CONCEPTUAL APPROACH TO THE DEVELOPMENT STRATEGY OF URBAN RAPID TRANSPORT

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ABSTRACT

The author offers a conceptual approach to formation of a development strategy of urban rapid transport based on the specifics of magnetic levitation technology.

It is offered to create an urban transport system, which complies with the criteria corresponding to society demand: high speed, low level of noise, vibration, low emissions to the environment, lack of intersections with other communications in the same plane. The definition of «rapid urban transport» is given.

The author suggests strategic priorities and corresponding development indicators as well as stages and principles of development and implementation of strategic programs, which take into account the experience of some countries (China, Japan, South Korea) in creation of maglev lines for urban passenger transport.

Keywords: rapid urban transport, development strategy, magnetic levitation, goals of management.

Background. *Rapid passenger transport is a necessary condition of social-economic development of a city. Such transport expands the borders of agglomerations, increases business activity of population, who live in regions, promotes the increase in labor productivity, income level of citizens. Nevertheless it should be emphasized: in existing transport strategies of federal and regional levels in Russia this promising sphere of urban passenger transportation does not draw sufficient attention.*

Objective. *The objective of the author is to consider a conceptual approach to a development strategy of urban rapid transport.*

Methods. *The author uses general scientific methods, comparative analysis, economic evaluation.*

Results.

Maglev on the breakout line

The creation of rapid passenger lines on the basis of magnetic levitation will be one of the measures to ensure the priority of development and the prevalence of public transport over individual motor vehicles, as well as the growth of financial and socio-economic efficiency of public transport. At the moment, commercial lines of maglev are built in three countries (Pic. 1) [3].

From our point of view, magnetic levitation transport meets the requirements of innovation, provides breakthrough solutions in the organization of urban transport, and has high competitiveness [4]. The main factors of the competitiveness of the Maglev are: passenger safety, average time of employees' travel, lower transportation costs than of other types of transport, environmental friendliness, energy efficiency, development prospects in the system of rapid urban transport [8].

Strategy formation

Strategic management of rapid urban transport is a set of management actions that ensure the development of its potential (the growth of rapid passenger transportation) in an optimal scenario reflecting the achievement of established priority goals.

The process of forming a strategy for development of rapid urban transport includes five stages:

1. Creation of prerequisites for strategic vision of the future of rapid urban transport, identification of long-term development prospects, formulation of goals, high-priority transport priorities in the metropolitan area.

2. Purpose-setting, management by objectives, transition from a strategic vision to practical actions.

3. Development of a strategy.

4. Implementation of a strategy.

5. Evaluation of results and adjustment of strategic vision, development goals, strategy and its implementation, taking into account the experience gained, the changing conditions, the emergence of new ideas and opportunities.

Choosing a strategy is the key to success in any business. First of all, the formation of a management strategy is determined by the mission and systemic vision of rapid urban transport.

System vision regards the perspectives and strategic guidelines of development of rapid urban transport, those long-term plans that can be achieved in the future. It encompasses not only the rapid transport itself, its development, but also the entire transportation sphere, operating technologies, the alignment of forces in the competitive struggle, assesses the cumulative focus audience of the industry. In the future, the vision is detailed for the purposes of rapid urban transport and the principles of its management.

If the vision determines the future, then the mission shows activity at present. The mission of rapid urban transport demonstrates a clearly expressed reason for its existence. The mission is formed taking into account the understanding of the socio-economic

China	Japan	South Korea
•Shanghai maglev on technology «Transrapid» (developed in Germany), linking Shanghai to Pudong Airport (2004); •V = 430 km/h, •1 km = $ 19 million	•Lineimo line operating in urban transport mode, Nagoya (2005) •V = 100 km/h, •1 km = $ 100 million	•Rapid section of the line with a length of 40 km; line on technology «Rotem» connects Incheon airport with a recreation center (2012) •V = 110 km / h, •1 km = $ 35,3 million

Pic. 1. Foreign examples of the use of urban maglev.

role to which it is oriented, the characteristics of passenger transportation and the availability of competitive advantages. In other words, the meaning of the emergence of rapid urban transport reflects the interest groups, the requirements of which it seeks to satisfy.

The mission of rapid urban transport implies a set of goals and characteristics, as well as three main tasks:

• increase of motivation, stimulation of aspiration to achieve the set goals;

• formation of ideas about the direction of development of rapid urban transport;

• setting basic job principles in the system of rapid transport.

At the same time, vision and mission can change over time, since the external and internal conditions under which they are determined may be unstable.

Forming the mission of rapid urban transport, it is necessary to accurately describe the current situation of the market of passenger transportation and used technologies. A clearly marked mission allows:

– to better to understand the leading, priority goals facing rapid urban transport;

– to define ways of development of rapid urban transport for the long-term perspective;

– to reduce the risks of inefficient solutions.

The role of strategic priorities in the formation of transport policy is to provide answers to the following questions:

• What will give the development of rapid transport to the population of agglomeration?

