

**PROBLEM-SOLVING IN "PASSENGER TRAFFIC" SYSTEM ON THE BASIS OF  
COEVOLUTION STRATEGY**

*In this article we review coevolution strategy as a problem-solving method in passenger complex. It should be applied on the basis of systematic approach and system analysis during optimal tasks solution making.*

*Key words: coevolution strategy, system approach, system analysis, passenger complex.*

**Problem statement.** *Coevolution is the development of processes at all levels: connected parts of a comprehensive whole, including its main components, less complex systems – controlling: organizational and economic mechanisms to ensure effective operation of passenger traffic and controlled – passenger traffic. The idea of coevolution appears as one of the central units of the development of management strategies called quality isolated control components of a complex system of "passenger complex" in order to ensure the efficiency of passenger transportation functioning. Coevolution strategy in the management of this mechanism should be applied on the basis of a systematic approach and system analysis in the development of optimal solutions to problems associated with an increase in the efficiency of long-distance passenger traffic.*

*The importance of problem-solving is due to the fact that passenger transportation influences on the economic development of the country, its defense, as well as to strengthen ties between the countries, the social level of the population, development of tourism and culture as now they are extremely unprofitable. The results of their implementation does not allow us not only to update rolling-stock, upgrade track facilities and other infrastructure, as well as to improve passenger service technologies, but also to compensate for their costs.*

**Purpose of the article.** *In times of crisis, competition, development of market relations and the unprofitableness of passenger traffic the main purpose of the application of coevolution strategy in the activities of passenger transport and its economic entities is to obtain the highest possible profit at the full satisfaction of population transference and high-quality services at all stages of transportation.*

**Analysis of primary sources.** *Strategy on transport problems were held by the following scientists: A.A. Bakaiev, V.I. Pasichnyk, L.A. Pozdniakova, and others.*

**Primary material statement.** *Given the competition for passengers (for income), to make a profit in the coevolution strategy for management of organizational and economic mechanism to ensure the effective functioning of passenger traffic it is necessary to apply the principles of integrated use of marketing and logistics, i.e. to implement marketing and logistics management. This will allow carriers to gain skills of systematic approach covering all the activities performed in the*

*implementation of the organizational and economic mechanism of the operation of passenger traffic at moving of passengers various categories. The validity of the application in marketing and logistics management of coevolution strategy based on a systematic approach is that it is possible to provide through a multi-level and multi-criteria optimization of passenger, financial, material (for own use), information, service and other streams, as well as providing logistical coordination and integration of accounting as the most important criteria of optimality of such indicators as the quality of transport services and the reliability of the carriers on the basis of marketing research data held by systems analysis. It will also ensure consistency of the results of strategic and tactical management through the use of automated systems for management decision-making (ASMDM) rather than **волютарных**.*

*The results of the passenger traffic, its image, and passenger's costs in the trip significantly affects the organization of their services in the transport unit when transferring by different kinds of transport. From the point of view of the modern coevolution transport nodal point representation is viewed not only as an object of potential passengers gravitational to transport business entities deployed in the node involved in complex service of passengers and providing transport procedures and operations, the creation of the necessary human resources and development the social structures, but also as a city-forming structure.*

*Unfortunately, technical re-equipment of domestically produced transport nodal points and the system of passenger service are behind the advanced foreign counterparts, slowly improving carriers technological processes, not improved by the use of coevolution strategy based on a systematic approach and systematic analysis of management practices that involve a radical increase in the level of informatization of transport processes and information interaction of carriers, focusing on the best examples of high-performance world. In the transportation process there appear only particular cases of private declarative systems approach and systems analysis.*

*To improve the efficiency of passenger service in transport nodal points and their further development, which would provide a stable and successful operation of passenger transport, it is necessary to introduce coevolution strategy to solve the following urgent problems [3, 4]:*

- *Urgent legal and organizational problems of territory property, legal conflicts, including those related to the actions of government oversight bodies, as well as issues arising from the complexity of the structure and management, excessive government interference in the activities of transport nodal points in the regulation of passenger tariffs and the interaction kinds of transport;*
- *To accelerate the retooling of transport nodal points, since its vehicles and infrastructure do not fully conform to the requirements of modern standards of passenger service. For example, the average age of railways vehicles reached and exceeded the threshold of economic security, the degree of deterioration - 95%, and due to lack of financial resources timely updating and replenishment is not performed.*

*The main reasons for unprofitableness of passenger traffic is the imperfection of management implementation of organizational and economic mechanism of the operation of passenger traffic and transport processes coordination in transport nodal points. Therefore, the elimination of unprofitableness is the most important task of passenger transport in the transport market. Unfortunately, an acceptable in every respect universal systematic methodology to solve it in Ukraine still does not exist. After all, to assess options to ensure the efficiency of passenger transport in the application of coevolution strategy it is needed a single criterion, expressed in one dimension (it is desirable to money) which would represent all of a system used in the problem of criteria including quality and natural. Passenger complex experts do not know how to do that yet. In addition, officially operating procedures calculations do not include the so-called local efficiency. For example, the transport nodal point does not include itself direct benefit options for coordinating the work of carriers. It is better they will seek funds to continue the transportation, stand for a while in turn for inquiries and registration of travel documents, and for this and other services the carrier will charge them the amounts used for their needs.*

