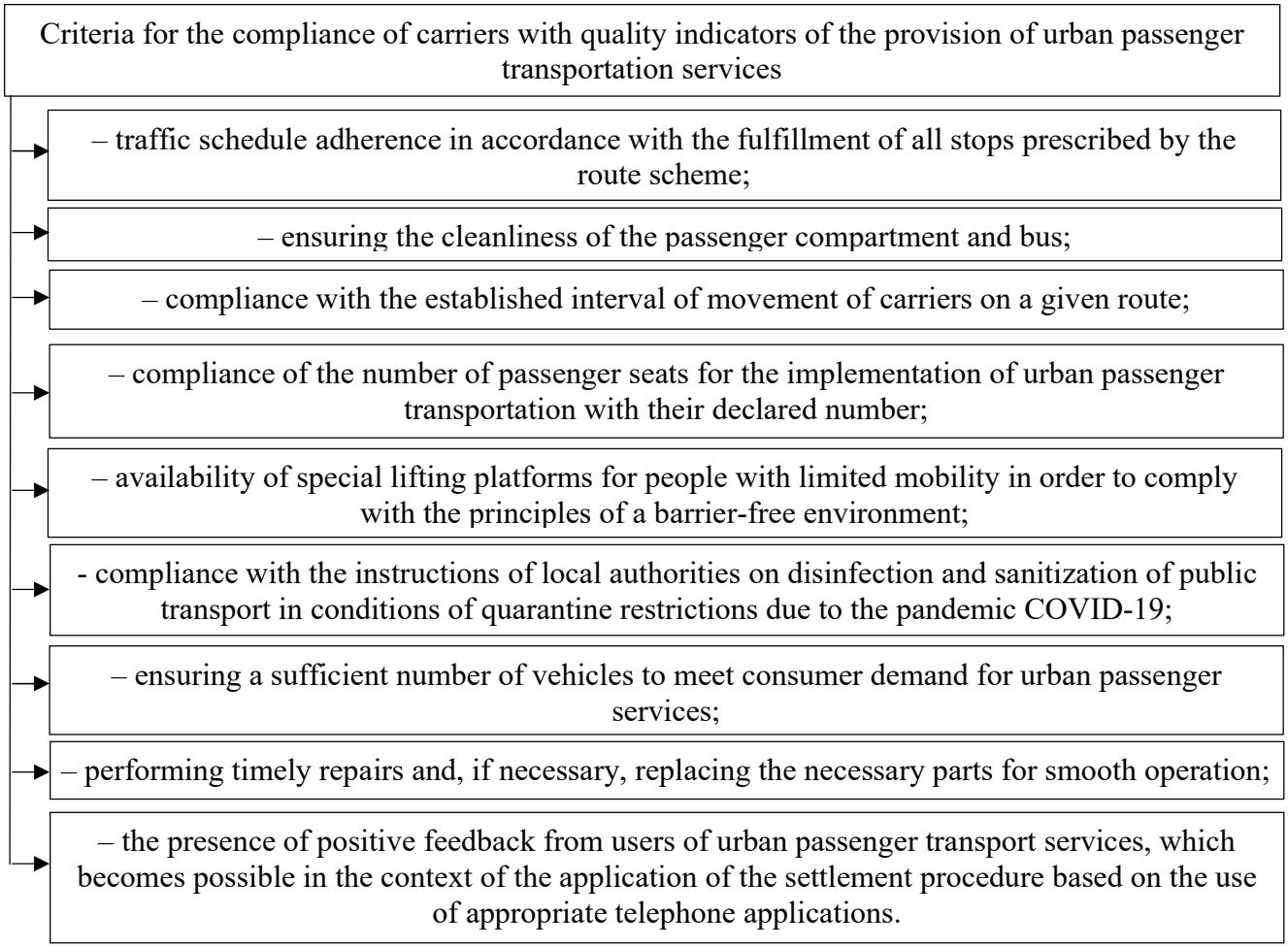


Figure 9 – Criteria for the compliance of carriers with quality indicators of the delivery of urban passenger transportation services

The conditions of the compensation policy for carriers should be based on the fulfillment of high-quality urban passenger transportation and the fulfillment of the set of requirements stated in Fig. 9. Failure to comply with the qualitative aspect entails a complex deterioration in the level of satisfaction of households with the services provided.

In matters of predictability of passenger traffic, it is necessary to deviate from the principles of annual planning stated in the Methodology for calculating tariffs for passenger road transport services, since this plan does not allow timely adjustments, which subsequently affect the cost and profit of carriers. Flexibility in

the issue of compensations, planning the constituent elements of the transport tariff will allow forecasting for a quarter or a month.

The system of compensation for carriers should take into account the risks of non-compliance of the established quality indicators with the actual assessment of the level of services provided by urban passenger transportation to consumers.

The development of relationships with the market operator in such a plane presupposes the termination of cooperation and the announcement of a competition to replace the carrier on the vacant route. In this case, compensation should be provided for only the expenditure part (cost) within the framework of the transport tariff structure. This system will create motivational incentives for carriers, as well as maintain a certain level of competition in the industry, which will have a positive effect both on the satisfaction of households with passenger transportation services and on the development of the urban transport system in accordance with international standards.

The epidemiological situation in the country in the 1st and 2nd quarters of 2020 led to the introduction of an additional criterion for the quality of services provided by carriers, namely, the need to comply with the instructions of local authorities on disinfection and sanitization of public transport in conditions of quarantine restrictions due to the COVID-19 pandemic. In the context of a change in the concept of making a profit from urban passenger transportation, compensation to carriers for services provided by the city authorities is becoming a significant advantage. The assessment of passenger traffic under quarantine restrictions was carried out on the basis of a comparison of indicators with the data for the previous reporting period and made it possible to identify the following deviations in the volume of services provided for urban passenger transportation (Fig. 10).

Analysis of the dynamics of changes in passenger traffic under quarantine restrictions for the period January-April 2020 allows stating a decrease in the volume of passenger transportation services provided both in the context of all types of transport, and, in particular, road transport.

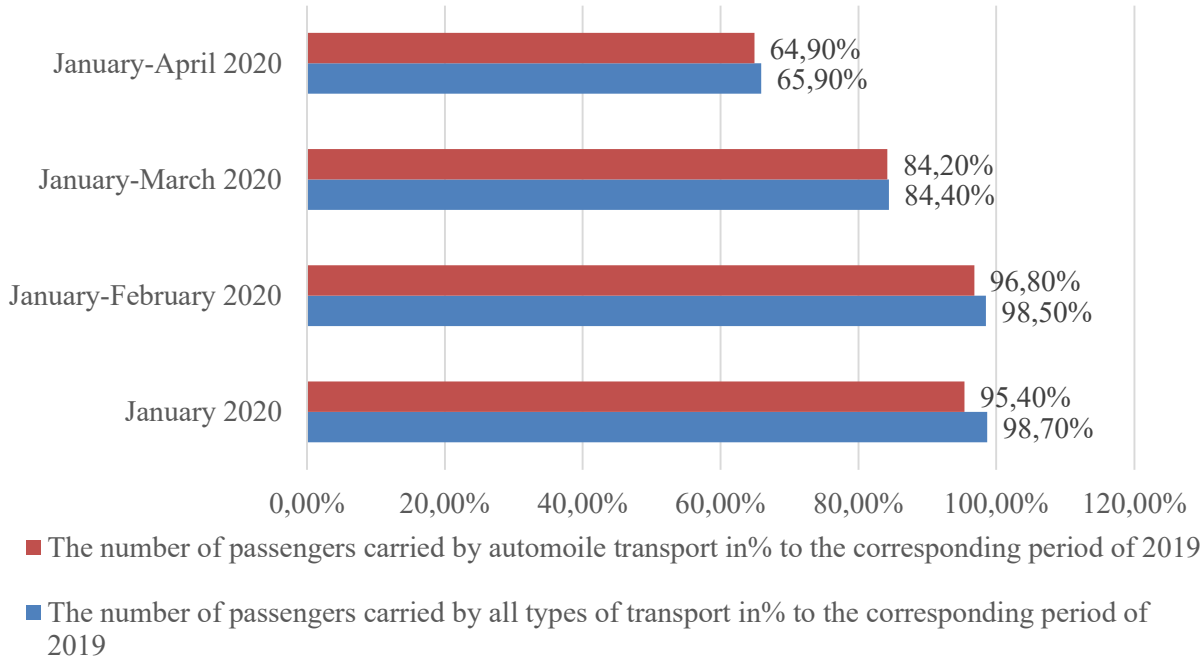


Figure 10 – Dynamics of changes in passenger traffic under quarantine restrictions for the period January-April 2020

The decrease in passenger traffic in automobile transport amounted to 35.1% in January-April 2020 compared to the same period of the last reporting period. Compensation from local authorities under contracts concluded with carriers helps to reduce the financial burden and losses of owners in the field of transport under conditions of quarantine restrictions.

Thus, when determining the income of carriers, the quality aspect of the services provided is in the first place, and not the indicator of the maximum vehicle occupancy. The system of compensation allows to ensure the financial stability of enterprises in the conditions of quarantine restrictions, supporting entrepreneurs in the urban passenger transportation sector, as well as helping to maintain competition in the industry.

The advantages of the implementation of the compensation system for carriers from the perspective of considering consumers of urban passenger transportation services are systematized (Fig. 11).

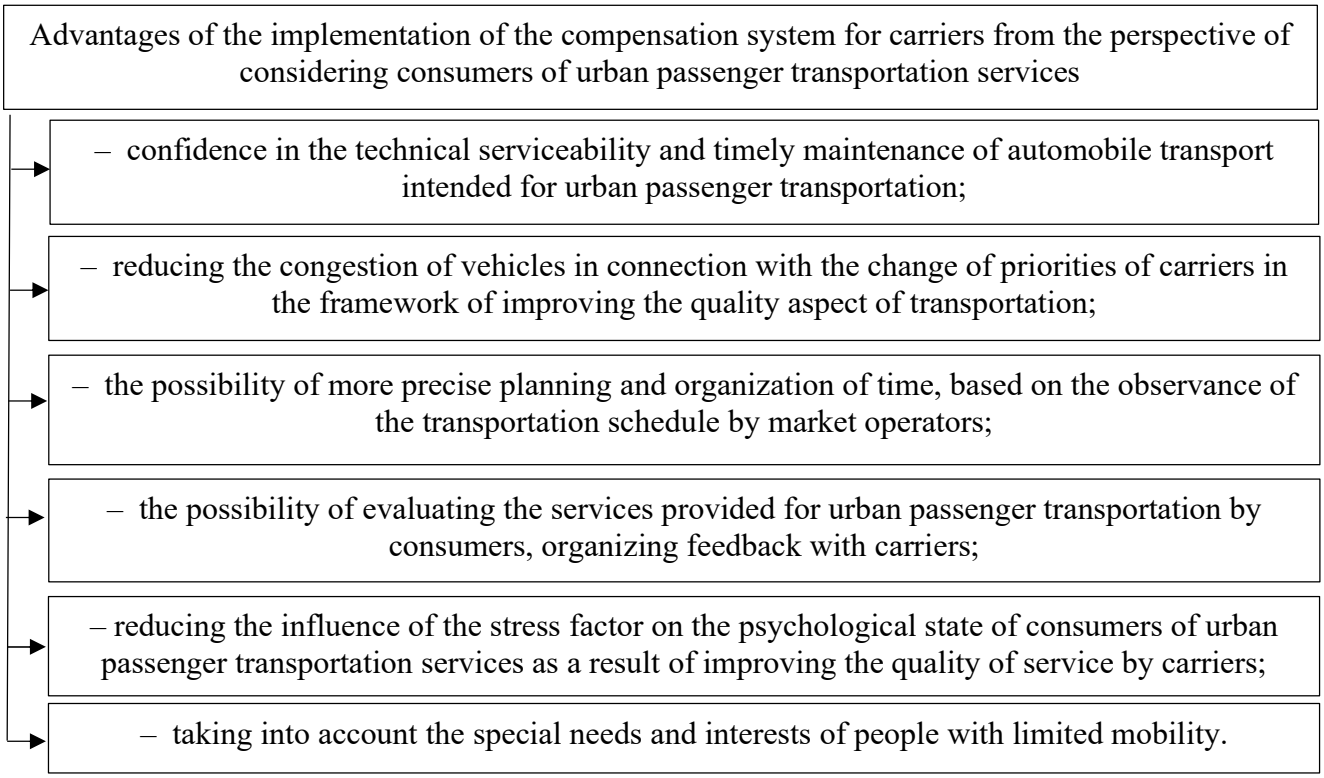


Figure 11 – Systematization of the benefits of the implementation of the compensation system for carriers from the point of view of consumers

The advantages of implementing the carrier compensation system from the perspective of local authorities are summarized in Fig. 12.

