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COMPLEX APPROACH TO TRANSPORT QUALITY AND EFFICIENCY

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Abstract

Currently, the planning of the activities of transport organizations is carried out according to the current nomenclature of costs for the types of activities of an enterprise. This approach to planning is oriented towards ensuring the cost-effectiveness of organizational and technical measures, but leads to unproductive costs from excessive environmental impact. The scattered production and environmental planning and the lack of interconnection between environmental planned measures and production organizational-technical measures lead to a certain paradox: transport enterprises first pollute the environment, creating unproductive costs, and then reduce it by increasing capital and operating costs aimed at reducing hazardous effects. The integrated approach proposed by the authors of the paper to planning the quality and efficiency of transport organizations is aimed at harmonizing planning of production and environmental activities. Organizational and technical measures taken by enterprises should be both effective and environmentally friendly, which will ensure the quality of work, compliance with the principles of corporate social responsibility, and increase the company's business reputation. The paper presents the main results of the study: a morphological model for planning the quality and efficiency of transport organizations developed taking into account the production processes of enterprises, their elements, components of transport impact on the environment and aspects of corporate social responsibility, as well as indicators for assessing the quality and efficiency of transport companies, which take into account industrial and non-transport components of the effect: economic, as well as socio-environmental.

Keywords: Efficiency, evaluation, indicator, model, planning, quality

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1. Introduction

In the 21st century the issues of the quality of enterprises in various sectors of the economy are the most important area of interdisciplinary research, since the "quality of work" is always associated with economic, technical, as well as socio-environmental aspects. The quality of work of the transport organization is inevitably associated with satisfying the needs of service consumers, increasing economic efficiency, as well as ensuring the social and environmental safety of their activities (Štefancová et al., 2017).

This study is devoted to the development of an integrated approach in the planning of activities of transport organizations to ensure the quality and efficiency of their work in the relationship between the economic and financial objectives of transport and the goals of its socio-environmental policy, which makes the topic of study quite relevant.

2. Problem Statement

Currently, transport companies have a scattered approach to cost planning in various areas of activity. The issue of cost planning in transport organizations appears to be largely elaborated and linked to production processes and elements. Cost planning should be carried out by activity (Teryoshina & Soroka, 2014). The current Nomenclature of revenues and expenses of natural monopolies in the field of railway transportation states the need for the grouping of specific (direct production) costs by type of activity. All activities of the Russian Railways are divided into the following two groups:

1. Transport, infrastructure and locomotive traction services.

2. Activities not related to transport, infrastructure services and locomotive traction.

Thus, it is possible to define the aggregate activity types of the Russian Railways according to the Nomenclature:

1) provision of freight transportation services;

2) maintenance and operation of railway transport infrastructure;

3) locomotive traction;

4) provision of long-distance passenger transportation services;

5) provision of passenger transportation services in suburban traffic;

6) repair of rolling stock and transport equipment;

7) construction of railway transport infrastructure facilities;

8) research and development works;

9) maintenance of social objects;

10) other types of work.

For each group, production costs are planned without environmental measures, which are carried out by separate production units – Railway Environmental Protection Centers. Thus, the management system of the Russian Railways differentiates between production and environmental activities, environmental and production planning is separate from each other. Figure 01 shows a structural diagram of the implementation of production, economic and environmental activities in the transport industry. Management solutions are the result of a combination of three components: management functions (MF),

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production processes (PP) and their elements (EPP). In the event of unproductive losses, current environmental costs (CEC) and environmental investments (EI) serve as the tools for reducing pollution and eliminating damage.