• What does the business community, business entities of the agglomeration economy expect in the era of rapid transport?

• What should transport workers have in the process of implementing the strategy to ensure the efficiency of rapid urban transport and its reproduction?

Goal setting

The objectives of the strategy for development of rapid urban transport should be consistent with the objectives of the Transport strategy of the Russian Federation for the period until 2030, but do not have to coincide with them. Such goals, in our opinion, are:

Goal 1. Ensuring the availability and quality of transport services for the agglomeration population (meeting the demand for passenger rapid transportation).

Goal 2. Increase the safety level of the rapid transport system.

Goal 3. Reduction of the negative impact of the rapid transport system of agglomeration on the environment.

In the implementation of goal 1, the strategy should provide for formation of optimal rapid route networks to meet the demand for passenger transportations of various categories of the population, depending on local conditions.

The role of agglomeration in the implementation of goal 2 is to ensure safety and security at the level set by the strategy indicators. In this case, it is necessary to detail and strictly control the efforts aimed at eliminating dangerous sections of the transport system.

The implementation of goal 3 to reduce the negative impact of a rapid transport system on the environment enters the sphere of strategic interests of the social and economic development of the agglomeration and directly depends on the activities of regional administrations. In this regard, regional transport strategies should include a set of measures to achieve relevant environmental indicators, as well as to improve energy efficiency of transport. This is achieved through reducing emissions and discharges of harmful substances into the environment, the emergence of public vehicles with efficient engines using alternative fuels.

For each goal of the strategy for development of rapid urban transport, it is necessary to give a brief description of it, revealing what the economy and social sphere of the region will receive as a result. The form and style of this description are determined by the developer. Plus, for each goal its own indicators should be proposed.

The indicators for the development of the transport system of St. Petersburg and the Leningrad Region for the period until 2030 (Table 1) are taken as the basis of the target indicators in our case [2].

At the stage of strategy development, it is necessary to answer the extremely important question: how to achieve the set goals, taking into account the situation and prospects of each transport company. Strategy is a means to achieve a goal. To achieve the goal, thoughtful and purposeful actions are required, if necessary an adequate reaction to unforeseen events, changed market conditions and increased competition is required.

How to implement the planned actions

The implementation of the strategy is a set of actions aimed at achieving strategic results. Accordingly, the implementation mechanism includes measures implemented by government customers and the coordinating council for the development of the transport system of St. Petersburg and Leningrad Region in order to increase the efficiency of projects and achieve the planned indicators envisaged in the strategy [7].

The strategy becomes the basis for evaluation of particularly significant and large-scale investment projects contained in the core documents of the Russian Federation, St. Petersburg and Leningrad Region in accordance with Federal Law No. 172 FZ of June 28, 2014 (as amended on July 3, 2016) «On strategic planning in the Russian Federation» [6].

Implementation of the strategy for development of rapid urban transport assumes:

• mechanisms for improving the effectiveness of managing the implementation of the strategy;

• improving the mechanisms for attracting investments in the development of the system of rapid urban transport strategy.

Improving the effectiveness of management of the implementation of the strategy provides for:

• creation of a system for monitoring and managing the implementation of the strategy for the period up to 2030;

• development of organizational mechanisms for implementing the strategy: preparation of sectoral and regional programs, decrees of the governor, government decrees, etc.

Mechanisms for attracting investments should provide for:

• use of various schemes of public-private partnership in the field of transport in the region;

• introduction of payment mechanisms for the use of transport infrastructure facilities to ensure their regulatory content;

• creation of a system of long-term contracts for design, construction and subsequent maintenance

Table 1

Strategic priorities, goals, objectives and indicators of the strategy for development of rapid urban passenger transport

Strategic priorities	Objectives	Strategic tasks	Indicators
Improving the quality of public transport services	Increasing the share of public transport in ensuring demand for transportation. Ensuring accessibility and quality of transport services for the population.	1. To improve the pedestrian accessibility of public transport facilities. 2. To increase the attractiveness of existing types of land transport. 3. To develop extra-rapid transport. 4. To increase the speed of transport communication with the airport and train stations.	1. The share of the population using the services of urban passenger transport, %. 2. The share of the population using rapid urban transport services, %. 3. Average travel time with work purposes, minutes. 4. Average travel speed, km/h.
Improving the ecology of the transport system	Reducing the negative impact of the transport system on the environment.	Reducing the use of the private transport fleet for trips with work purposes to the central planning zone by 30 %.	1. Death rate due to an accident, a person per 100 thousand inhabitants. 2. Number of recorded accidents, cases per 10 thousand vehicles.
Increasing the security of the transport system	Improving transport safety performance.	1. To develop pedestrian and traffic flows in different levels. 2. To minimize the movement of dangerous goods in St. Petersburg.	1. Pollutant emissions to the atmosphere from motor vehicles, thousand tons. 2. Decrease in intensity of noise load in the zone of urban highways, %.

of transport infrastructure facilities aimed at achieving indicators.