The introduction of a compensation system to carriers for the provided services of urban passenger transportation allows to bring in line with the planning indicators of income from the services provided, the needs of the population in high-quality transport services and the level of service provided by market operators.

The advantages of introducing a compensation system from the perspective of carriers that provide urban passenger transportation services are shown in Fig. 13.

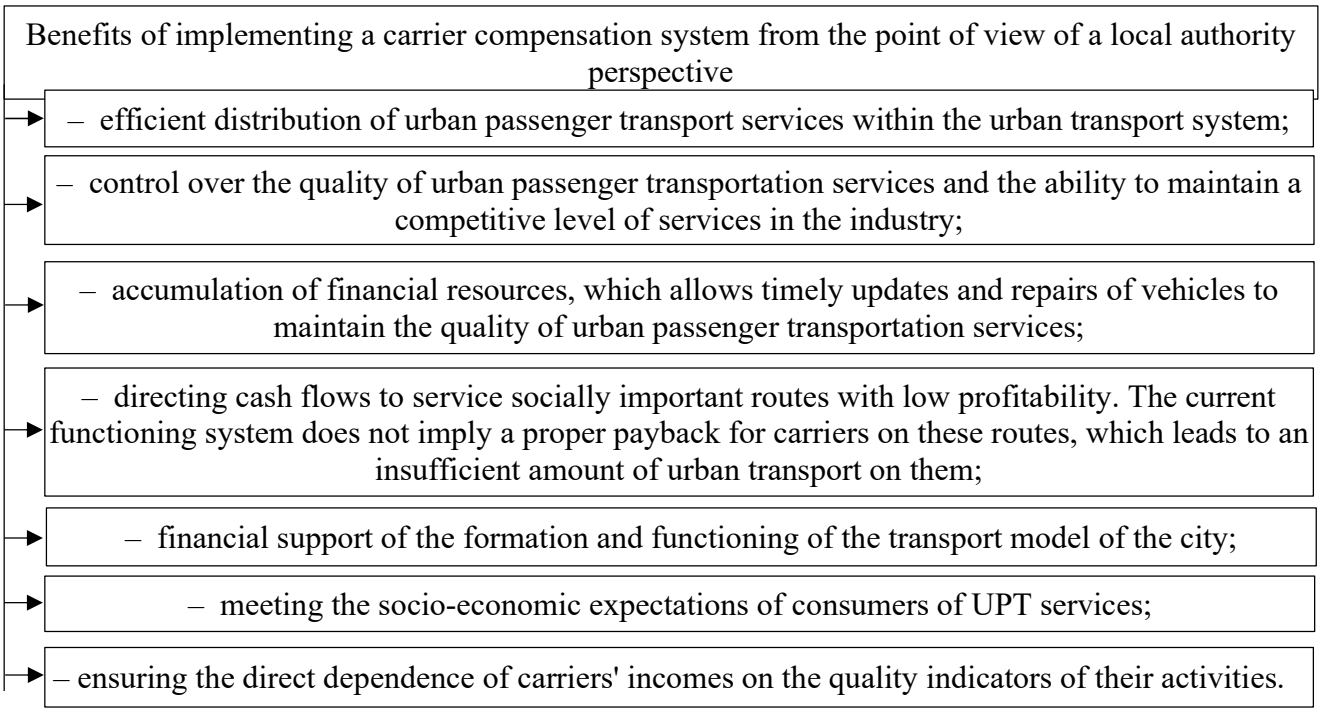


Figure 12 – Systematization of the benefits of the implementation of the compensation system for carriers from the perspective of local authorities

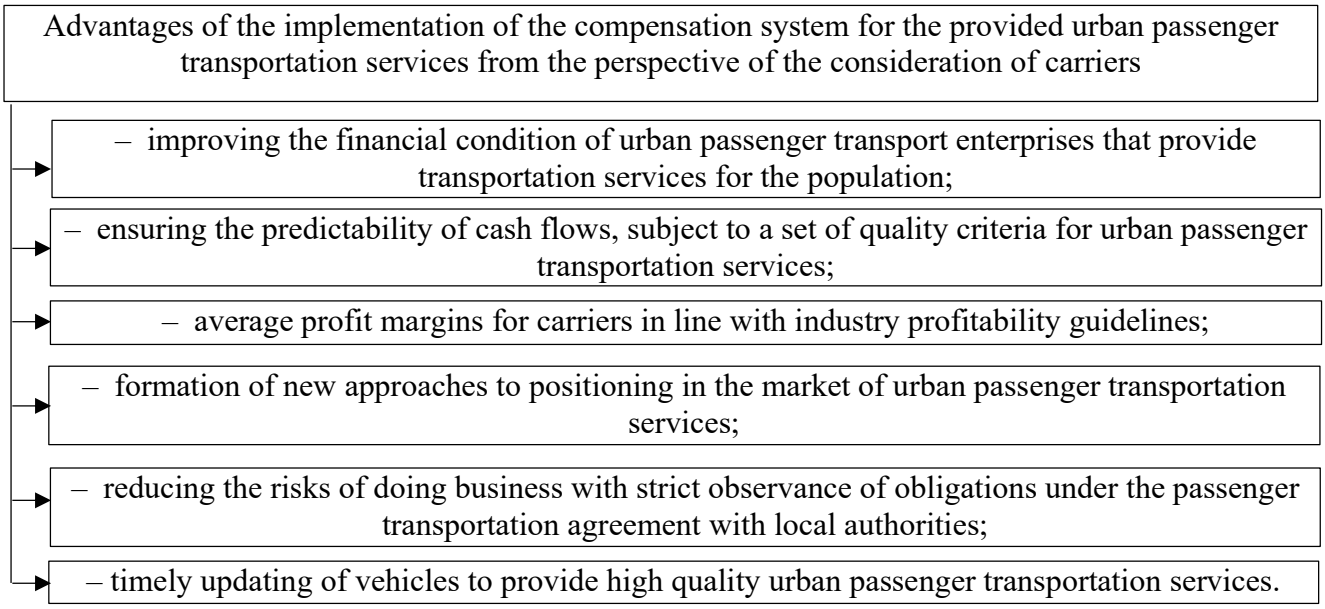


Figure 13 – Advantages of the implementation of the compensation system for the provided urban passenger transportation services from the position of market operators

In fig. 13 there are instructions on the need for market operators to adhere to the terms of the contract for providing urban passenger transportation services. The current model of interaction presupposes the existence of exclusively a system of compensation for transportation of privileged categories of the population. As part of the project for the implementation of a smart accounting system in urban passenger transport, a reallocation of financial flows is taking place, which secures the receipt of compensation payments to market operators depending on the total traffic volume.

As part of the proposed smart accounting system in urban passenger transport, the compensation system is based on the fulfillment of a number of indicators, the assessment of which is made on the basis of automated accounting of urban passenger transportation services:

a) the compliance of the number of round trips on the route declared in the contract with their actual amount;

b) the amount of expenses for the performed mileage of passenger traffic is taken into account during calculating the amount of compensation;

c) taking into account the average industry profitability of passenger transportation services when calculating compensation payments.

To create a positive perception among carriers of the new format for organizing passenger transportation and the compensation system, it is necessary to provide the possibility of indexing payments in the context of changing market conditions. The proposed model of compensation has become widespread in developed economic systems, which is named as the "Contract based on gross costs" [9, p. 4] (Fig. 14).

Today there is a concept of “covering the deficit”, which has a significant number of disadvantages in the field of urban passenger transportation services in Ukraine, that relate to:

– determination of the peculiarities of compensation for the carriage of passengers who are entitled to reduced fares;

– non-transparency of statistics about the volume of transportation of passengers who use the services of public urban passenger transport, the services of a route taxi;

– potential risks of physical injury to passengers, because the driver also performs the function of a cashier, which distracts him from driving a vehicle;

– underpayment of tax revenues to the budget due to incorrect calculation of passenger traffic and deliberate underestimation of the level of economic efficiency by carriers;

– insufficient coverage of routes with low profitability by private carriers, which negatively affects the satisfaction of transport service consumers.

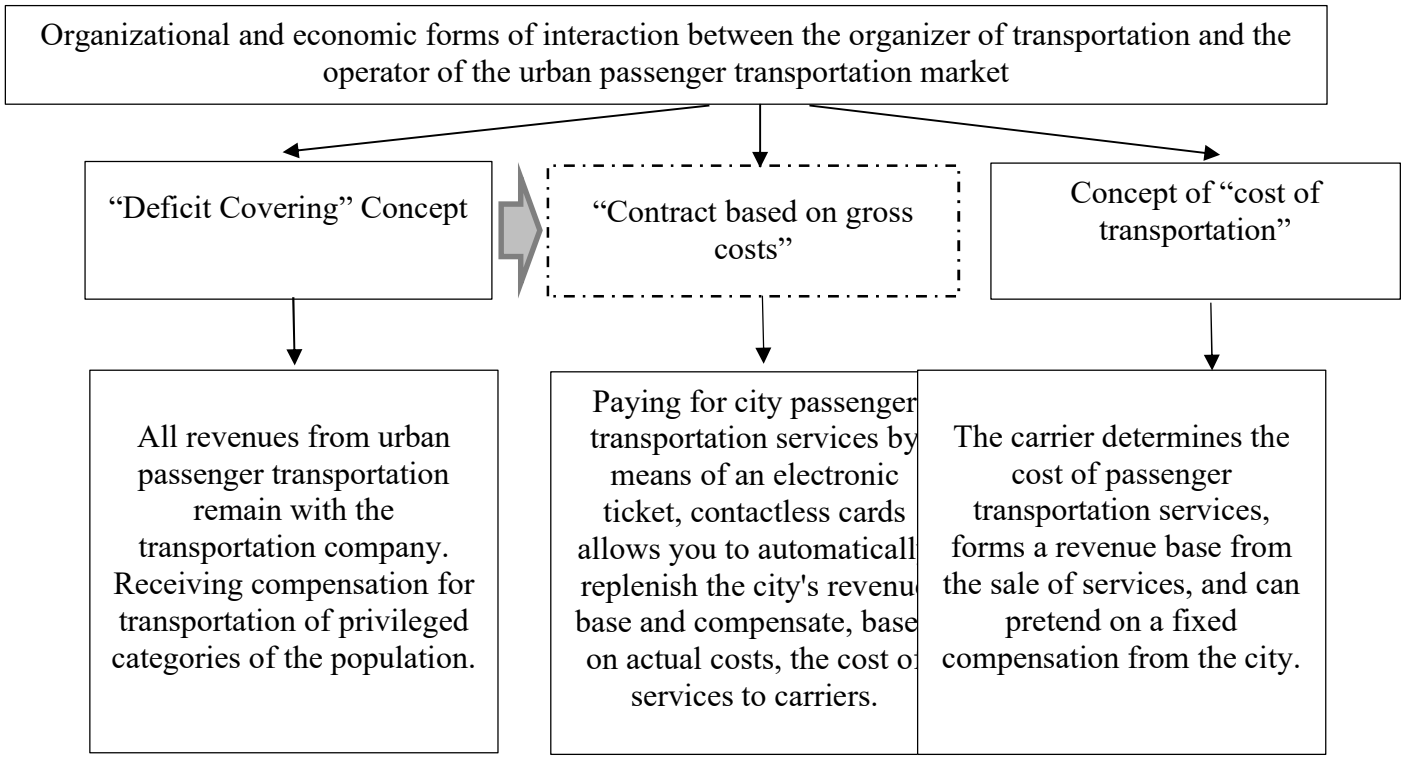


Figure 14 – Organizational and economic forms of interaction between the organizer of transportation and the operator of the urban passenger transportation market [9, p. 4]

The transition to the functioning of urban passenger transport according to the principle of “Contract based on gross costs” will create the basis for the formation of a transport model of the city, which meets the practice of developed economic systems, as well as form a flexible approach to tariffing - the establishment of "contractual prices" in the transport system.