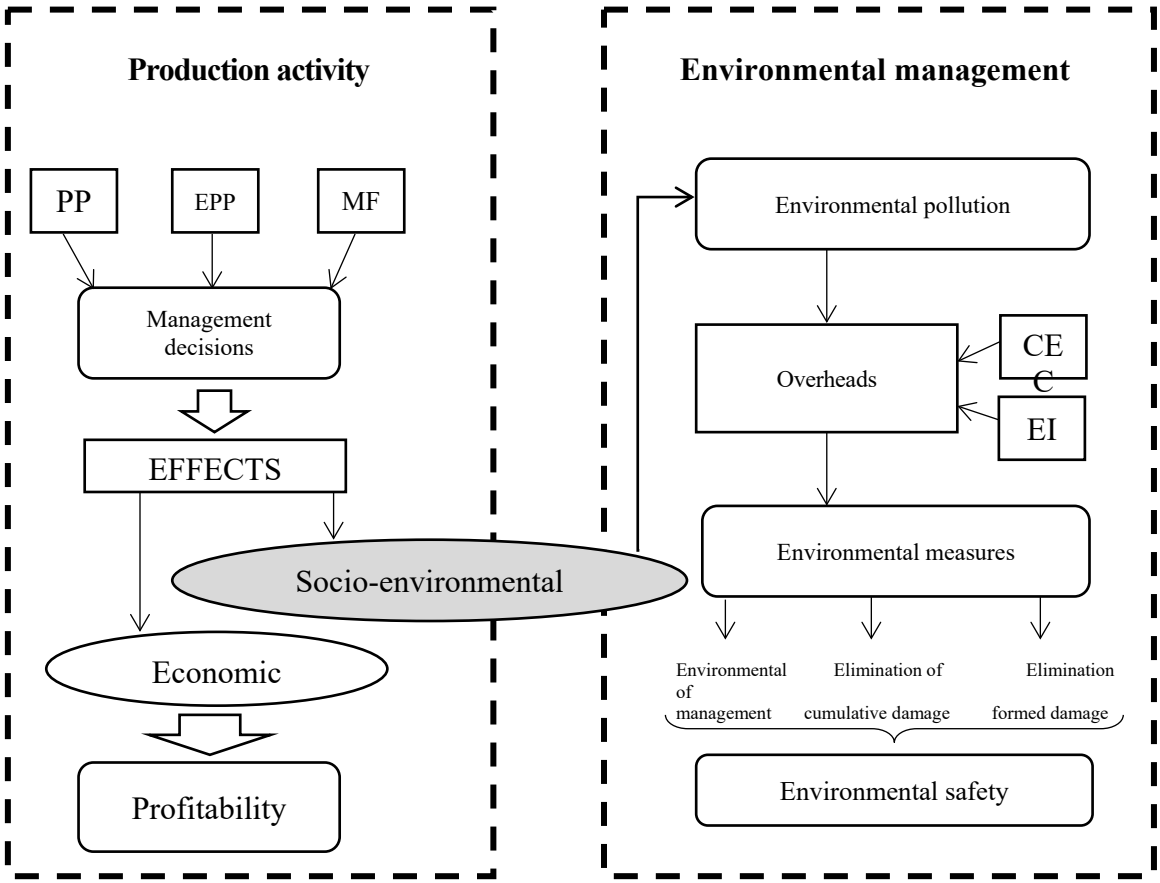

Figure 1. Scheme of transport industry in terms of economic efficiency and environmental safety

Management decisions inevitably have both economic effects expressed in the form of profitability of production activities, and socio-environmental effects, which may lead to unproductive costs. To prevent or reduce such losses, environmental measures are formed that, in turn, ensure environmental safety (Malekpour et al., 2017). Excess overhead costs are represented as payments for excess pollution, and regulatory costs are represented as payments for permissible (agreed) pollution.

There is a paradox of planning: production planning is aimed at achieving economic efficiency without taking into account environmental safety and the quality of work from the point of view of corporate social responsibility, while environmental planning is aimed at eliminating the effects of pollution on the one hand, and preventing the growth of environmental damage caused by production planning. This paradox leads to the development of an integrated approach to planning the activities of transport organizations, in which environmental interest will be taken into account at the stage of production planning, thus ensuring the triunity of economic efficiency, environmental safety and quality of work of transport organizations.

