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METHODOLOGICAL BASE FOR THE IMPLEMENTATION OF THE MAGNETIC LEVITATION TRANSPORT TECHNOLOGY PROJECT IN RUSSIA

Aim: determine the methodological basis for forecasting social economic effect from implementation of major infrastructure projects in world practice. To compile an individual list of evaluation criteria based on recent research about technical capabilities of magnetic levitational transport technology (MLTT) transport.

Methods: statistical methods of transport industry analysis and interbranch balance method are applied.

Results: the potential market for application of technology has been identified and a forecast for changing transport industry matrix has been made.

Conclusion: this article is the basis for conducting a comprehensive study of the social-economic response of the MLTT project implementation in Russia and determination of optimal parameters for public-private partnership during its realization.

Keywords: magnetic levitation, maglev, social economic effect, interbranch balance method, BIG DATA

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МЕТОДОЛОГИЧЕСКАЯ БАЗА ОБОСНОВАНИЯ РЕАЛИЗАЦИИ ПРОЕКТА МАГНИТОЛЕВИТАЦИОННОЙ ТРАНСПОРТНОЙ ТЕХНОЛОГИИ В РОССИИ

Цель: определить методологическую базу обоснования и прогнозирования социально-экономических эффектов от реализации крупных инфраструктурных проектов в мировой практике. На основании свежих исследований о технических возможностях транспорта на основе магнитолевитационной транспортной технологии (МЛТТ) составить индивидуальный ряд критериев оценки.

Методы: в работе применены статистические методы анализа транспортной отрасли, метод межотраслевого баланса.

Результаты: определён потенциальный рынок применения технологии и сделан прогноз изменения матрицы транспортной отрасли.

Выводы: работа является базисом для проведения комплексного исследования социально-экономического отклика на реализацию проекта МЛТТ в России и определения оптимальных параметров государственно частного партнерства при реализации данного проекта.

Ключевые слова: магнитная левитация, маглев, социально-экономический эффект, межотраслевой баланс, BIG DATA

INTRODUCTION

Magnetic levitation transport technology (MLTT) has a huge potential for introduction into the transport complex of the largest world's countries (area above 3 million km²), in which the improvement of transport mobility will significantly accelerate the processes of value creation. At the same time, high-speed magnetic-levitation transport systems, in contrast to the conventional "wheel-rail" technology, are suitable not only for passenger transportation, but also for freight. Such flexibility of the MLTT is due to this number of reasons:

1. Reduction of the dynamic component on high speeds. A detailed study of these aspects was carried out in [1, 2]. The resonance factor of MLTT train is determined to be 1.07; for high-speed trains this value is 3–4 [3, 4];
2. More controlled level of acceleration. The movement of MLTT trains is based on the high-frequency calculations of microcontrollers, thanks to which a more comfortable level of acceleration is achieved. This characteristic is important both for passengers and freight transportation;
3. Full automation of processes – it will lead to higher productivity of sort facilities.

ANALYSIS OF METHODOLOGICAL APPROACHES

The determination of social economic effects from the construction of a road network based on MLTT is a fundamentally new task that combines a combination of previously proposed solutions:

1. Construction of high-speed passenger railways [5, 6];
2. Correlation of the redistribution of passenger traffic between airports and high-speed railways [7–9];
3. Methodology for designing a multimodal transport network [10–11].

4. The construction of road networks is an integral driver of region's development. But there is no universal method for estimating the effect from the construction of new routes. The exact answer to the questions about what feedback on the new transport network will come from different industries, private business, real estate market and integral growth of GDP is impossible. Any forecasting in this area has evaluation nature. And reports dedicated to estimating of social economic effects from new infrastructure objects use a combination of methods:

1. Interbranch balance method (inputs-outputs);
2. Evaluation of agglomeration effects;
3. Evaluation of reduced travel times between the concentration centers of consumers and the suppliers of products effects;
4. Effects on the budget: increase of the tax base; reduction of costs for the implementation of obsolete infrastructure.

Examples of the most relevant studies are the assessment of the social and economic effects of High Speed 2 in the UK, the modernization of the Chicago transport system until 2020, and the maritime logistics center in Portland, USA.

The construction of the Moscow-Kazan High speed railway (HSR) and analysis of project HSR «Eurasian» have demanded conducting similar researches in Russia. These developments were carried out by PwC and the Center of Strategic Development (CSD). The results of published reports are not equal and more detailed algorithm of calculating are not given [12, 13].

FORMULATION OF MODERN WAY OF INFRASTRUCTURE DATA BASE ANALYSIS

At the same time, the reason for the high correlation of the results is absence of extensive statistical bases for the industrial branches and regional social economic indicators that researchers can operate on. The data published by Russian Federal State Statistics Service is very general and, in fact, obsolete by the time of release, so it can't be a basis of local infrastructure solutions which determinate of the overall development vector.

Nowadays when all spheres of life includes BIG DATA, implementation of large infrastructure projects requires a comprehensive automated analysis of current data bases. The demands of local directions should be correlated with each other. And on the basis of its conflicts, a set of optimal strategies should be allocated. The scheme of the methodological basis for making decision is shown in the Fig. 1.