The establishment of contractual prices may include, in addition to the proposals indicated in Fig. 5, binding tariffication to:

– the number of stops that a passenger passes by in urban passenger transport. So, in accordance with DBN B.2.2-12: 2018 “Planning and development of territories”, the distance between bus stops of public transport is 400 m in large cities [7, p.70];

– the duration of the trip and the number of transfers made under the conditions of the functioning of the city's transport model;

– the day of the week when the trip is carried out – a weekday, a day off or a public holiday;

– depending on the intersection of the designated areas of the city by the route, which implies its clear territorial zoning [1, p.22];

– the age division of consumers of urban passenger transport services.

The proposal for linking tariffication depending on the intersection of the designated areas of the city by the route, which implies its clear territorial zoning, has a number of disadvantages due to the complexity of calculating passenger traffic and their monitoring by the controllers along the route, insufficient coverage of transportation costs by revenues to the city budget within this tariff plan.

Thus, it is advisable to introduce tariffication on routes that pass along city-wide highways, depending on the duration of the trip and the number of transfers made, which implies the organization of transport hubs as an integral part of the functioning of the city's transport model.

The advantage for passengers will be the optimization of transport costs, since changing several types of transport in a limited period of time – payment will be

charged once. To clarify the features of compensation, carriers should clearly define the conditions for the provision of urban passenger transportation services and the key principles of building relationships with contractors, which are summarized in a contract between the city administration and a business entity, the main activity of which, in accordance with the type of economic activity, is 49.31 Passenger land transport, urban and commuter connection.

The main points of the agreement between the city administration and carriers are shown in Fig. 15.

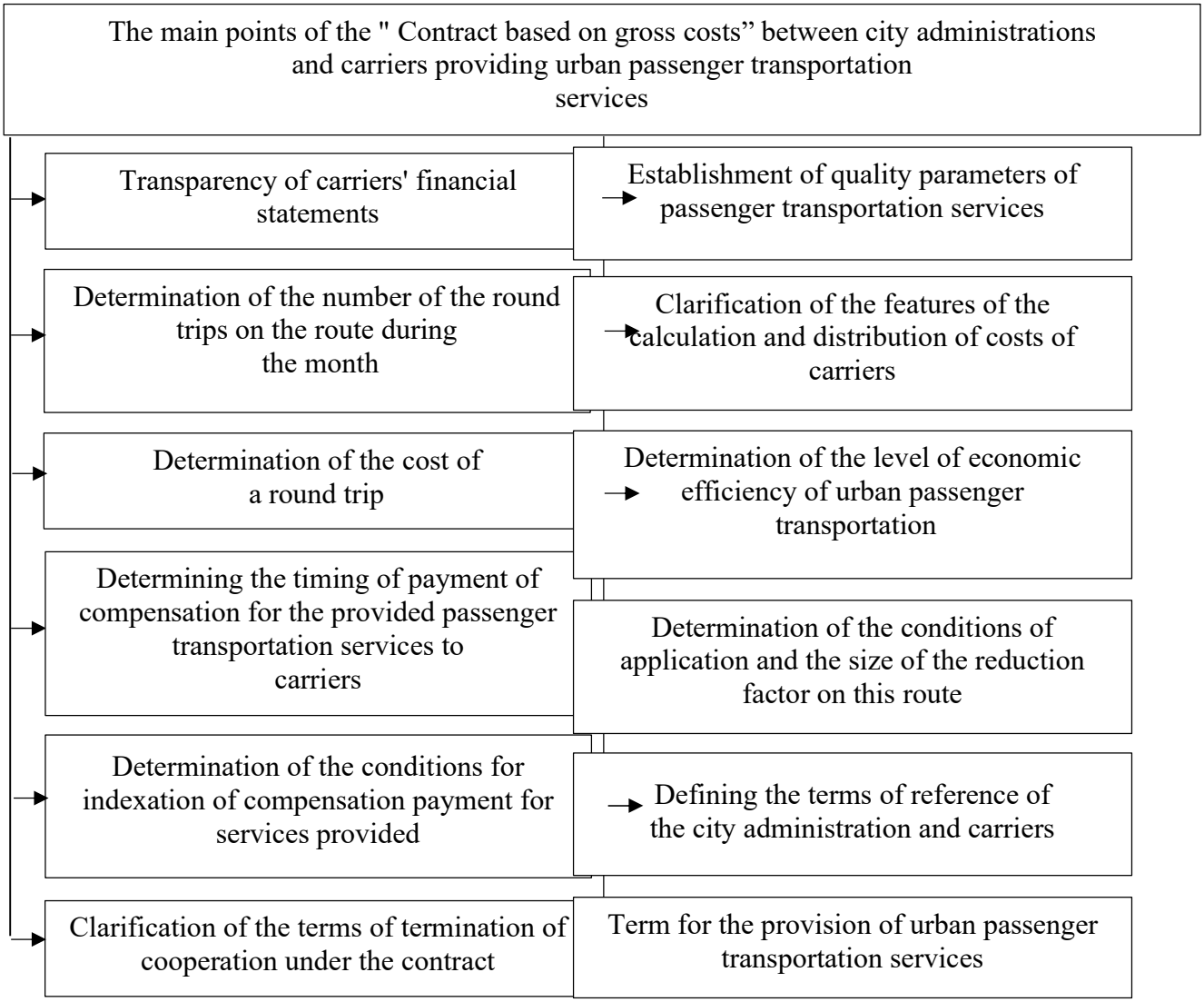


Figure15 – The main points of the " Contract based on gross costs" between city administrations and carriers providing urban passenger transportation services

To calculate the amount of compensation to carriers, as well as the cost of a round trip, it is necessary to consider in more detail the structure of their expenses, set out in the Methodology for calculating tariffs for passenger road transport services [5; 15].

Direct material costs include fuel costs for urban passenger transportation. With the transfer of a certain range of functions to the city administration and an increase in the amount of financial resources in circulation, a centralized purchase of fuel in bulk for the future is possible, which will allow fixing the cost of a round trip at a fixed level for a certain long period in this component part of it.

As part of direct labor costs for the carrier, the position of the conductor will be excluded in connection with the introduction of an electronic ticket and the transition to a non-cash form of payment. This position in the staffing table will be replaced by a controller on a specific route, whose responsibility will include monitoring the compliance of purchased tickets, depending on their type of declared duration and the final destination of the passenger's trip. In the proposed model, the city administration accumulates the total revenue, therefore it is advisable to introduce this personnel position into its subordination. Accordingly, among other direct costs, the structural element of charges for labor costs for conductors will also undergo changes.

The composition of the general production costs of the carrier in terms of the costs of making tickets for travel requires revision, since when purchasing an electronic ticket or smart card, this expense item must be taken into account by the city administration.

The structure of the distribution of costs of carriers whose main activity is related to the providing of services according to KVED – 49.31 “Passenger land transport of urban and suburban connections” can be analyzed using the example of micro-enterprises. Statistical information on large enterprises of the industry is not disclosed in the reports of the State Statistics Service of Ukraine due to the need to comply with the requirements of the Law of Ukraine "On State Statistics" on the

confidentiality of statistical information, for medium and small enterprises – data are partially published, which does not allow analyzing the dynamics of the expense item parts.

The analysis of the costs of micro-enterprises in the sphere of urban and suburban passenger transportation is summarized in Table 4. and Table 5.

The analysis of the structure of expenses of micro-enterprises in the sphere of urban and suburban passenger transportation indicates that material expenses and expenses for payment for services carried out in the course of their main activities account for the largest part of the costs of carriers. If in 2012 the share of material costs accounted for 56.01% in the total cost structure, then in 2018 – 68.1%.

Table 4 – Analysis of the cost structure of micro-enterprises in the sphere of urban and suburban passenger transportation

Carrier cost group	2012		2013		2014		2015		2016		2017		2018	
	mln. UAH	%	mln. UAH	%	mln. UAH	%	mln. UAH	%	mln. UAH	%	mln. UAH	%	mln. UAH	%
Material costs and costs of payment for services carried out in the course of the main activity	39,23	56,01%	107,87	74,84%	60,89	65,34%	79,83	72,47%	79,06	67,58%	76,70	58,14%	181,35	68,1%
Depreciation	2,8	4,00%	8,69	6,03%	5,10	5,48%	6,35	5,77%	5,80	4,96%	15,39	11,67%	18,20	6,8%
Labor costs	24,03	34,31%	19,39	13,45%	18,32	19,66%	16,16	14,67%	22,95	19,62%	23,74	18,00%	51,21	19,2%
Social spending	2,96	4,23%	7,07	4,90%	6,44	6,91%	5,82	5,28%	5,54	4,74%	5,64	4,27%	14,67	5,5%
Other expenses	1,02	1,45%	1,13	0,78%	2,44	2,62%	1,98	1,80%	3,63	3,10%	10,46	7,93%	0,97	0,4%
Total expenses for the implementation of services	70,04	100,00%	144,15	100,00%	93,19	100,00%	110,14	100,00%	116,98	100,00%	131,93	100,00%	266,40	100,0%

Table 5 – Analysis of the dynamics of micro-enterprises in the sphere of urban and suburban passenger transportation, mln. UAH

Carrier cost group	Period										
								2018/2017		2018/2012	
	2012	2013	2014	2015	2016	2017	2018	Absolute deviation, mln.UAH.	Relative deviation, %	Absolute deviation, mln.UAH.	Relative deviation, %
Material costs and costs of payment for services carried out in the course of the main activity	39,23	107,87	60,89	79,83	79,06	76,70	181,35	104,65	136,44 %	142,12	362,27 %
Depreciation	2,8	8,69	5,10	6,35	5,80	15,39	18,20	2,81	18,26 %	15,40	550,00 %
Labor costs	24,03	19,39	18,32	16,16	22,95	23,74	51,21	27,47	115,71 %	27,18	113,11 %
Social spending	2,96	7,07	6,44	5,82	5,54	5,64	14,67	9,03	160,11 %	11,71	395,61 %
Other expenses	1,02	1,13	2,44	1,98	3,63	10,46	0,97	-9,49	-90,73 %	-0,05	-4,90 %
Total expenses for the implementation of services	70,04	144,15	93,19	110,14	116,98	131,93	266,40	134,47	101,93 %	196,36	280,35 %

The main attention should be paid to direct material costs during calculating the amount of compensation by the city administration, and the possible indexing of its value.

Material and service costs incurred by carriers in the course of their core business increased by UAH 142.12 million or 4.6 times over the entire study period, which demonstrates a significant increase in the cost of materials and components used to directly ensure the implementation of passenger transportation and preparation of vehicles for operation in accordance with statement 2.6 of the Methodology for calculating tariffs for urban passenger transport services [5].

Total expenses for the implementation of urban passenger transportation services for 2012-2018 in total increased by UAH 196.36 million or 3.8 times and amounted to UAH 266.40 million at the end of the study period.

To determine the factors that need to be taken into account during the process of indexing the amount of compensation and which are key in calculating the cost of a round trip, in conditions of market uncertainty, it is relevant to apply one of the methods of economic and mathematical modeling – regression analysis.

Taking into account the factor of the change in the value of the national currency, we will analyze the influence of the Consumer Price Index, as well as examine the dynamics of the change in the cost of diesel fuel on the total amount of expenses of micro-enterprises in the sphere of urban and suburban passenger transportation. Thus, as a resultant indicator, we take the total costs of micro-enterprises in the sphere of urban and suburban passenger transportation, factors of arguments: Consumer price index and the cost of diesel fuel.

Using analytical data on the cost of diesel fuel and the Consumer Price Index, we will carry out economic and mathematical modeling of the dependence of the total costs of passenger transportation services on the selected factors, statistics for which are presented in Table. 6. To study the economic and mathematical relationship, we will consider the period from 2014, which will avoid distortion of calculations due to the fact that since 2014 data from the temporarily occupied ARC, the city of Sevastopol and part

of the occupied territories in Donetsk and Luhansk regions are not available, which significantly reduced the total costs of carriers in 2014 compared to 2013.