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3. Research Questions

The object of the study is transport organizations; the subject of the study is the methodological aspects of an integrated approach in planning the quality and efficiency of their work.

3.1. Problem of planning model development

It is necessary to combine the production and environmental parts of the activity, on the basis of which it is possible to develop a new structure of production planning (Liu et al., 2011). It includes new principles for the formation of organizational and technical measures that take into account four components: production processes of transport, elements of production processes, components of transport impact on the environment and aspects of corporate social responsibility.

3.2. Problem of developing quality and planning performance indicators

It is clear that the cost-effectiveness indicators cannot be used to evaluate the integrated approach to transport enterprise planning. Universal performance indicators are needed that will take into account both economic and environmental components. The principles for the development of new assessment indicators are based on the consideration of risks in planning, an assessment of profitability taking into account environmental impact (Han et al., 2018). The decision criteria will allow only activities that are both cost-effective and environmentally sound at the same time to be included in production plans.

4. Purpose of the Study

To summarize the above, the purpose of this scientific study is to develop methodological aspects of an integrated approach to planning the production and economic activities of transport organizations, which allows taking into account economic and environmental aspects, reducing unproductive losses and improving the quality and efficiency of enterprises. The achievement of this purpose involves the following objectives of the study:

1. To develop a model of cost planning taking into account production processes, their elements, components of transport impact on the environment and aspects of corporate social responsibility, which allows forming organizational and technical measures aimed at reducing unproductive costs, improving the efficiency and quality of transport organizations.

2. To develop a structure of a comprehensive transport organization plan taking into account the used cost range to reduce unproductive losses, improve the quality of work, efficiency and compliance with the principles of corporate social responsibility.

3. To develop indicators to assess the quality and efficiency of the integrated work plan of transport organizations taking into account uncertainty and risk.

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5. Research Methods

The authors applied the following methods of scientific research: modeling, formalization, generalization, the method of system analysis, analysis and synthesis, as well as the methods of technical and economic calculations. The methodological basis of the study includes the work of scientists on modeling the organizational environment, management of transport enterprises, as well as the development of metrics designed both to assess planning uncertainty and risk, and economic efficiency.

6. Findings

When planning operating costs, the railway transport enterprise should be considered from the point of view of interconnected and interacting production processes. This means that the modeling of a transport organization should take into account the following elements of the system:

1. Production processes of an enterprise.
2. Elements of production processess.
3. Management functions.

The main production process of transport organizations is transportation, which includes sub-processes: unloading, loading, traffic. The main sub-processes are provided through the coordinated work of other departments that perform supporting processes, such as scientific research, repair, transportation, storage, disposal, construction, maintenance, etc.

Each production process is ensured by a combination of its components. The elements of production processes are as follows: labor, raw materials, materials, works (services), components, information, investments, fixed assets, intangible assets, corporate interest, etc. Thus, the economic decision in the transport organization is the result of the interaction of the process of managerial influence on the elements of production processes in the framework of the production process itself. With respect to the diad “Production Process – Element of Production Process”, the third component of mom-standard overhead costs is identified – the transport impact component. The Transport Impact Component (TIC) is understood as a set of effects from production processes that result in, or is capable of causing, overhead, regulatory or over-regulatory costs. These include public, environmental, economic and reputational.

Based on the definition of corporate social responsibility as a concept according to which companies take into account the interests of the company and conduct business in accordance with the ethical, commercial and public expectations of the company (Devyatlovsky & Pozdnyakova, 2014), it may be concluded that the compliance with the principles of corporate social responsibility is linked with the business reputation of the transport organization – goodwill (Kivarina, 2014). Many authors consider goodwill as a type of intangible asset ensuring a positive or negative premium to the sale price. Therefore, business reputation management is necessary from the moment the company is founded throughout its life cycle. The motivation of the transport organization from the point of view of corporate social responsibility may be considered in several aspects, such as: preserving and improving the business reputation of a transport organization, ensuring sustainable development of territories, ensuring staff social development, improving the environmental situation (environmental protection), increasing the off-transport effect, resource-saving.

