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## FORMATION AND FUNCTIONING OF THE SYSTEM OF MANAGEMENT OF OPERATING ACTIVITY OF THE RAILWAY TRANSPORT COMPANY IN THE ADAPTIVE MANAGEMENT ASPECTS

*Ovchynnikova V.A., doctor of sciences, professor,  
Gangzhur A.S., student (USURT)*

*The article proved the necessity of applying an adaptive approach in the management of domestic railway enterprises, which allowed to substantiate the purpose of the article, which is to form and outline the peculiarities of the functioning of the management system of operational activity of the railway transport enterprise in the aspect of adaptive management. In order to achieve this goal, methods of modeling, abstraction and logical analysis were mainly used to clarify the key conceptual aspects of the formation and functioning of the railway transport enterprise operational management system in the aspect of adaptive management. The basic provisions of the concept of adaptive control are investigated. The peculiarities of formation and functioning of the system of management of the operational activity of the railway transport enterprise in the aspect of adaptive management are outlined. The goals, objectives and tools of adaptive management of railway enterprises are defined. The implementation of the basic principles and provisions of the adaptive approach to the management of the operational activity of the railway enterprise should be carried out with the help of the developed system of models and methods of decision-making, which have a single information base and interconnected certain information links. The structure and composition of the model system must vary depending on the input, so management information systems must be used to make management decisions. The system of methods and models should include factor analysis of the results of production and economic activity of the enterprise; forecasting demand for goods and services provided by the enterprise; formation and optimization of production capacities; reliability assessment; logistics. An important aspect of adaptive management is to make management decisions based on successive balanced steps. The decision-making algorithm should include the following steps: detecting changes, external perturbations; analysis of information collection and change; development of a criterion for evaluating the effectiveness of the solution; creating a list of potential impacts on the industry's adaptation to environmental change; predicting the effects of these*

*impacts and adapting to emerging situations; review and evaluation of decision options; making, registration, bringing to executors, execution, control over execution of decisions.*

*Keywords: system, adaptation, adaptive management, enterprise, railway transport, operational activity.*

## **ФОРМИРОВАНИЕ И ФУНКЦИОНИРОВАНИЕ СИСТЕМЫ УПРАВЛЕНИЯ ОПЕРАЦИОННОЙ ДЕЯТЕЛЬНОСТЬЮ ЖЕЛЕЗНОДОРОЖНОЙ ТРАНСПОРТНОЙ КОМПАНИИ В АДАПТИВНЫХ АСПЕКТАХ УПРАВЛЕНИЯ**

*Овчинникова В.А., д.э.н, профессор,  
Гангжур А.С., студент (УкрГУЖТ)*

*В статье обоснована необходимость применения адаптивного подхода в управлении отечественными железнодорожными предприятиями, что позволило обосновать цель статьи, которая заключается в формировании и изложении особенностей функционирования системы управления оперативной деятельностью предприятий железнодорожного транспорта, в аспекте адаптивного управления. Рассмотрены основные положения концепции адаптивного управления. Обозначены особенности формирования и функционирования системы управления оперативной деятельностью предприятия железнодорожного транспорта в аспекте адаптивного управления.*

*Ключевые слова: система, адаптация, адаптивное управление, предприятие, железнодорожный транспорт, оперативная деятельность.*

## **ФОРМУВАННЯ ТА ФУНКЦІОНУВАННЯ СИСТЕМИ УПРАВЛІННЯ ОПЕРАЦІЙНОЮ ДІЯЛЬНІСТЮ ПІДПРИЄМСТВА ЗАЛІЗНИЧНОГО ТРАНСПОРТУ В АСПЕКТІ АДАПТИВНОГО УПРАВЛІННЯ**

*Овчиннікова В.О., д.е.н, професор,  
Гангжур А.С., студент (УкрДУЗТ)*

*У статті доведено необхідність застосування адаптивного підходу в управлінні вітчизняними залізничними підприємствами, що дозволило обґрунтувати мету статті, а саме сформулювати та окреслити особливості функціонування системи управління оперативною діяльністю підприємства залізничного транспорту в аспекті адаптивного управління. У статті досліджено особливості формування та функціонування системи управління оперативною діяльністю підприємства залізничного транспорту в аспекті адаптивного управління. Визначено цілі, завдання та інструменти адаптивного управління залізничними підприємствами. Реалізація основних принципів та положень адаптивного підходу до управління експлуатаційною діяльністю залізничного підприємства повинна здійснюватися за допомогою розробленої системи моделей та методів прийняття рішень, які мають єдину інформаційну базу. Структура та склад модельної системи повинні змінюватись залежно від бази даних, тому для прийняття управлінських рішень повинна використовуватися інформаційна система управління. Система методів і моделей повинна включати факторний аналіз результатів виробничої та господарської*

діяльності підприємства; прогнозування попиту на товари та послуги, що надаються підприємством; формування та оптимізація виробничих потужностей; оцінка надійності; логістика. Важливим аспектом адаптивного управління підприємствами залізничного транспорту є прийняття управлінських рішень. Алгоритм прийняття рішень повинен включати такі етапи: виявлення змін, зовнішніх збурень; аналіз збору та зміни інформації; діагностувати можливі проблеми, викликані змінами в навколишньому середовищі, та розробляти сценарії їх вирішення; визначення цілей управління при вирішенні проблеми; розробка критерію оцінки ефективності рішення; створення списку можливих впливів на адаптацію галузі до змін навколишнього середовища; прогнозування наслідків цих впливів та адаптація до виникаючих ситуацій; перевірка та оцінка варіантів рішень; прийняття, реєстрація, доведення до виконавців, виконання, контроль за виконанням рішень.