Table 6 – Statistical data for conducting regression analysis based on open statistical sources [3, 8]

Period	Total expenses for passenger transportation services, mln.UAH (У)	Price for 1 liter of diesel fuel, UAH (X1)	Consumer price index, % (X2)
2014	93,19	14,61	124,9
2015	110,14	17,27	143,3
2016	116,98	19,45	112,4
2017	131,93	23,78	113,7
2018	266,4	27,04	109,8

Based on formula (4), it is possible to visually express the interdependence of indicators in the economic and mathematical model:

$$Y_t = f(X_1; X_2)_t + \delta_t \quad (4)$$

In formula (4), the index t indicates the acceptance of different values by the elements of the regression model in the forecast planning periods. The δt component makes it possible to correct the result obtained for the probable error between the planned and actual values of carriers' expenses.

Regression analysis was carried out using the “Regression” function of MS Excel, the results of which are summarized in Fig. 16.

The multiple correlation coefficient takes a value of 0.86, which indicates the presence of a high correlation between the resulting factor and the factors-arguments. The R-squared value causes a 74% change in the total costs of carriers for the provision of passenger transportation services as a result of changes in the price of diesel fuel and the consumer price index.

Regression statistics						
Multiple R	0,859738121					
R-square	0,739149636					
Normalized R-square	0,478299272					
Standard error	50,54124813					
Observations	5					
Variance analysis						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	2	14476,47555	7238,237777	2,833615504	0,260850364	
Surplus	2	5108,835525	2554,417763			
Total	4	19585,31108				
	Factors	*Standard error*	*t-statistics*	*P-Value*	*Bottom 95%*	*Top 95%*
Y-intersection	-174,348746	400,892202	-0,434901814	0,706062841	-1899,248673	1550,55118
Variable X 1	12,85379443	6,76289636	1,900634543	0,197723892	-16,24460005	41,9521889
Variable X 2	0,459143567	2,441819222	0,188033399	0,868200202	-10,04715657	10,9654437

Figure 16 – Conclusion of the results of regression analysis using MS Excel

Based on the results of the correlation-regression analysis, we express the algorithm for the dependence of the factors:

$$Yt = 12.85 * X1 + 0.46 * X2 – 174.35, \quad (5)$$

where Yt – total expenses for passenger transportation services, million UAH;

X1 – price for 1 liter of diesel fuel, UAH;

X2 – Consumer Price Index,%.

Both factors are in direct proportion to the amount of carriers' expenses, but factor X1 (the cost of one liter of diesel fuel) has a greater impact, due to the value of its coefficient (12.85). When predicting the cost of a round trip and the amount of compensation for the future, the influence of this factor on the carrier's costs must be considered at first.

The economic meaning of this correlation-regression model can be presented as follows: with an increase in the cost of diesel fuel and an increase in the Consumer Price Index, the total costs of the carrier for the provision of urban passenger transportation services will increase.It is necessary to improve the compensation model in terms of quarterly revision of the amount of compensation payments in relation to these factors, which will make it possible to take this sphere of economic activity out of the zone of losses and contribute to the efficient functioning of the transport model of the city.

It is recommended to use the methods of correlation-regression analysis on an ongoing basis when planning the cost of a round trip and indexing compensation payments to carriers.

MAIN RECOMMENDATIONS

Research has shown that the perception of the introduction of a smart accounting system (e-ticket) directly depends on the overall improvement in the field of UPT. Thus, our proposals will relate both to the direction of implementation of the smart accounting system and to general issues in the field of UPT, which have an indirect impact on the implementation of the smart accounting system.

To reduce the risk of public rejection:

- one of the negative factors is its load during rush hour. In order to unload public transport, we propose to use different fares, for example, from 8-9: 30 and 18-19: 30 there is an increased fare (there is no discounted fare for retirees);
- together with the cards to offer the population shielding protective plates, on which advertising images can be applied for their full payback;
- Introduce greater use of the smart accounting system by connecting additional services that can be paid for with money on the balance sheet. First of all, it should be introduced in school canteens: firstly, parents will be able to control what their child buys, and secondly, it will avoid cases of bullying related to extortion;
- use the smart accounting system as a targeted assistance tool, for example, under the programs "Affordable Medicines", "Monthly state support for the purchase of bakery products" and other city and national programs;
- connection with the application "Action" will provide even more opportunities due to the number of users of the application, its growing popularity, ease of use.

To reduce the risk of rejection by taxi owners. The study found that this is the "most difficult" category of smart accounting stakeholders: any

implementation of an integrated continuous accounting system with a high share of non-cash payments removes the conditions for the existence of current colossal corruption in the system and, consequently, meets enormous sabotage. This confirms the experience of introducing an electronic ticket in Khmelnytsky, where terminals are broken, they forget to bring them to the line and so on. The only tool to overcome this resistance is to show that the system will now work just like that - with strict accounting of both passengers, flights and cash flows. The second tool is the financial support of minibus owners on special terms to upgrade the fleet of vehicles, because this type of transport is the oldest in its total mass and technically unsuitable.

When using the subvention for compensation for concessional travel of certain categories of citizens, an effective mechanism will offer the Executive Committee of the Odessa City Council to strengthen the capacity of the Department of Transport of the Odessa City Council, the Department of Social Protection and Labor of the Odessa City Council and the Finance Department of the Odessa City Council. provision of services by carriers to privileged categories of passengers by making the necessary changes to their own regulations.

To management of a transport complex of the city of the Odessa city council to offer:

- to introduce an automated control system of the city transport complex with the use of modern technologies and ensuring proper remote control over the operation of each unit of urban passenger transport;
- to ensure the timely holding of tenders for the maintenance of urban routes, as well as the current control over the compliance of carriers with the conditions of the tender in the process of working on urban routes;
- to include in the composition of the tender commission to determine the enterprises-carriers of representatives of the bodies of self-organization of

the population and public organizations working in the field of consumer protection.

- to ensure early informing of members of territorial communities of the city of Odessa about competitions on definition of the enterprises-carriers and free access to meeting of the competitive commission of representatives of bodies of self-organization of the population and the public organizations working in the field of consumer protection;
- to introduce special, stationary marking of vehicles used for transportation of privileged categories of passengers;
- to ensure proper control with the involvement of members of the public (public organizations and bodies of self-organization of the population) over the enterprises-carriers in terms of their compliance with the conditions under which they were recognized as winners of tenders for urban routes. In case of detection of such violations, to terminate the relevant contracts for the maintenance of city routes ahead of time, as well as to initiate the deprivation of violators of licenses for the provision of services for domestic transportation of passengers by buses.

To propose to the Department of Transport Complex of the City of Odessa City Council together with the Department of Social Protection of the Population and Labor of the Odessa City Council and the Department of Finance of the Odessa City Council:

- to ensure the payment of compensation for the transported beneficiaries to all carriers in proportion to the volume of services provided by them;
- to ensure constant control (including with the involvement of members of the public) over the enterprises-carriers, which carry out transportation of privileged categories of citizens, in order to avoid cases of falsification of the indicators of actually transported number of passengers.

To propose to the Department of Transport Complex of the City of Odessa City Council together with the Department of Information of the Odessa City Council and the editorial office of the newspaper of the Odessa City Council "Odessa Herald":

- to ensure proper informing of members of the territorial community of the city of Odessa through the official website of the city, as well as through the newspaper "Odessa Herald" about the schedule of public transport, which provides transportation of privileged categories of citizens;
- to carry out explanatory work among the population of the city about the mandatory need to obtain tickets from conductors and drivers of passenger transport when paying for travel in order to ensure the receipt of additional funds to the budget.

To offer to Management of a transport complex of the city of the Odessa city council and the Municipal enterprise "Odesmiskelektrotrans":

- to ensure the production and placement at all bus stops signs with information about the exact time of departure from each stop of each unit of public transport, which transports privileged categories of citizens, and the current telephone number of the dispatch service of the Department of Transport Complex of Odessa City Council.
- increase the number of controllers in order to ensure proper control over the receipt of funds in the budget for travel received from passengers by conductors and drivers of urban passenger transport.

The priority task of local authorities should be to remove financial responsibility for social measures of the state from business entities by monetizing transport benefits directly from the budget. Limited financial resources of local budgets do not allow to transport all "beneficiaries" who are granted this right, so the number of beneficiaries should be reduced to a minimum of the poorest and most vulnerable. Significant unevenness of the

number of preferential transportation in the regions of Ukraine shows that the declared reform of the social protection system, which provides for the monetization of benefits, can not be carried out solely from local budgets.

CONCLUSIONS

There are significant problems in the organization of the transport system of the city of Odesa, as well as in most cities of Ukraine. Their solution is carried out gradually. At the same time, it is worth taking into account the international experience in solving passenger transport problems. The solution of the issues revealed in the research is possible with the introduction of a single dispatching service of the common form of management.

Considering the tariff systems and compensation policy in public transport of foreign countries, we can see a bright contrast with the Ukrainian system, which has long become obsolete and does not meet the needs of citizens.

It is advisable to allow the possibility of increasing the fare in Odesa to 10-12 UAH. for a single ticket. This would be a kind of extra fee in the system, which would encourage not one-time, but frequent trips. However, a network of tariff plans should be developed that would allow locals and tourists to save, actively use public transport and have much lower actual travel costs. Such decisions will satisfy both the carrier and passengers.

Requirements for the professional level of specialists must be uniform for employees of enterprises of all forms of ownership and meet the requirements of state regulations.

The level of training of managers, specialists and drivers of transport companies should become one of the factors that are taken into account when conducting competitions for the right to work on city bus routes.

The conducted research and the obtained results made it possible to formulate conclusions of theoretical and practical nature, reflecting the solution of the tasks of the work, in accordance with the defined goal.

1. It is established that the transport of a "smart" city is based on technological innovations in the transport system, which provide for the integration of operational management of all modes of transport and the ability to respond to events in real time. The practice of world transport operators shows that in the presence of an automated fare payment system, it is possible to increase revenue collection by one and a half to two times only due to a properly compiled timetable.

The main risks in the implementation of an automated accounting system are the risks of cybersystems, information risks, financial risks.

Thus, the theoretical and methodological approaches to the disclosure of the essence and basic provisions for: 1) the concept of "smart" city, 2) risk management of smart metering in urban public passenger transport and 3) the introduction of a single integrated intelligent transport system.

2. An analytical study of the transport industry of Ukraine and an analysis of the segment of public urban passenger transport. It should be noted that compared to the European transport system, Ukraine looks the opposite. In particular, in contrast to the European one, where road transport dominates, the domestic transport system is characterized by an expanded share of railways in the overall structure of freight turnover and a smaller role of other modes of transport. It should be noted that the structure of transportation in Ukraine is optimal in terms of European approaches, but the formation and innovative development of the transport industry depends on the introduction of new technologies in industry and, in fact, is an industrial process where Ukraine lags far behind developed countries. . Transport in the world is becoming a high-tech, science-intensive and multifunctional process. Today, modern global logistics includes elements of production, distribution and service activities. The key problem of road transport is the extremely low energy efficiency of vehicles, which is due to the high degree of physical wear and obsolescence of vehicles,

insufficient rate of renewal of the fleet, which leads to inconsistency of technical and technological level with modern requirements for energy efficiency and environmental friendliness. 30% increase in fuel consumption and financial resources for their maintenance, low level of comfort, quality and safety of transport services.

Thus, the tools for assessing and managing the realization of the potential of the route system of the modern city have been improved, which, unlike the existing ones, takes into account (1) the increase of urban territory and the requirements of constant increase of speed and comfort and (3) a unified methodological approach to the introduction of the electronic ticket.

3. The study showed that the most effective direction for the development of urban transport systems is the development and implementation of urban programs Smart City. In addition, it is proposed to improve the risk management of the introduction of a smart metering system in public urban passenger transport. As a result of the study, a methodological toolkit for identifying and classifying types of risks from the Smart City case was developed, according to which it is proposed to identify 5 types of risks of implementing a smart metering system in public passenger transport.

Thus, the prospect of implementing the electronic service "Electronic Ticket" is considered. We offer a single ticket for all types of public transport based on a contactless electronic plastic card. The purpose of this innovation is to simplify and make more transparent payment for travel in buses, minibuses, trolleybuses, trams and subways.