*In our opinion, one of the coevolution strategy implementation measures in order to improve the quantitative and qualitative indicators of the functioning of passenger transport is the creation of marketing and logistics centers in transport nodal points in order to coordinate the work of carriers of passengers (MLCC). The purpose of their creation – it will be places where that determines the possibility of using integrated marketing and logistics solutions for the economic problems the efficiency of passenger traffic. The implementation of this task will be carried out by early studies by relevant calculations of logistics technological schemes of passengers transfer in the nodal point from one kind of transport to another through the use of pre-marketing information on the approach to the junction of trains and buses, marine and river vessels (in regions where transportations are performed by sea or river transport kinds) and the arrival of the aircraft. MLCC develops an operational plan for coordination work of carriers' coordination and communicate it to all stakeholders in advance, and then controls the execution.*

*The following important functions of MLCC during the application of coevolution strategy for internal process control of transportation of passengers organization in the nodal point is to optimize the technology of passenger services on the basis of demand and dynamo determining the minimum total of all costs associated with this problem. The application of coevolution strategy should be based on the calculation of variations by using the most reliable pre-marketing information about the arrival of vehicles in a transport nodal point.*

*The solution to this problem, as well as other related to the operational management of transport processes of the carriages, in a not complete certainty and risk should be carried out by methods of so-called coefficients priority queuing of passenger service.*

*Restrictions on the use of these methods is the fact that they allow us to consider the problem of under one item transport point, for example the railway station (bus station, airport) and does not*

*allow for the situation evolving after the adoption of one or another variant of passenger service in a whole transport nodal point. Meanwhile, the cost-effectiveness of possible solutions to such conflicts can most reliably be solved by a special program on the computer calculating of compares variants of passenger service node to a sufficient depth perspective, using the functions of operational management through the use of so-called method of leaping ahead [1].*

*Such functions of coevolution strategy of MLCC as the choice of technological scheme of passenger services in the nodal point should be performed systematically, i.e. from local calculations, within the production subsystem - the station plus airport (bus station), you need a transferring to a global, within the boundaries of the entire transport nodal point, with the preliminary information about trains, buses, aircraft arrival arrivals and others. If at the first step of calculating the choice is made in favor of direct passenger service options in the nodal point, it remains without further adjustment if the same line option initially rejected, then the correctness of this decision is reviewed at the second calculation.*

*In addition to recommendations making regarding the operational management of passenger services in the nodal point and tactical problem solving, i.e. the daily management and coordination of the carriers work, having complete, timely and reliable information about the passenger passes through a nodal point, and difficulties in the process of passing, of a certain capacities in all divisions of the nodal point, its loading and opportunities of enhancing efficiency, - should give them a solution of promising strategic objectives, including the development of transport nodal points generally uniform technological processes (UTP), which now stands at almost **обум**.*

*On MLCC it is advisable to entrust also questions of perspective development of transport nodal point in conjunction with the development of the city as a daily analysis of the functioning of the transport unit provides the necessary information for decision-making, allows you to find flaws and needs. Moreover, these centers can take on the transport service of multimodal transport of passengers, including tourists. It goes without saying that both tactical and strategic management in all aspects should be based on evidence-based system analysis methodology for problem solving [4, 5].*

*Therefore, taking into consideration the objective characteristics of the functionality of the components of the organizational and economic mechanism for the operation of passenger traffic, the choosing level of the hierarchy (in particular, the time of its reaction to the changes, which in the case of compliance is not required urgent operational decision-making generates ungovernability, you can definitely assert that transport nodal points need your own boss, who showed them to be a constant concern. MLCC can become such the owner, coordinates and directs the work site to ensure the rhythm and high system efficiency (emergence) of passenger service. It will play the role of a production cell of the Ministry of Infrastructure, which has so far only provides formal guidance industries throughout relying on departmental management, without interference in improving coordination of interaction of carriers.*

*At present, the situation is such that neither the Ministry of Infrastructure, nor his departmental units of each of the kinds of transport are unable to ensure the continued production coordination of transport nodal points: Ministry of Infrastructure is far, and departmental units engaged in their work and do not own an aggregate of operative marketing information for the introduction of the application coevolution strategy. Therefore, the organization of passenger service in transport nodal points abandoned to itself, causing huge loss of natural and financial resources, the elimination of which is through the creation and implementation of application MLCC coevolution strategy is entirely justified.*

*In modern conditions it is increasingly evident the impact on the transport processes of difficult and often not taken into consideration controllable factors that complicate the possibility of coordinating the work of interconnected kinds of transport in the process of long-haul passengers. However, despite that, in reforming the transport sector and especially the organizational and economic mechanism of the operation passenger traffic, it is necessary to introduce a component coordination and improve coevolution strategy, or simply we cannot a radical change for the better qualitative and quantitative indicators of carriers. The process of regulation of the transport of passengers in transportation nodal points – the most radically reduce the cost of passengers and carriers, improve their standard of service due to the integrated use of marketing information on the transport process by continuously monitoring the passenger flow and a nodal point trains and buses arrival, marine and river vessels and on the arrival of the plane, as well as develop optimal technology will allow passenger services, taking into consideration the dynamics of their requests [1].*