Identifying of demands of individual enterprises and consumers, optimizing the transport connection between them is an actual task all over the world. Currently, there is a stable trend of introducing BIG DATA analysis in this direction. In the

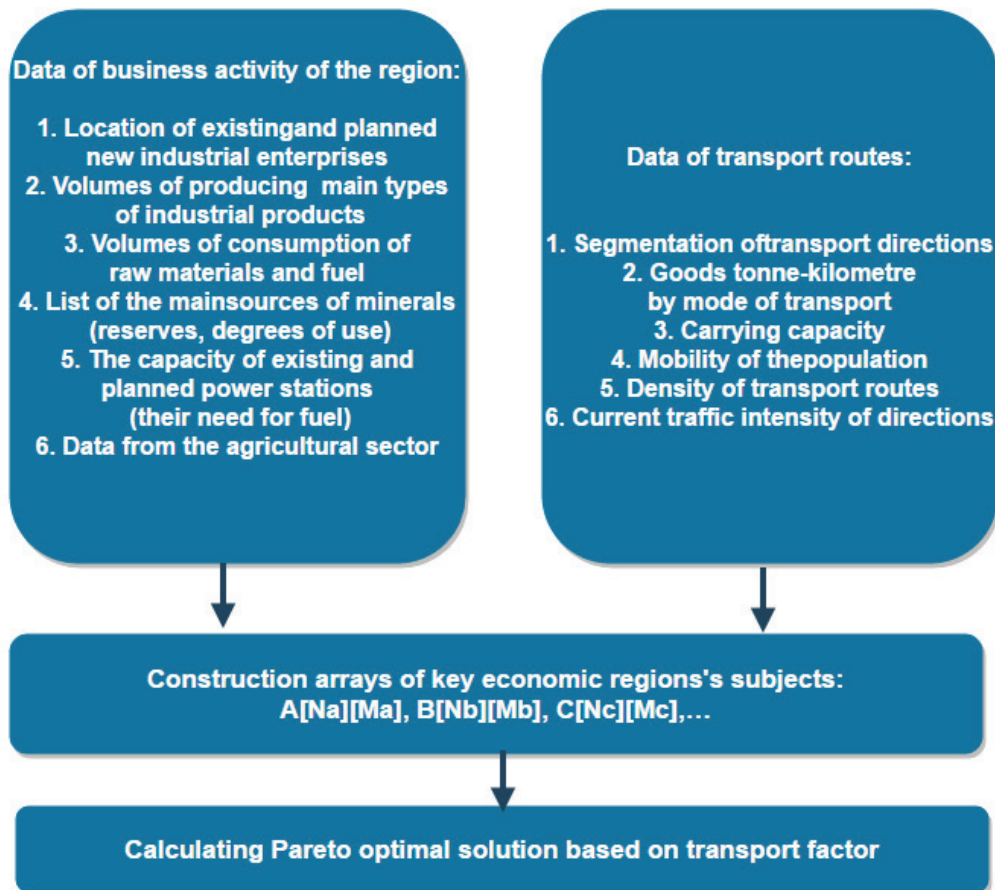


Fig. Modern methodological basis for making infrastructural decision

US, some of the solutions for optimizing the transport network are adopted using dynamic database analysis in the REMI, KTC, TREDIS software complexes [14].

FORECAST OF CHANGINGS IN RUSSIAN TRANSPORT INDUSTRY MATRIX AFTER MLTT INTRODUCTION

The economic justification for the construction of a route based on MLTT is a complex and responsible study. The major tasks of which are:

1. Determination of the optimal location of the network.
2. Determination of changings in transport industry matrix after MLTT implementation.

Taking into account the above-mentioned specificity MLTT, the decision about stages of network construction should be taken based on an expanded set of criteria mentioned in scheme above.

The second task is a consequence of the first. Analysis of data published by Russian Federal State Statistics Service [15] gives general summary of current Russian transport industry matrix – Table 1.

Table 1. Matrix of Russian transport industry

	<i>Group 1</i>	<i>Group 2</i>	<i>Group 3</i>
Types of transport	Pipeline and railway	Automobile	Marine, river, air
Main characteristics	Long distances of transportation of goods and large volumes of goods tonne-kilometre	Small average distances and large tonnage	The volume of freight transportation is much lower

Based on these statistics and general transport characteristics of MLTT, it is possible to draw conclusions about a number of potential areas of its implementation. Creation of high-speed freight/passenger ground transport with the possibility of full automation of shipment process will significantly increase the average route speeds of transportation, which for today on railway transport are only 15 km/h.

The implementation of MLTT will lead to a multiple increase in the carrying capacity of new lines.

Therefore, with the wide introduction of the MLTT in the continental part, the following changes will occur in the system of freight transportation – Table 2.

Table 2. Changes in the freight transportation matrix after implementation of MLTT

Types of transport	Summary characteristics of changes
Railway	Transportation for long distances will disappear; Local industrial application
Marine & River	Remain in demand transoceanic transport
Automobile	Remain relevant for transportation to medium and small distances
Pipeline	Never changers
Air	Remain relevant routes to hard-to-reach areas

CONCLUSION

The 21st century for the Russian Federation is a century of territorial potential reveal through the implementation of large scale infrastructure projects. In the area of construction of extended transport networks, the profit received by the carrier from the direct transport services is much less than the incomes received by the state (the increase of GDP). Therefore, the construction of these facilities - should be carried out according to the public-private partnership

This article listed the main methodologies for assessing social economic effects from the construction of new infrastructure projects. Based on the technical

characteristics of the magnetic levitation transport, the main vectors of integration existing methods were formulated. The main components of the integrated assessment method are given. There was identifying the demand of expanding industries monitoring to improve the accuracy of solving forecasting infrastructure tasks and improving the efficiency of management decisions in transport Industry.

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