The result of the study is a substantiation of the modern conceptual scheme (model) of risk management of the smart accounting system in public urban passenger transport, based on detection, assessment and monitoring, as well as measures to reduce the risk of risks, which includes selected stages, with appropriate actions that are appropriate for each of these stages

The search for vectors for the realization of the potential for intellectualization of the urban passenger transport management system on the basis of targeted management is the direction of further scientific and practical research in the direction of this study.

The second volume of the monograph will be devoted to improving measures for interaction with stakeholders of the smart metering system in urban passenger transport.

REFERENCES

1. Bohachenko M. V. The theoretical aspects of tariff policy formation of public passenger transport. Uzhorod National University Herald. 2018. № 19, part 1. P. 19-22.

2. Bozhkova V., Ptashchenko O., Saher L., Syhyda L. Transformation of marketing communications tools in the context of globalization. Marketing and management of innovations. 2018. P. 73-82.

3. Sotnyk I., Hulak D., Yakushev O., Yakusheva O., Prokopenko O., Yevdokymov A. Development of the US electric car market: Macroeconomic determinants and forecasts. Polityka Energetyczna. 2020. № 23(3). P. 147-164.

4. Prokopenko O., Miśkiewicz R. Perception of "green shipping" in the contemporary conditions Entrepreneurship and Sustainability Issues. 2020. № 8(2). P. 269-284.

5. Methods of calculating tariffs for passenger road transport services: Order of the Ministry of Transport and Communications of Ukraine from 17.11.2009 № 1175. Available at: https://zakon.rada.gov.ua/laws/show/z1146-09

6. State Statistics Service of Ukraine URL: http://www.ukrstat.gov.ua/

7. Aksenov I.M. Passenger traffic marketing. Textbook. K.: Osnova, 2016. 212 p.

8. Sustainable Urban Transportation System: An Overview. Published by: United Nations Economic and Social Commission for Asia and the Pacific and CITYNET. 2012. 45 p. Available at: https://www.uncclearn.org/sites/default/files/inventory/unescap20_0.pdf

9. Novikova A.M., Yashchenko T.M., Kovalchuk N.M., Leonov M.A. Financing of public passenger transport services is an equation to the European

level of quality. Research and production magazine "Road Truck of Ukraine". 2018. № 2 (254). 2- 6.

10. DBN B.2.2-12: 2019 "Planning and development of territories": Order of the Ministry of Development of Communities and Territories of Ukraine from 26.04.2019 №104 Available at: http://dipromisto.gov.ua/files/NMD/B2212-IBprint.pdf

11. MinfinMedia URL: https://minfin.com.ua/

12. Bashynska I. Smart-innovations in the urban passenger transport in the context of smart-city concept Economy. Finances. Law. 2017. № 11/2. P. 4-6

13. Bashynska I., Levinska L. The theoretical substantiation of the economic essence of the category "risk". Economy. Finances. Law. 2017. № 10/1'2017. P. 66-68.

14. Bashynska I. Improving the Tariff Policy of Urban Passenger Transport Based on International Experience. TEM Journal. 2020. № 9(4). P. 1588-1596. DOI: 10.18421/TEM94-34

15. Bashynska I., Biskup V., Kuz'kin O., Hryzovska L., Shapoval G. Improving Management Decisions in Urban Passenger Transport Based on the Sociological Study. International Journal of Industrial Engineering & Production Research. 2020. № 31 (4). P. 491-498. DOI: 10.22068/ijiepr.31.4.491.

16. Bashynska, I., Kovalova, O., Malovichko, O., Shirobokova, O. Risk Management of Innovative Socially Significant Projects (On the Example of Urban Passenger Transport). International Journal of Advanced Research in Engineering and Technology. 2020. № 11(4). P. 294-305 DOI: 10.34218/IJARET.11.4.2020.026

17. Bashynska I., Filippov V. Smart system of urban passenger transport as a component of Smart City: monograph, Kharkiv: Disa Plus Publishing House, 2018. 220 p.

18. Bashynska I., Dyskina A. The overview-analytical document of the international experience of building smart city. Business: Theory and Practice. 2018. № 19. pp. 228–241 DOI: 10.3846/btp.2018.23

19. Dyskina A. System technology as an element of smart innovation in the context of the smart city concept. Economic Journal of Odessa Polytechnic University. 2017. № 2 (2). P. 70-76.

20. Dyskina A. World achievements in the field of smart innovation. Econom. magazine. Odessa. Polytechnic un-tu. 2018. № 1 (3). P. 19–31.

21. Australian/New Zealand Standard «Risk management» on 21 July 2004 and on behalf of the Council of Standards New Zealand on 20 August 2004. Available at: https://www.ucop.edu/enterprise-riskmanagement/_files/as_stdrds4360_2004.pdf.

22. Aven T. Implications of black swans to the foundations and practice of risk assessment and management. Reliability Engineering and System Safety. 134 (2015). P. 83-91

23. Aven T., Flage R. How the definition of security risk can be made compatible with safety definitions. Proc IMechE Part O: J Risk and Reliability. 2017. 231(3). P. 286-294.

24. Bashynska I., Filyppova S. Risk Management. Lecture course: textbook. Kharkiv: publishing house "Disa Plus", 2017. 101 p.

25. Bashynska I., Filyppova S. Risk Management. Practical lessons & Case Study: textbook. Kharkiv: “Disa Plus”, 2018. 220 p.

26. Bashynska I. Smart-innovations in the urban passenger transport in the context of smart-city concept. Economy. Finances. Law. 2017. № 11/2. P. 4-6.

27. Bashynska I., Baldzhy M., Ivanchenkova L., Skliar L., Nikoliuk O., Tkachuk G., Game Risk Management Methods for Investment Portfolio

Optimization, International Journal of Recent Technology and Engineering, Volume-8 Issue-2, 2019, P. 3940-3943 DOI: 10.35940/ijrte.B1729.078219

28. Bashynska I., Levinska L. The theoretical substantiation of the economic essence of the category "risk". Economy. Finances. Law. 2017. № 10/1'2017. P. 66-68

29. Bashynska I., Poleshchuk A., Motova A. Udoskonalennia systemy upravlinnia ryzykamy na pidpryiemstvi (Improvement of the risk management system at the enterprise). Scientific journal "Black Sea Economic Studies". 2017. Issue 7. P. 91-94

30. Bashynska I., Sokhatska O., Stepanova T., Malanchuk M., Rybianets S., O. Sobol, Modelling the risks of international trade contracts, International Journal of Innovative Technology and Exploring Engineering, Volume-8 Issue-11, Sep. 2019, P. 2815-2820 DOI: 10.35940/ijitee.K2313.0981119

31. Bashynska I.O. Using the method of expert evaluation in economic calculations. Actual Problems in Economics. 2015. № 7 (169). P. 408-412.

32. Bashynska Iryna, Filippov Volodymyr, Novak Nadiia, Smart Solutions: Protection NFC Cards with Shielding Plates, International Journal of Civil Engineering and Technology. 9(11). 2018. P. 1063-1071.

33. Bashynska Iryna, Malanchuk Marina, Zhuravel Olena, Olinichenko Kateryna, Smart Solutions: Risk Management of Crypto-Assets and Blockchain Technology, International Journal of Civil Engineering and Technology. 10(2). 2019. P. 1121–1131.

34. Bjerga Torbjørn, Aven Terje, Zio Enrico. Uncertainty treatment in risk analysis of complex systems: The cases of STAMP and FRAM. Reliability Engineering and System Safety. 156 (2016). P. 203-209.

35. Car`s consumer behavior, 2015. Available at: www.bcgperspectives.com.

36. Cities economy general urban governance IESE. Cities in Motion Index 2017. Available at: http://blog.iese.edu/cities-challenges-and-management/2017/05/25/164/.

37. City Prosperity Initiative – UN-Habitat. – 2017. Available at: https://unhabitat.org/urban-initiatives/initiatives-programmes/city-prosperity-initiative/.

38. CityDashboard. Available at:http://citydashboard.org/about.php

39. Communications Security Establishment Canada. Royal Canadian Mounted Police. Harmonized threat and risk assessment methodology. Available at: https://www.cse-cst.gc.ca/en/system/files/pdf_documents/tra-emr-1-e.pdf

40. Cox L.A. (2008) Some limitations of 'risk = threat 3 vulnerability 3 consequence' for risk analysis of terrorist attacks. Risk Anal 2008; 28: 1749–1761.

41. Dyskina, A.A., Fedorchuk, O.M., Protosvitska O.I. (2019). The use of information and communication technologies in the context of building a competitive infrastructure of a smart city. Naukovyi visnyk Khersonskoho derzhavnoho universytetu. Ser.: Ekonomichni nauky, 33, 93-96 http://ej.kherson.ua/journal/ economic_33/20.pdf

42. European Smart Cities 2017. Available at:http://www.smart-cities.eu/ranking.html.

43. Filippov V. Normative-legal bases of regulation of the system of city passenger transport and possibilities of its innovative development. Naukovyi visnyk Khersonskoho derzhavnoho universytetu. Ser.: Ekonomichni nauky. 2018. № 29 (2), P. 36-39 Available at: http://ej.journal.kspu.edu/index.php/ej/article/view/205

44. Filyppova S., Bashynska I., Kholod B., Prodanova L., Ivanchenkova L., Ivanchenkov V., Risk management through systematization: Risk Management Culture, International Journal of Recent Technology and

Engineering. 2019. Volume-8 Issue-3, P. 6047-6052 DOI: 10.35940/ijrte.C5601.098319

45. Goldenberg, S. Masdar's zero-carbon dream could become world's first green ghost town. – The Guardian, 2016. February 16. Available at: https://theguardian.com/environment/2016/feb/16/masdars-zero-carbon-dream-could-become-worlds first-green-ghost-town.

46. Grants - Calls for proposals in the field of Transport. The European Commission – 2016. Available at: http: //ec.europa.eu/transport/facts-fundings/grants_en.

47. Greenfield A. Against the Smart City. Available at: http://www.academia.edu/6732875/Emerging_Markets_and_8Digital_Economy_Building_Trust_in_the_Virtual_World_032.

48. Hollnagel E. (2012) FRAM: The functional resonance analysis method: modelling complex socio-technical systems. Farnham: Ashgate Publishing Ltd; 2012.

49. Kovalova O., Bashynska I. Plan and scheme of measures to reduce the negative perception of innovations by carriers and the population (divided into groups). Strategies for sustainable socio-economic development and mechanisms their implementation in the global dimension : Monograph. Sofia: VUZF Publishing House "St. Grigorii Bogoslov", 2019. Vol. 2. P. 245-256.

50. Landoll D.J. Security risk assessment handbook: a complete guide for performing security risk assessments. 2nd ed. Boca Raton, FL: CRC Press, 2011.

51. Leveson N. Engineering as aferworld: systems thinking applied to safety. Cambridge: TheMITPress; 2011.

52. Leveson N.G., Dulac N., Barrett B., Carroll J.,Cutcher-Gershenfeld J., Friedenthal S. Risk Analysis of NASA Independent Technical Authority. Cambridge, MA:MIT; 2005.

53. Litman, T. Smart Transportation Economic Stimulation. – Victoria Transport Policy Institute, 2009. Available at: http://www.vtpi.org/econ_stim.pdf.

54. Mapping Smart Cities in the EU [Study]. – European Union: European Parliament, 2014. URL: Available at: http://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/507480/IPOLITRE_ET(2014)507480_EN.pdf.

55. Masse T, O'Neil S and Rollins J. The Department of homeland security's risk assessment methodology: evolution, issues, and options for congress. Washington, DC: Congressional Research Service, Available at: http://www.dtic.mil/dtic/tr/fulltext/u2/a462494.pdf

56. Routes to prosperity: how smart transport infrastructure can help cities to thrive. – Ernst & Young, 2015. Available at: http://www.ey.com/Publication/ vwLUAssets/EY-routes-to-prosperity-via-smart-transport/$FILE/ EY-routes-to-prosperity-via-smart-transport.pdf.

57. Smart cities: Ranking of European medium-sized cities. – Vienna: Vienna University of Technology, 2007. Available at: http://www.smart-cities.eu/download/smart_cities_final_report.pdf, https://smartundp.wordpress.com/2012/01/20/smart-city.