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The developed economic solutions will be focused on reducing overhead non-standard costs and increasing corporate social responsibility, which means the quality of the enterprise (Sokolov & Lavrov, 2015). Thus, based on the constructed morphological models, it is possible to propose a cost planning model of a transport organization. This model is shown in Figure 02.

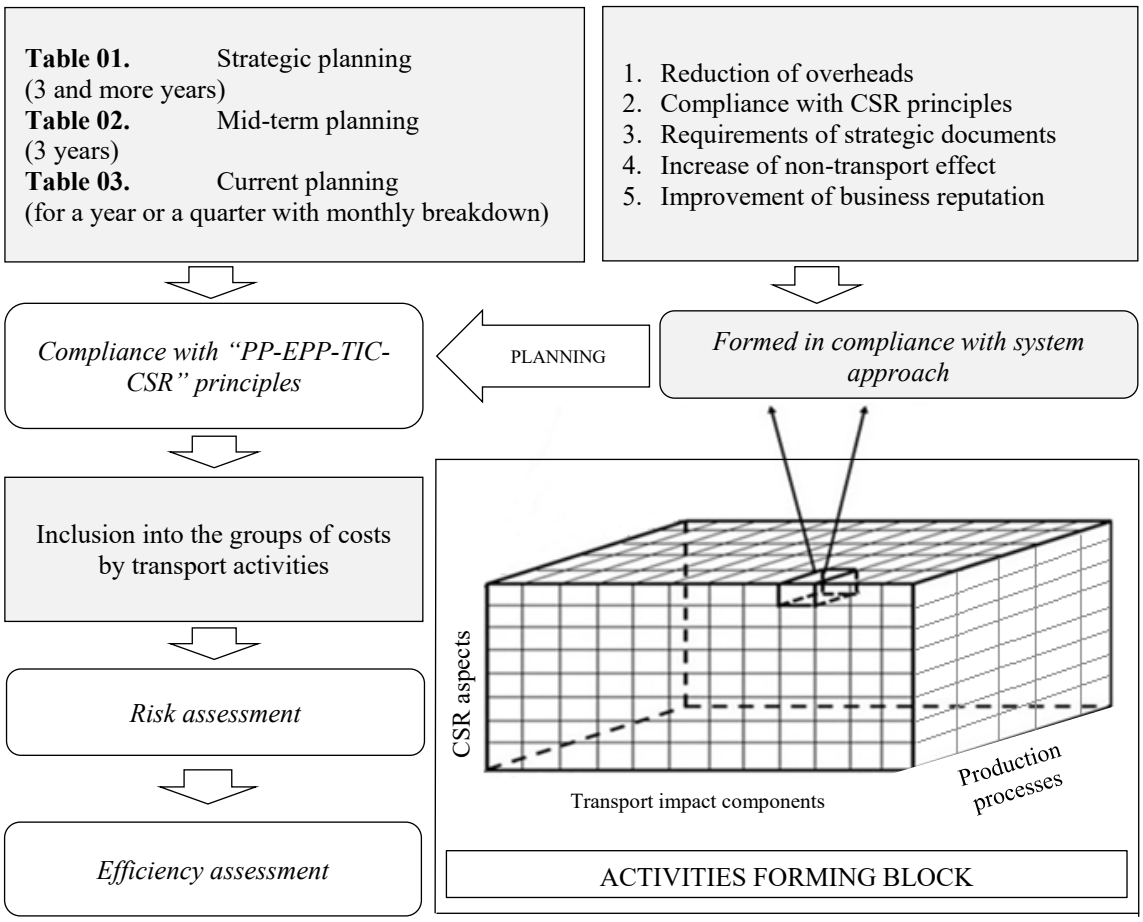

Figure 2. Cost planning scheme for transport organizations to ensure quality and efficiency mid-term planning

The formation of organizational and technical measures in planning the costs of production and economic activities of transport organizations takes place according to the following principles:

1. All activities should be based on the "Production Process – Elements of Production Process – Transport Impact Component – Corporate Social Responsibility Aspect" model.