The Ministry of Transport of the Russian Federation, territorial structures (divisions) of federal executive bodies, public authorities of St. Petersburg and Leningrad Region, local municipal bodies, transport companies, enterprises of various economic sectors, business community, educational and scientific institutions, public associations and other interested organizations participate in the strategy implementation.

It is planned to fully inform the population about the progress and results of the strategy implementation in the mass media, as well as on the portal of ANO «Directorate for Development of the Transport System of St. Petersburg and Leningrad Region».

Successful implementation of the strategy will be ensured by:

– coordination of the main provisions of the regional strategy with the Transport Strategy of the Russian Federation and documents for long-term and medium-term planning of social and economic development of St. Petersburg and the Leningrad Region;

– availability of normative-legal, scientific-methodological, organizational, resource and information support for the strategy;

– involvement of the public at large in the processes of identifying and discussing the priorities, goals and objectives of the strategy;

– accessibility and openness of information on the main provisions of the strategy, its activities and priority investment projects;

– establishing a clear order of interaction between the participants in the implementation of the strategy;

– functioning of the monitoring system for development of the rapid transport system, which allows an objective assessment of the degree of implementation of the planned.

Management principles

The development of the strategy of rapid urban transport organizations is based on the principles of the strategic management system. We have agreed upon the principles for implementation of sustainable development of rapid transport, while taking into account the experience of foreign cities that have achieved the greatest success.

The principle of competition, supply and demand is especially important for rapid urban transport, as competition in the passenger transportation market increases, and demand and supply have significant fluctuations. In this regard, the initial stage of strategy development should be the study of long-term trends in this area.

The possibility of using one infrastructure for freight and passenger traffic, which is due to the technological features of the maglev system, makes it possible to additionally carry out competitive passenger transportations at high speed. Within the framework of the project, it is realistic to consider the variant of passenger routes on the line of the maglev constructed in the proximity of St. Petersburg–Moscow HSR line. To do this, first of all, additional investment is needed.

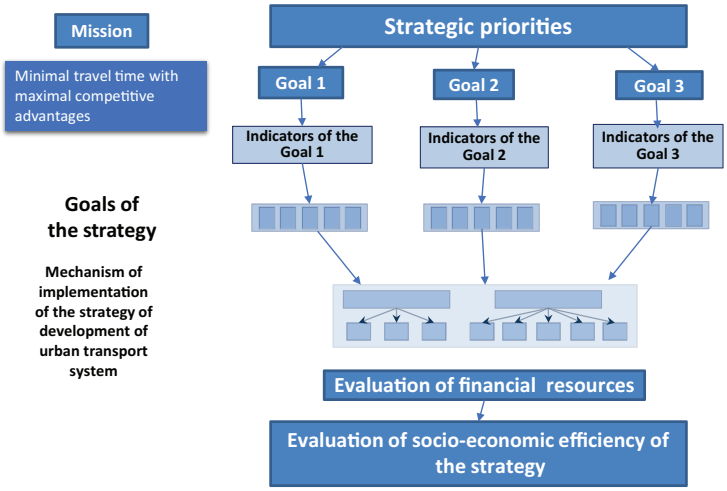
The principle of variability assumes the calculation of the strategy of rapid urban transport companies taking into account possible scenarios of socio-economic development and modernization of the transport complex of agglomeration. When developing the forecast for the transport system, the modern processes in the world economy were taken into account, as well as the main trends determining the socio-economic prospects of the Russian Federation, the North-West Federal District, St. Petersburg and the Leningrad Region.

The principle of expectation means a rational calculation of the expected revenues from implementation of possible options for the strategy, depending on demand and supply for rapid urban transport services.

The principle of conformity reflects the degree of conformity of the developed strategy for development of rapid urban transport to the main strategic goals and requirements of the market for services of this type of transport.

The principle of balance implies linking the volumes of passenger flows planned in the strategy for development of rapid urban transport with the capacity and sources of financing.

The principle of safety and ecology aims at increasing the level of safety and environmental protection in the area of functioning of rapid urban transport, which remains an unchanged state priority



Pic. 2. Conceptual approach to development of a strategy for development of rapid urban transport.

in the strategy of development and modernization of the industry.

The development of a strategy for development of rapid urban transport relies on the use of the above principles. They are also taken into account in the conceptual scheme, shown in Pic. 2. The elements present in it will visually summarize all the interrelations and features of the process of formation of the new system and the management efforts behind it.

Conclusions. *One of the ways to solve the transport problem is the use of urban rapid transport. An alternative to its traditional form is maglev (transport on magnetic suspension) – environmentally friendly, safe, with the highest speed of all types of public land transport.*

The proposed conceptual approach to developing a strategy for development of rapid urban transport is an important condition for improving the efficiency of rapid passenger transportation. This will not only solve a number of problems facing the transport complex of large cities, reducing traffic jams and the number of accidents, improving the ecology in the city, but will also result in the growth of the level of strategic traffic management and the quality of passenger transportation in general.

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