58. Smart Communities Guidebook: How California's Communities Can Thrive in the Digital Age. – San Diego: State University of San Diego, 1997.

59. Smart Metering deployment in the European Union. Available at: http://ses.jrc.ec.europa.eu/smart-metering-deployment-european-union

60. Smarter Cities: Public Safety in the Digital Age. – IBM. Available at: https://www.govloop.com/blogs/4001-5000/4144-Public_Safety_Digital_Age.pdf.

61. Sustainable Urban Transportation System: An Overview. Published by: United Nations Economic and Social Commission for Asia and the Pacific

and CITYNET. 2012. 45 p. Available at: https://www.uncclearn.org/sites/default/files/inventory/unescap20_0.pdf

62. Taleb N. N. The blackswan: the impact of the highly improbable. London: Penguin; 2007.

63. The winners of the 2016 World Smart City Awards. Available at:http://www.smartcityexpo.com/ru/cfa-finalists.

64. Top 5 smartest Smart Cities in the world. 2017. Available at: http://www.cbronline.com/news/internetof-things/smart-cities/top-5-smartest-smart cities.

65. Washington Economic Development Commission Strategy 2009.

66. World Economic Forum. Global ompetitiveness Index, 2010-2012; 2013.

67. Zadorozhko, G. & Nikolaev, Yu. & Barabash, O. & Goncharenko O.. Problems and prospects for the implementation and development of smart accounting system at municipal transport. Marketynh i menedzhment innovatsii. 2018. № 3. P. 208-215. DOI: 10.21272/mmi.2018.3-18

68. Filippov V., Dyskina A., Malin O. Plan and scheme of measures to improve tariff and compensation policies to reduce the risk of confrontation by route taxi owners. Strategies for sustainable socio-economic development and mechanisms their implementation in the global dimension : Monograph. Sofia: VUZF Publishing House “St. Grigorii Bogoslov”, 2019. Vol. 3. P. 226-234.

69. Filippov V. Improvement of tariff and compensation policy of smart metering system in urban passenger transport. Tendenze attuali della moderna ricerca scientifica : zu den materialien der internationalen wissenschaftlich-praktischen konferenz. 5 juni, 2020, Stuttgart, Deutschland. B. 1. P. 19-20. DOI: 10.36074/05.06.2020.v1.05

70. Padrón Nápoles VM, Gachet Páez D, Esteban Penelas JL, García Pérez O, García Santacruz MJ, Martín de Pablos F. Smart Bus Stops as Interconnected

Public Spaces for Increasing Social Inclusiveness and Quality of Life of Elder Users. Smart Cities, 2020. 3(2). P. 430-443. DOI: 10.3390/smartcities3020023

71. IVU.validator at evm Verkehrs GmbH. Available at: https://news.cision.com/ivu-traffic-technologies/i/ivu-validator-at-evm-verkehrs-gmbh,c1602589

72. Bashynska I., Kuz'kin O., Biskup V. and Shapoval G. Conducting a Sociological Survey to Improve Tariff Policy in Urban Passenger Transport, International Journal of Management, № 11(7). 2020. P. 111-128.

73. Bohachenko M. V. The theoretical aspects of tariff policy formation of public passenger transport. Uzhorod National University Herald. 2018. № 19, part 1. P. 19-22.

74. Bozhkova V., Ptashchenko O., Saher L., Syhyda L. Transformation of marketing communications tools in the context of globalization. Marketing and management of innovations. 2018. P. 73-82.

75. Sotnyk I., Hulak D., Yakushev O., Yakusheva O., Prokopenko O., Yevdokymov A. Development of the US electric car market: Macroeconomic determinants and forecasts. Polityka Energetyczna. 2020. № 23(3). P. 147-164.

76. Prokopenko O., Miśkiewicz R. Perception of "green shipping" in the contemporary conditions Entrepreneurship and Sustainability Issues. 2020. № 8(2). P. 269-284.

77. Methods of calculating tariffs for passenger road transport services: Order of the Ministry of Transport and Communications of Ukraine from 17.11.2009 № 1175. Available at: https://zakon.rada.gov.ua/laws/show/z1146-09

78. State Statistics Service of Ukraine URL: http://www.ukrstat.gov.ua/

79. Aksenov I.M. Passenger traffic marketing. Textbook. K.: Osnova, 2016. 212 p.

80. Sustainable Urban Transportation System: An Overview. Published by: United Nations Economic and Social Commission for Asia and the Pacific and CITYNET. 2012. 45 p. Available at: https://www.uncclearn.org/sites/default/files/inventory/unescap20_0.pdf

81. Novikova A.M., Yashchenko T.M., Kovalchuk N.M., Leonov M.A. Financing of public passenger transport services is an equation to the European level of quality. Research and production magazine "Road Truck of Ukraine". 2018. № 2 (254). 2- 6.

82. DBN B.2.2-12: 2019 "Planning and development of territories": Order of the Ministry of Development of Communities and Territories of Ukraine from 26.04.2019 №104 Available at: http://dipromisto.gov.ua/files/NMD/B2212-IBprint.pdf

83. MinfinMedia URL: https://minfin.com.ua/

84. Bashynska I. Smart-innovations in the urban passenger transport in the context of smart-city concept Economy. Finances. Law. 2017. № 11/2. P. 4-6

85. Bashynska I., Levinska L. The theoretical substantiation of the economic essence of the category "risk". Economy. Finances. Law. 2017. № 10/1'2017. P. 66-68.

86. Bashynska I. Improving the Tariff Policy of Urban Passenger Transport Based on International Experience. TEM Journal. 2020. № 9(4). P. 1588-1596. DOI: 10.18421/TEM94-34

87. Bashynska I., Biskup V., Kuz'kin O., Hryzovska L., Shapoval G. Improving Management Decisions in Urban Passenger Transport Based on the Sociological Study. International Journal of Industrial Engineering & Production Research. 2020. № 31 (4). P. 491-498. DOI: 10.22068/ijiepr.31.4.491.

88. Bashynska, I., Kovalova, O., Malovichko, O., Shirobokova, O. Risk Management of Innovative Socially Significant Projects (On the Example of Urban Passenger Transport). International Journal of Advanced Research in

Engineering and Technology. 2020. № 11(4). P. 294-305 DOI: 10.34218/IJARET.11.4.2020.026

89. Bashynska I., Filippov V. Smart system of urban passenger transport as a component of Smart City: monograph, Kharkiv: Disa Plus Publishing House, 2018. 220 p.

90. Bashynska I., Dyskina A. The overview-analytical document of the international experience of building smart city. Business: Theory and Practice. 2018. № 19. pp. 228–241 DOI: 10.3846/btp.2018.23

91. Dyskina A. System technology as an element of smart innovation in the context of the smart city concept. Economic Journal of Odessa Polytechnic University. 2017. № 2 (2). P. 70-76.

92. Dyskina A. World achievements in the field of smart innovation. Econom. magazine. Odessa. Polytechnic un-tu. 2018. № 1 (3). P. 19–31.

93. Australian/New Zealand Standard «Risk management» on 21 July 2004 and on behalf of the Council of Standards New Zealand on 20 August 2004. Available at: https://www.ucop.edu/enterprise-riskmanagement/_files/as_stdrds4360_2004.pdf.

94. Aven T. Implications of black swans to the foundations and practice of risk assessment and management. Reliability Engineering and System Safety. 134 (2015). P. 83-91

95. Aven T., Flage R. How the definition of security risk can be made compatible with safety definitions. Proc IMechE Part O: J Risk and Reliability. 2017. 231(3). P. 286-294.

96. Bashynska I., Filyppova S. Risk Management. Lecture course: textbook. Kharkiv: publishing house "Disa Plus", 2017. 101 p.

97. Bashynska I., Filyppova S. Risk Management. Practical lessons & Case Study: textbook. Kharkiv: “Disa Plus”, 2018. 220 p.

98. Bashynska I. Smart-innovations in the urban passenger transport in the context of smart-city concept. Economy. Finances. Law. 2017. № 11/2. P. 4-6.

99. Bashynska I., Baldzhy M., Ivanchenkova L., Skliar L., Nikoliuk O., Tkachuk G., Game Risk Management Methods for Investment Portfolio Optimization, International Journal of Recent Technology and Engineering, Volume-8 Issue-2, 2019, P. 3940-3943 DOI: 10.35940/ijrte.B1729.078219

100. Bashynska I., Levinska L. The theoretical substantiation of the economic essence of the category "risk". Economy. Finances. Law. 2017. № 10/1'2017. P. 66-68

101. Bashynska I., Poleshchuk A., Motova A. Udoskonalennia systemy upravlinnia ryzykamy na pidpryiemstvi (Improvement of the risk management system at the enterprise). Scientific journal "Black Sea Economic Studies". 2017. Issue 7. P. 91-94

102. Bashynska I., Sokhatska O., Stepanova T., Malanchuk M., Rybianets S., O. Sobol, Modelling the risks of international trade contracts, International Journal of Innovative Technology and Exploring Engineering, Volume-8 Issue-11, Sep. 2019, P. 2815-2820 DOI: 10.35940/ijitee.K2313.0981119

103. Bashynska I.O. Using the method of expert evaluation in economic calculations. Actual Problems in Economics. 2015. № 7 (169). P. 408-412.

104. Bashynska Iryna, Filippov Volodymyr, Novak Nadiia, Smart Solutions: Protection NFC Cards with Shielding Plates, International Journal of Civil Engineering and Technology. 9(11). 2018. P. 1063-1071.

105. Bashynska Iryna, Malanchuk Marina, Zhuravel Olena, Olinichenko Kateryna, Smart Solutions: Risk Management of Crypto-Assets and Blockchain Technology, International Journal of Civil Engineering and Technology. 10(2). 2019. P. 1121–1131.

106. Bjerga Torbjørn, Aven Terje, Zio Enrico. Uncertainty treatment in risk analysis of complex systems: The cases of STAMP and FRAM. Reliability Engineering and System Safety. 156 (2016). P. 203-209.

107. Car`s consumer behavior, 2015. Available at: www.bcgperspectives.com.

108. Cities economy general urban governance IESE. Cities in Motion Index 2017. Available at: http://blog.iese.edu/cities-challenges-and-management/2017/05/25/164/.

109. City Prosperity Initiative – UN-Habitat. – 2017. Available at: https://unhabitat.org/urban-initiatives/initiatives-programmes/city-prosperity-initiative/.

110. CityDashboard. Available at:http://citydashboard.org/about.php

111. Communications Security Establishment Canada. Royal Canadian Mounted Police. Harmonized threat and risk assessment methodology. Available at: https://www.cse-cst.gc.ca/en/system/files/pdf_documents/tra-emr-1-e.pdf

112. Cox L.A. (2008) Some limitations of 'risk = threat 3 vulnerability 3 consequence' for risk analysis of terrorist attacks. Risk Anal 2008; 28: 1749–1761.

113. Dyskina, A.A., Fedorchuk, O.M., Protosvitska O.I. (2019). The use of information and communication technologies in the context of building a competitive infrastructure of a smart city. Naukovyi visnyk Khersonskoho derzhavnoho universytetu. Ser.: Ekonomichni nauky, 33, 93-96 http://ej.kherson.ua/journal/ economic_33/20.pdf

114. European Smart Cities 2017. Available at:http://www.smart-cities.eu/ranking.html.

115. Filippov V. Normative-legal bases of regulation of the system of city passenger transport and possibilities of its innovative development. Naukovyi visnyk Khersonskoho derzhavnoho universytetu. Ser.: Ekonomichni nauky.

2018. № 29 (2), P. 36-39 Available at: http://ej.journal.kspu.edu/index.php/ej/article/view/205

116. Filyppova S., Bashynska I., Kholod B., Prodanova L., Ivanchenkova L., Ivanchenkov V., Risk management through systematization: Risk Management Culture, International Journal of Recent Technology and Engineering. 2019. Volume-8 Issue-3, P. 6047-6052 DOI: 10.35940/ijrte.C5601.098319

117. Goldenberg, S. Masdar's zero-carbon dream could become world's first green ghost town. – The Guardian, 2016. February 16. Available at: https://theguardian.com/environment/2016/feb/16/masdars-zero-carbon-dream-could-become-worlds first-green-ghost-town.