*For the introduction of coevolution strategy in marketing and logistics management, as well as a systematic approach and system analysis in the production process of passenger transport it is necessary to carry out a diagnostic analysis of its management components - the organizational and economic mechanism for the operation of passenger services in order to determine its compliance with at the moment, revealing it bottlenecks and determining production capabilities. The result of the diagnostic analysis should be to determine the problems of the mechanism as a system and the appropriateness of their resolution in a certain order that is based on the ranking in order of importance. It is necessary to start improving of the efficiency of passenger transportation, as is well known, from the main problem, without which it is impossible to solve the other; figuratively speaking, you need to pull out of the tangle of problems the main unit, and then tangle will disintegrate [3].*

*Diagnostic analysis of the "organizational and economic mechanism of passenger traffic functioning ensuring", depending on the nature of the problem can be carried out in various ways. During the system approach and a targeted system analysis it is necessary to clearly determine what we want to find out in the management of this mechanism: shortcomings in the organization, management and technology service for passengers, price formation system, barriers to passenger traffic resulting from the imperfection of the individual components of the mechanism as a control in*

*a more complex system of "passenger complex" bottlenecks in the schemes and the interaction of the individual units, lack of power or equipment, etc.*

*Diagnostic analysis involves the collection and subsequent processing of statistical and other accounting information in dynamics for several years. It is important to select such a retrospective period in which there was no sudden changes in the conditions of carriage and their volumes in order to obtain a representative sample of data and set the trend of the performance of nodal point carriers on it. Studying the dynamics of indicators, comparing them with carrier's similar data gives an opportunity to assess the level of efficiency of the passenger traffic in the nodal point, and identify actions to optimize them. However, the collected official statistics, as a rule, does not provide the necessary completeness display of all features of interest to the researcher of "passenger traffic" system. Because both statistics and reports are made to meet the needs of operatives, not researchers or designers. Therefore it is necessary to introduce additional local observation in accordance with the research object survey, to determine the necessary characteristics (e.g., loading staff in time) using various types of automated sensors and instruments, some of which are offered in the works. Such a simple and inexpensive measuring equipment can be installed for permanent, not just for the period of the investigation, load control the corresponding components of the "passenger traffic", and the subsequent periodic review of their use in changing environments, to search for and implementation of the provisions of the object. You can also significantly complement the objective examination through focused discussions and interviews with carriers' personnel, assembly polls pre-selected by experts, etc.*

*Each production and management division node need to conduct their examination on a specially designed cards. At the same time it is necessary to question experts on nodal point as a whole, particularly on the prospects of its development. Although questionnaires card for each office should take into consideration its specificity and be individualized, the main issues are rather general in nature and should make it possible to obtain such information:*

- the role of this unit in the "passenger traffic" system in the nodal point;*
- the volume and performance - inside the object and common nodal point;*
- the difficulties in work and their causes;*
- operational measures to improve the quality and efficiency of operation of this unit and the unit as a whole;*
- measures concerning future development of the unit, kind of transport and the entire assembly.*

*During researching it is necessary to subdivide schemes of interposition of components and their interrelationships in the "passenger traffic" system in the nodal point, city planning, distribution of the population by districts of gravity and other data necessary for the subsequent solution of the main problems in the managed system "passenger traffic", and then the other urgent.*

*Such a procedure for diagnostic evaluation of transport nodal points in a market economy is necessary because the presence of Ministry of Infrastructure only, different kinds of transport function in the nodal point, while virtually autonomously, with the priority of their departmental interests. However, as the situation in the country will stabilize, transport and economic ties will be revived, and new, more or less sustainable, will recover, and then will increase previous volumes of passenger traffic. Consequently, the problem of smooth operation of transport nodal points and balanced development will inevitably highlight and this will certainly demand a methodology of diagnostic examination.*

*A new level of information should help to create MLCC providing all kinds of logistics services for passengers, as well as contributing to the formation of larger passenger transported direct technical route to your destination, one or more kinds of transport, according to a single travel document for the entire complex logistic transport chain laid on the place of departure to the point of arrival.*

*As one of the necessary regional units of the new control system it can also be offered the option to create a MLCC control centers (CC) operating with the use of expert systems as a means to support management decisions, established on the basis of operational simulation of dynamic interactive model [2].*

*The objectives of the process according to the operation of the nodal point may be different - the establishment of economic linkages indicators and work carriers measurements, their impact on the volume and quality of traffic and direct, balanced workforce in the system unit, present status and development of legal and social aspects of the carriers and others. Under these goals a system for addressing the challenges is formed, which include some components of the "passenger traffic" system with the necessary degree of integration and detail of their elements.*

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