Methodological aspects of singular and applied economics in increasing economic efficiency in railway transport enterprises

Bobojonova Zarnigor Shokirovna
Tashkent University of Information Technologies
Associate Professor of the Department of "Economics in the ICT Sector"

Annotation: The issue of increasing economic efficiency in railway transport enterprises has reached a level that cannot be solved within the framework of simple savings or linear logic such as "carry more". This is because the railway system is simultaneously a capital-intensive infrastructure, a social service and a pillar of national logistics stability, in which small parameters (tariff, schedule, energy supply, cargo composition, service quality, disruptions in digital systems) can dramatically change the outcome of the entire system. That is why the integration of singular and applied economics is defined as the methodological basis from the very beginning of the work. In particular, while applied economics turns railway operations into a mechanism controlled by measurable indicators (OPEX/CAPEX, cost, profitability, wagon turnover, ton-km/passenger-km, energy consumption, service KPI), singular economics reveals exactly at what points the system leaves the traditional operating mode and enters a nonlinear state.

Key words: singular economics, applied economics, railway transport.

The direct compatibility of this approach with the priority areas of digital transformation and efficiency improvement within the framework of the "Uzbekistan-2030" development strategy is described as follows: in the context of modernization of economic sectors, strengthening the competitiveness of logistics and transport corridors,

and expanding digital solutions in public services and management processes, a data-based management paradigm is also being formed in the railway sector. Especially in the current era of accelerating processes related to the development of artificial intelligence, the methodology for assessing the railway economy should accept technologies such as AI/ML, big data, IoT and digital twin as an integral part of a single production and service function. In this regard, the singular-practical methodology serves to accurately measure the economic outcome of solutions such as AI-based schedule optimization, predictive maintenance, demand forecasting, dynamic tariffs and energy-efficient management in railway enterprises, while at the same time identifying "singular risks" in advance, such as digital disruptions, socially sensitive tariff zones and critical load points. In our opinion, the singular economy methodology interprets the economic system not as a set of simple linear connections, but as a complex adaptive structure evolving through critical points, accelerating changes and qualitative leaps. This methodology analyzes economic processes not within the framework of a stable equilibrium model, but in terms of nonlinear dynamics, increased internal dependencies and transformational depth. Here, efficiency is assessed not by a simple profit or profitability indicator, but by the system's ability to reorganize itself, the level of digital integration and the speed of decision-making in conditions of uncertainty. In the field of railway transport, the singular economy methodology considers the interrelationships between train movements, logistics flows, energy management and asset operation in a single intelligent management environment; where a small operational change can lead to a sharp increase or decrease in the efficiency of the entire system. It is for this reason that this approach defines the methodological basis for the cumulative formation of economic value by transferring the railway system to information-based, real-time and adaptive management.

The methodology of applied economics is a holistic system that analyzes economic processes not at the level of abstract theoretical constructs, but through measurable indicators, empirical data and instruments that directly affect management decisions. This methodology assesses economic efficiency based on real costs, revenues, cash flows, risk levels and results of resource use and turns the decision-making process into a precise mechanism based on calculations. The main emphasis is on normative analysis, optimization, forecasting and monitoring of results. In the field of railway transport, the methodology of applied economics means ensuring the economic sustainability of the system through a comprehensive assessment of the efficiency of the train schedule, the speed of wagon turnover, ton-kilometer indicators, energy consumption, repair costs and return on investment.

American futurist and technological thinker Ray Kurzweil, in his Theory of the Technological Singularity, argues that "as technological progress advances at an exponential rate and artificial intelligence surpasses human intelligence, the economic structure will be fundamentally reshaped." This approach analyzes the economic system based on the accelerating momentum of innovation over time. As technological capabilities increase, production, management, and service processes become more independent of human labor.

British economist Diane Coyle, in her commentary on the concept of the singular economy, notes that "the digital economy will blur the boundaries between physical and virtual activity and fundamentally change the mechanism of value creation." This concept links economic value no longer with the volume of production, but with information, algorithms, and intellectual capital. The labor market will be restructured, and the mechanism of income formation will move to a new institutional framework.

As American economist Erik Brynjolfsson has argued in the context of the economic singularity hypothesis, "the rapid development of artificial intelligence will

be able to perform many economic tasks at a level superior to humans, and this may lead to a reduction in the share of labor." This hypothesis associates a new source of economic growth with automated decision-making systems. Production efficiency will increase, but there will be dramatic changes in the structure of employment. Institutions will be redesigned to suit the new technological environment. As a result, economic policy will need to be combined with the retraining of human capital and the maintenance of social stability.

The American economist Don E. Ethridge expressed the following opinion to explain the importance of applied economics in terms of methodological basis: "Theoretical economics has the advantage of its theoretical complexity, and applied economics has the advantage of using empirical methods and presenting economics more clearly and topically. But we can achieve truly high-quality applied research only when we combine the important aspects of these two directions within a single effort. And the arguments and disputes between the two "camps" have a negative impact on both sides." The singular economy methodology sees the railway enterprise not as a collection of separate departments, but as a network of mutually resonant processes and justifies the fact that efficiency can be increased precisely by managing the turning mechanisms within this network. In this approach, the center of value creation is not in a single indicator, but at the points where schedule discipline, technical condition of assets, energy supply, tariff signals, customer experience and digital continuity reinforce each other. Therefore, the methodological task begins with finding which chain of links to strengthen, rather than which indicator to increase: for example, predictive maintenance not only reduces failures, it increases schedule stability, and schedule stability accelerates wagon turnover, which increases service quality and revenue predictability. The singular methodology requires the railway economy to perceive AI and data-based management not as an additional technical module, but as a management

logic that reorganizes the system itself, because it is through this logic that the system moves from a normal operating mode to a high-performance mode, and the growth of the result becomes cumulative.

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