118. Grants - Calls for proposals in the field of Transport. The European Commission – 2016. Available at: http: //ec.europa.eu/transport/facts-fundings/grants_en.

119. Greenfield A. Against the Smart City. Available at: http://www.academia.edu/6732875/Emerging_Markets_and_8Digital_Economy_Building_Trust_in_the_Virtual_World_032.

120. Hollnagel E. (2012) FRAM: The functional resonance analysis method: modelling complex socio-technical systems. Farnham: Ashgate Publishing Ltd; 2012.

121. Kovalova O., Bashynska I. Plan and scheme of measures to reduce the negative perception of innovations by carriers and the population (divided into groups). Strategies for sustainable socio-economic development and mechanisms their implementation in the global dimension : Monograph. Sofia: VUZF Publishing House "St. Grigorii Bogoslov", 2019. Vol. 2. P. 245-256.

122. Landoll D.J. Security risk assessment handbook: a complete guide for performing security risk assessments. 2nd ed. Boca Raton, FL: CRC Press, 2011.

123. Leveson N. Engineering as aferworld: systems thinking applied to safety. Cambridge: TheMITPress; 2011.

124. Leveson N.G., Dulac N., Barrett B., Carroll J.,Cutcher-Gershenfeld J., Friedenthal S. Risk Analysis of NASA Independent Technical Authority. Cambridge, MA:MIT; 2005.

125. Litman, T. Smart Transportation Economic Stimulation. – Victoria Transport Policy Institute, 2009. Available at: http://www.vtpi.org/econ_stim.pdf.

126. Mapping Smart Cities in the EU [Study]. – European Union: European Parliament, 2014. URL: Available at: http://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/507480/IPOLITRE_ET(2014)507480_EN.pdf.

127. Masse T, O'Neil S and Rollins J. The Department of homeland security's risk assessment methodology: evolution, issues, and options for congress. Washington, DC: Congressional Research Service, Available at: http://www.dtic.mil/dtic/tr/fulltext/u2/a462494.pdf

128. Routes to prosperity: how smart transport infrastructure can help cities to thrive. – Ernst & Young, 2015. Available at: http://www.ey.com/Publication/vwLUAssets/EY-routes-to-prosperity-via-smart-transport/$FILE/ EY-routes-to-prosperity-via-smart-transport.pdf.

129. Smart cities: Ranking of European medium-sized cities. – Vienna: Vienna University of Technology, 2007. Available at: http://www.smart-cities.eu/download/smart_cities_final_report.pdf, https://smartundp.wordpress.com/2012/01/20/smart-city.

130. Smart Communities Guidebook: How California's Communities Can Thrive in the Digital Age. – San Diego: State University of San Diego, 1997.

131. Smart Metering deployment in the European Union. Available at: http://ses.jrc.ec.europa.eu/smart-metering-deployment-european-union

132. Smarter Cities: Public Safety in the Digital Age. – IBM. Available at: https://www.govloop.com/blogs/4001-5000/4144-Public_Safety_Digital_Age.pdf.

133. Sustainable Urban Transportation System: An Overview. Published by: United Nations Economic and Social Commission for Asia and the Pacific and CITYNET. 2012. 45 p. Available at: https://www.uncclearn.org/sites/default/files/inventory/unescap20_0.pdf

134. Taleb N. N. The blackswan: the impact of the highly improbable. London: Penguin; 2007.

135. The winners of the 2016 World Smart City Awards. Available at:http://www.smartcityexpo.com/ru/cfa-finalists.

136. Top 5 smartest Smart Cities in the world. 2017. Available at: http://www.cbronline.com/news/internetof-things/smart-cities/top-5-smartest-smart cities.

137. Washington Economic Development Commission Strategy 2009.

138. World Economic Forum. Global ompetitiveness Index, 2010-2012; 2013.

139. Zadorozhko, G. & Nikolaev, Yu. & Barabash, O. & Goncharenko O.. Problems and prospects for the implementation and development of smart accounting system at municipal transport. Marketynh i menedzhment innovatsii. 2018. № 3. P. 208-215. DOI: 10.21272/mmi.2018.3-18

140. Filippov V., Dyskina A., Malin O. Plan and scheme of measures to improve tariff and compensation policies to reduce the risk of confrontation by route taxi owners. Strategies for sustainable socio-economic development and mechanisms their implementation in the global dimension : Monograph. Sofia: VUZF Publishing House “St. Grigorii Bogoslov”, 2019. Vol. 3. P. 226-234.

141. Filippov V. Improvement of tariff and compensation policy of smart metering system in urban passenger transport. Tendenze attuali della moderna

ricerca scientifica : zu den materialien der internationalen wissenschaftlich-praktischen konferenz. 5 juni, 2020, Stuttgart, Deutschland. B. 1. P. 19-20. DOI: 10.36074/05.06.2020.v1.05

142. Padrón Nápoles VM, Gachet Páez D, Esteban Penelas JL, García Pérez O, García Santacruz MJ, Martín de Pablos F. Smart Bus Stops as Interconnected Public Spaces for Increasing Social Inclusiveness and Quality of Life of Elder Users. Smart Cities, 2020. 3(2). P. 430-443. DOI: 10.3390/smartcities3020023

143. IVU.validator at evm Verkehrs GmbH. Available at: https://news.cision.com/ivu-traffic-technologies/i/ivu-validator-at-evm-verkehrs-gmbh,c1602589

144. Bashynska I., Kuz'kin O., Biskup V. and Shapoval G. Conducting a Sociological Survey to Improve Tariff Policy in Urban Passenger Transport, International Journal of Management, № 11(7). 2020. P. 111-128.

145. Bohachenko M. V. The theoretical aspects of tariff policy formation of public passenger transport. Uzhorod National University Herald. 2018. № 19, part 1. P. 19-22.

146. Bozhkova V., Ptashchenko O., Saher L., Syhyda L. Transformation of marketing communications tools in the context of globalization. Marketing and management of innovations. 2018. P. 73-82.

147. Sotnyk I., Hulak D., Yakushev O., Yakusheva O., Prokopenko O., Yevdokymov A. Development of the US electric car market: Macroeconomic determinants and forecasts. Polityka Energetyczna. 2020. № 23(3). P. 147-164.

148. Prokopenko O., Miśkiewicz R. Perception of "green shipping" in the contemporary conditions Entrepreneurship and Sustainability Issues. 2020. № 8(2). P. 269-284.

149. Methods of calculating tariffs for passenger road transport services: Order of the Ministry of Transport and Communications of Ukraine from

17.11.2009 № 1175. Available at: https://zakon.rada.gov.ua/laws/show/z1146-09

150. State Statistics Service of Ukraine URL: http://www.ukrstat.gov.ua/

151. Aksenov I.M. Passenger traffic marketing. Textbook. K.: Osnova, 2016. 212 p.

152. Sustainable Urban Transportation System: An Overview. Published by: United Nations Economic and Social Commission for Asia and the Pacific and CITYNET. 2012. 45 p. Available at: https://www.uncclearn.org/sites/default/files/inventory/unescap20_0.pdf

153. Novikova A.M., Yashchenko T.M., Kovalchuk N.M., Leonov M.A. Financing of public passenger transport services is an equation to the European level of quality. Research and production magazine "Road Truck of Ukraine". 2018. № 2 (254). 2- 6.

154. DBN B.2.2-12: 2019 "Planning and development of territories": Order of the Ministry of Development of Communities and Territories of Ukraine from 26.04.2019 №104 Available at: http://dipromisto.gov.ua/files/NMD/B2212-IBprint.pdf

155. MinfinMedia URL: https://minfin.com.ua/

156. Bashynska I. Smart-innovations in the urban passenger transport in the context of smart-city concept Economy. Finances. Law. 2017. № 11/2. P. 4-6

157. Bashynska I., Levinska L. The theoretical substantiation of the economic essence of the category "risk". Economy. Finances. Law. 2017. № 10/1'2017. P. 66-68.

158. Bashynska I. Improving the Tariff Policy of Urban Passenger Transport Based on International Experience. TEM Journal. 2020. № 9(4). P. 1588-1596. DOI: 10.18421/TEM94-34

159. Bashynska I., Biskup V., Kuz'kin O., Hryzovska L., Shapoval G. Improving Management Decisions in Urban Passenger Transport Based on the

Sociological Study. International Journal of Industrial Engineering & Production Research. 2020. № 31 (4). P. 491-498. DOI: 10.22068/ijiepr.31.4.491.

160. Bashynska, I., Kovalova, O., Malovichko, O., Shirobokova, O. Risk Management of Innovative Socially Significant Projects (On the Example of Urban Passenger Transport). International Journal of Advanced Research in Engineering and Technology. 2020. № 11(4). P. 294-305 DOI: 10.34218/IJARET.11.4.2020.026

161. Bashynska I., Filippov V. Smart system of urban passenger transport as a component of Smart City: monograph, Kharkiv: Disa Plus Publishing House, 2018. 220 p.

162. Bashynska I., Dyskina A. The overview-analytical document of the international experience of building smart city. Business: Theory and Practice. 2018. № 19. pp. 228–241 DOI: 10.3846/btp.2018.23

163. Dyskina A. System technology as an element of smart innovation in the context of the smart city concept. Economic Journal of Odessa Polytechnic University. 2017. № 2 (2). P. 70-76.

164. Dyskina A. World achievements in the field of smart innovation. Econom. magazine. Odessa. Polytechnic un-tu. 2018. № 1 (3). P. 19–31.

165. Australian/New Zealand Standard «Risk management» on 21 July 2004 and on behalf of the Council of Standards New Zealand on 20 August 2004. Available at: https://www.ucop.edu/enterprise-riskmanagement/_files/as_stdrds4360_2004.pdf.

166. Aven T. Implications of black swans to the foundations and practice of risk assessment and management. Reliability Engineering and System Safety. 134 (2015). P. 83-91

167. Aven T., Flage R. How the definition of security risk can be made compatible with safety definitions. Proc IMechE Part O: J Risk and Reliability. 2017. 231(3). P. 286-294.

168. Bashynska I., Filyppova S. Risk Management. Lecture course: textbook. Kharkiv: publishing house "Disa Plus", 2017. 101 p.

169. Bashynska I., Filyppova S. Risk Management. Practical lessons & Case Study: textbook. Kharkiv: “Disa Plus”, 2018. 220 p.

170. Bashynska I. Smart-innovations in the urban passenger transport in the context of smart-city concept. Economy. Finances. Law. 2017. № 11/2. P. 4-6.

171. Bashynska I., Baldzhy M., Ivanchenkova L., Skliar L., Nikoliuk O., Tkachuk G., Game Risk Management Methods for Investment Portfolio Optimization, International Journal of Recent Technology and Engineering, Volume-8 Issue-2, 2019, P. 3940-3943 DOI: 10.35940/ijrte.B1729.078219

172. Bashynska I., Levinska L. The theoretical substantiation of the economic essence of the category "risk". Economy. Finances. Law. 2017. № 10/1'2017. P. 66-68

173. Bashynska I., Poleshchuk A., Motova A. Udoskonalennia systemy upravlinnia ryzykamy na pidpryiemstvi (Improvement of the risk management system at the enterprise). Scientific journal "Black Sea Economic Studies". 2017. Issue 7. P. 91-94

174. Bashynska I., Sokhatska O., Stepanova T., Malanchuk M., Rybianets S., O. Sobol, Modelling the risks of international trade contracts, International Journal of Innovative Technology and Exploring Engineering, Volume-8 Issue-11, Sep. 2019, P. 2815-2820 DOI: 10.35940/ijitee.K2313.0981119

175. Bashynska I.O. Using the method of expert evaluation in economic calculations. Actual Problems in Economics. 2015. № 7 (169). P. 408-412.

176. Bashynska Iryna, Filippov Volodymyr, Novak Nadiia, Smart Solutions: Protection NFC Cards with Shielding Plates, International Journal of Civil Engineering and Technology. 9(11). 2018. P. 1063-1071.

177. Bashynska Iryna, Malanchuk Marina, Zhuravel Olena, Olinichenko Kateryna, Smart Solutions: Risk Management of Crypto-Assets and Blockchain Technology, International Journal of Civil Engineering and Technology. 10(2). 2019. P. 1121–1131.