2. All organizational and technical activities are formed for three levels of planning: strategic, medium-term and current in order to ensure the unity of planning.

3. All organizational and technical measures are formed by the types of work of each branch of the transport organization.

4. All organizational and technical measures are formed in relation to the nomenclature of income and expenses by type of activity of the transport organization.

The evaluation indicators of planned organizational and technical measures are included into the plans of the branches of the transport organization.

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The designed model will allow combining the production and environmental parts of planning, will ensure only management decisions that will be aimed at improving both the economic efficiency and the quality of the transport organization.

The activities are evaluated using indicators of economic impact and efficiency. The indicators in this case should take into account both economic efficiency and public efficiency for each planned organizational and technical activity, as well as be risk-oriented (Mezhokh, 2014). Thus, summarizing all the above, let us present the economic effect of the implementation of the planned action as the difference between the positive effects, including industry and non-transport, and costs – productive and overhead. It is defined by formula (1).

$$E^{ec} = (IE_1 - IE_2) + \sum ССВЭ + EV_п - (A_2 - A_1) - (B_2 - B_1) - P_э \quad (1)$$

where: E^{ec} – indicator of the economic effect from the implementation of planned organizational and technical measures, rub.;

IE_1 – industrial effect before implementation of planned organizational and technical measures, rub.;

IE_2 – industrial effect after implementation of planned organizational and technical measures, rub.;

A_2 – risk-adjusted value of the amount of capital investments in the planned activity, reduced to the initial period without taking into account the reduction of overheads, rub.;

A_1 – risk-adjusted value of the amount of capital investments in the planned activity reduced by the initial period, rub.;

B_2 – risk-adjusted value of the volume of operational productive investments in the planned activity reduced by the initial period, rub.;

B_1 – risk-adjusted value of the volume of operational productive investments in the planned activity reduced by the initial period, rub.

An integral criterion that is used to assess the quality and efficiency of cost planning and allowing unambiguously answering the main question: whether a specific organizational and technical activity should be included in the plan or not is the criterion for evaluating the planned organizational and technical activity taking into account overheads (Drozdov et al., 2019). It is represented in formula (2).

$$C^{ec} = \frac{E^{ec}}{A+B+P_э}, \quad (2)$$

where C^{ec} – criterion for estimating the economic efficiency of planned organizational and technical measures taking into account overheads.

Thus, when planning a particular organizational and technical activity, it is necessary to take into account not only its effectiveness at the time of planning, but also during its implementation, while the effect of its implementation will be reduced due to uncertainty of the future and a possible error in the assessment (Vasilenko et al., 2018).

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Based on formula (2), the planned solution will be effective if $E^{ec} > 0$. This means that the amount of overhead costs is lower than the industrial and non-transport effects of the enterprise. In this case, it is required to satisfy the condition in formula (3).

$$(IE_1 - IE_2) + \sum \text{ССВ}E + EV_{\text{п}} > (A_2 - A_1) - (B_2 - B_1) - \text{НП}_{\text{э}} \quad (3)$$

When this inequality is satisfied, it makes sense to plan organizational and technical measures since it is cost-effective and reduces non-standard overheads. In other cases, the planned activity is environmentally inefficient – it means that it should not be included in the plan.

7. Conclusion

Thus, the study justified an integrated approach in planning the quality and efficiency of transport organizations. The integrated approach implies the relationship between the production planning of operational costs of transport organizations and the planning of their environmental activities: each organizational and technical activity in production planning should be aimed at reducing non-standard overhead and regulatory costs, respecting the principles of corporate social responsibility, improving business reputation. A model of cost planning in transport organizations was developed, indicators for assessing the economic impact of planned organizational and technical measures, quality and efficiency of work were presented.

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