178. Bjerga Torbjørn, Aven Terje, Zio Enrico. Uncertainty treatment in risk analysis of complex systems: The cases of STAMP and FRAM. Reliability Engineering and System Safety. 156 (2016). P. 203-209.

179. Car`s consumer behavior, 2015. Available at: www.bcgperspectives.com.

180. Cities economy general urban governance IESE. Cities in Motion Index 2017. Available at: http://blog.iese.edu/cities-challenges-and-management/2017/05/25/164/.

181. City Prosperity Initiative – UN-Habitat. – 2017. Available at: https://unhabitat.org/urban-initiatives/initiatives-programmes/city-prosperity-initiative/.

182. CityDashboard. Available at:http://citydashboard.org/about.php

183. Communications Security Establishment Canada. Royal Canadian Mounted Police. Harmonized threat and risk assessment methodology. Available at: https://www.cse-cst.gc.ca/en/system/files/pdf_documents/tra-emr-1-e.pdf

184. Cox L.A. (2008) Some limitations of 'risk = threat 3 vulnerability 3 consequence' for risk analysis of terrorist attacks. Risk Anal 2008; 28: 1749–1761.

185. Dyskina, A.A., Fedorchuk, O.M., Protosvitska O.I. (2019). The use of information and communication technologies in the context of building a competitive infrastructure of a smart city. Naukovyi visnyk Khersonskoho derzhavnoho universytetu. Ser.: Ekonomichni nauky, 33, 93-96 http://ej.kherson.ua/journal/ economic_33/20.pdf

186. European Smart Cities 2017. Available at:http://www.smart-cities.eu/ranking.html.

187. Filippov V. Normative-legal bases of regulation of the system of city passenger transport and possibilities of its innovative development. Naukovyi visnyk Khersonskoho derzhavnoho universytetu. Ser.: Ekonomichni nauky. 2018. № 29 (2), P. 36-39 Available at: http://ej.journal.kspu.edu/index.php/ej/article/view/205

188. Filyppova S., Bashynska I., Kholod B., Prodanova L., Ivanchenkova L., Ivanchenkov V., Risk management through systematization: Risk Management Culture, International Journal of Recent Technology and Engineering. 2019. Volume-8 Issue-3, P. 6047-6052 DOI: 10.35940/ijrte.C5601.098319

189. Goldenberg, S. Masdar's zero-carbon dream could become world's first green ghost town. – The Guardian, 2016. February 16. Available at: https://theguardian.com/environment/2016/feb/16/masdars-zero-carbon-dream-could-become-worlds first-green-ghost-town.

190. Grants - Calls for proposals in the field of Transport. The European Commission – 2016. Available at: http: //ec.europa.eu/transport/facts-fundings/grants_en.

191. Greenfield A. Against the Smart City. Available at: http://www.academia.edu/6732875/Emerging_Markets_and_8Digital_Economy_Building_Trust_in_the_Virtual_World_032.

192. Hollnagel E. (2012) FRAM: The functional resonance analysis method: modelling complex socio-technical systems. Farnham: Ashgate Publishing Ltd; 2012.

193. Kovalova O., Bashynska I. Plan and scheme of measures to reduce the negative perception of innovations by carriers and the population (divided into groups). Strategies for sustainable socio-economic development and

mechanisms their implementation in the global dimension : Monograph. Sofia: VUZF Publishing House “St. Grigorii Bogoslov”, 2019. Vol. 2. P. 245-256.

194. Landoll D.J. Security risk assessment handbook: a complete guide for performing security risk assessments. 2nd ed. Boca Raton, FL: CRC Press, 2011.

195. Leveson N. Engineering as aferworld: systems thinking applied to safety. Cambridge: TheMITPress; 2011.

196. Leveson N.G., Dulac N., Barrett B., Carroll J.,Cutcher-Gershenfeld J., Friedenthal S. Risk Analysis of NASA Independent Technical Authority. Cambridge, MA:MIT; 2005.

197. Litman, T. Smart Transportation Economic Stimulation. – Victoria Transport Policy Institute, 2009. Available at: http://www.vtpi.org/econ_stim.pdf.

198. Mapping Smart Cities in the EU [Study]. – European Union: European Parliament, 2014. URL: Available at: http://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/507480/IPOLITRE_ET(2014)507480_EN.pdf.

199. Masse T, O’Neil S and Rollins J. The Department of homeland security’s risk assessment methodology: evolution, issues, and options for congress. Washington, DC: Congressional Research Service, Available at: http://www.dtic.mil/dtic/tr/fulltext/u2/a462494.pdf

200. Routes to prosperity: how smart transport infrastructure can help cities to thrive. – Ernst & Young, 2015. Available at: http://www.ey.com/Publication/ vwLUAssets/EY-routes-to-prosperity-via-smart-transport/$FILE/ EY-routes-to-prosperity-via-smart-transport.pdf.

201. Smart cities: Ranking of European medium-sized cities. – Vienna: Vienna University of Technology, 2007. Available at: http://www.smart-cities.eu/download/smart_cities_final_report.pdf,
https://smartundp.wordpress.com/2012/01/20/smart-city.

Ministry of Education and Science of Ukraine
Odessa National Polytechnic University
Institute of Business, Economics and Information Technology
Department of Accounting, Analysis and Auditing
Department of Management

Bashynska Iryna
Fillipov Volodymyr

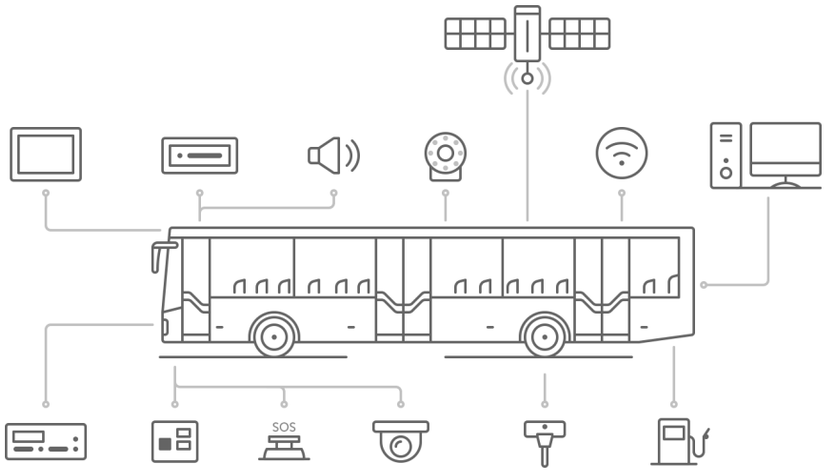
Risk management of smart accounting system implementation in urban passenger transport based on integration of smart innovations, information technologies and marketing tools

monograph

Odesa
2020

Bashynska Iryna Okeksandrivna
PhD (economics), Associate Professor, Department of Accounting, Analysis and Audit, Odessa national polytechnic university (ONPU).

Filippov Volodymyr Yuriyovych
PhD (economics), Associate Professor, Department of Management, Odessa national polytechnic university (ONPU).



timerealities.com

ISBN 978-3-9818494-9-3

TIME REALITIES SCIENTIFIC GROUP

Time Realities Scientific Group UG
Schopperstr. 24, 97421 Schweinfurt, Germany
Publisher ID 5275053
timerealities@gmail.com

Bashynska Iryna
Filippov Volodymyr

RISK MANAGEMENT OF SMART ACCOUNTING SYSTEM IMPLEMENTATION IN URBAN PASSENGER TRANSPORT BASED ON INTEGRATION OF SMART INNOVATIONS, INFORMATION TECHNOLOGIES AND MARKETING TOOLS

2020

TIME REALITIES SCIENTIFIC GROUP

Iryna O. Bashynska
Volodymyr Yu. Filippov

RISK MANAGEMENT OF SMART ACCOUNTING SYSTEM IMPLEMENTATION IN URBAN PASSENGER TRANSPORT BASED ON INTEGRATION OF SMART INNOVATIONS, INFORMATION TECHNOLOGIES AND MARKETING TOOLS

MONOGRAPH

Time Realities Scientific Group UG (haftungsbeschrankt)
Schweinfurt

INTRODUCTION

The transition to the investment and innovation stage of economic development, accession to the WTO, the acquisition of associate membership in the European Union requires the development of transport on a qualitatively new basis. Due to the fact that the modern transport system of urban passenger transport does not meet the requirements of society, mass motorization of the population is becoming an alternative to public transport, which creates a new lifestyle and ensures the mobility of the population. The number of privately owned cars in Ukraine is growing every year and in 2016 there were 202 cars per thousand Ukrainians. This leads to congestion in cities, increased environmental load and significant energy costs, as transport is the largest consumer of light petroleum products. In addition, low comfort in transport (no Wi-Fi, air conditioning, etc.); inability to plan a trip in advance due to the lack of a clear schedule and high level of possible injuries to passengers (due to distraction of the driver to carry out fare transactions with passengers; "competition" between taxi drivers - violation of traffic rules to increase passenger traffic, and thus revenue).

Most leading Ukrainian scientists insist on creating competition between carriers and reducing government regulation in this area. But now there is competition only between route carriers and due to the lack of routes and the number of public transport, passengers are more likely to get on minibuses, despite their technical condition or the fullness of transport because it is impossible to guess when the trolleybus or tram. On March 15, 2017, the Odessa City Council adopted a decision № 1780-VII On the introduction of an automated metering system in public passenger transport in Odessa, which provides for bringing the relationship between the city and the transport system to a completely different level, as close as possible to European practice: income carriers will be made dependent on the quality of their

work and will create the conditions for the elimination of traffic "minibus" and the transfer of all buses to normal traffic.

But due to a mistake in taking into account the possible risks, due to inefficient use of information technology and marketing tools, even this project may fail, which will lead to significant financial losses from the state and for many years again reject the introduction of quality, socially oriented, cost-effective urban passenger transport .

Public passenger transport is one of the priority infrastructure sectors, and its stable operation is a necessary condition for the development of all sectors of the economy and improving the social situation in the city. To begin with, it is necessary to understand the content of the concepts of tariff and compensation policy.

The system of state financial support of public passenger transport, the purpose of which is the balanced development of transport systems with a high level and quality of passenger service in terms of partial performance of public transport assigned to it, exists in most developed countries. The basis of unprofitable urban passenger transport in developed countries is a single tariff for intermodal transport systems. An intermodal transport system is a system for ensuring the functioning of public transport in a given area, when several types of urban transport (bus, tram, trolleybus, metro) create a clear and simple system of interconnected routes, adhering to certain conditions and regularity of intervals between connections and relocation. passengers at a single fare, which contributes to the promotion of urban transport and encourage the population to it through the establishment of a relatively low fare.

The authors of this monograph are employees of Odessa National Polytechnic University, Department of Accounting, Analysis and Auditing, Department of Management and Department of Business Economics:

Bashynska Iryna, PhD, Associate Professor, (Introduction; Sections 1.1; 1.2; 1.3; 1.4; 1.5; 2.1; 2.2; 2.3; 2.4; 3.2; conclusions – 5,6 p.p);

Filippov Volodymyr, PhD, Associate Professor, (Introduction; Sections 1.2; 2.3; 3.2; conclusions – 5,0 p.p);

Chapter 3 was prepared jointly with Doctor of Economics, Full Prof. **Filyppova Svitlana** (1,2 p.p); Sections 1.3 and 3.1 – with Ph.D., Assoc. Prof. **Dyskina Anastasia** (1,1 p.p); Section 4.2 – with Ph.D., Assoc. Prof. **Kovalova Olena** (0,9 p.p); Sections 2.1 and 2.3 – with Ph.D student **Alnuaimi Hamed Rashed Sayed Abdullah** (0,2 p.p); Sections 2.2-2.3 – with Ph.D student **Alhammadi Taleb Abdullah Mohammed Ali** (0,2 p.p); Section 2.5 – with Ph.D student **Eisai Salah Abu Isbaykhah Almabruk** (0,2 p.p) according to the results of research for a long period.

The monograph contains the results of research for the budget of the Ministry of Education and Science of Ukraine, provided for the development of research topic № 0017U003804 № 711-82 "Risk management of smart metering in urban passenger transport based on the integration of smart innovations, information technology and marketing tools".