**Ключові слова:** система, адаптація, адаптивне управління, підприємство, залізничний транспорт, експлуатаційна діяльність.

**Introduction.** In a changing environment, rapid scientific and technological progress to ensure the harmonious development of the operational activity of the domestic railway transport enterprise requires the formation and active use of the enterprise's capabilities and changes, changes in the structure, its properties and functioning parameters, directions of development in order to adapt them to changes external and internal environment, the needs of today's market, which will support the competitive advantages. Achieving this task requires the development of new, more sophisticated management methods that will allow the industrial enterprise to balance between the scarcity of financial resources, the outdated technological base, energy and material intensity of production technology, on the one hand, and the need to meet the requirements of the modern economic environment □ on the other.

It should be noted that in determining the approach to operational management, it is necessary to consider that the enterprise is a system object and should be considered as an ordered set of elements that meet the requirements of the objective function and have interrelated structural and parametric components. A purposeful function aimed at meeting the needs of consumers, the harmonious development of the enterprise, is a set of interconnected local functions and requirements that must be met for its

effective functioning. These requirements are determined by the external environment, and the development of the enterprise should be carried out as an adaptation to changes in the external environment through innovative development.

Management of the processes of harmonization of relations and relationships between the enterprise and the external environment, changes in the internal structure that will ensure its harmonious development, should be carried out on the basis of an adaptive approach to management, which will allow to take into account the unpredictability of the enterprise's reactions and considers each action in the process of structural management as an experiment, in the result of which is training.

In addition, the transition to adaptive management will allow us to respond more quickly to changes, while maintaining the optimal balance between the internal capabilities of the enterprise and external market conditions, will provide information transparency of production and economic activity, resource efficiency, will facilitate the adoption of adequate management decisions in accordance with the goals of the enterprise.

The need to adopt an adaptive approach in the management of railway undertakings is also due to the need to develop adequate management mechanisms in changing external and internal conditions.

**Analysis of recent researches.** The issues of ensuring the efficiency of

management of domestic enterprises are presented in the works of V.L. Dikan, V.O. Zubenko, O.V. Makovoz, I.V. Tokmakova, O.V. Shramenko, V.T. Denysova, N.O. Nazareva, O.V. Grishchenko and others [1, 2].

The features of the concept of adaptive control were covered by scientists: S.B. Alekseev, I.V. Tokmakova, N.V. Yanchenko, A.V. Tkachenko, L.M. Manitskaya and others. [3 - 6].

The analysis of theoretical developments on the mentioned issues shows the high interest of scientists in the formation and use of the concept of adaptive management both at domestic enterprises and abroad. At the same time, new effective proposals are clearly needed, which would take into account the peculiarities of the functioning of domestic railway enterprises and allow the effective implementation of the concept of adaptive management on them.

**The study purpose.** The purpose of the article is to formulate and outline the peculiarities of the functioning of the management system of operational activity of the railway transport enterprise in the aspect of adaptive management.

**The main part of the study.** As the basic provisions of the concept and methodology of adaptive management of the railway undertaking have not yet been fully formed, the conceptual design of adaptive management is still being formed, there are different and ambiguous interpretations of this category.

Borisov A.B. believes that adaptive management – is a form of enterprise management that helps it to change flexibly, adapt quickly to the goals that are being updated, the tasks, functions of the enterprise, to changes in the external economic environment, in the conditions of its activity [7].

According to Varlamova T.P., adaptive management is the study, study of the environment, adjusting its activity to the needs of the environment, internal reserves and the activity itself to the needs of consumers [8].

Alekseev S.B. believes that adaptive management enables the enterprise, through the use of an adaptation mechanism based on constant monitoring of compliance with the actual level of adaptation to the regulatory one, to make timely changes to the strategic and current plans in order to ensure the survival of the enterprise and achieve the stated goal [3].

Provide adaptation directed changes of functioning both present and in the future. Given that purposeful change is a process of adjustment, and the state of the system, taking into account the future, is its potential, adaptation should be considered as a process of adjustment of the potential and an integral part of its formation, and adaptive management as an integrated component of the overall management system, which represents a consistent process of identifying the level of adaptation of economic potential and developing on this basis tactical and strategic decisions to implement the processes of its adjustment [4, 9].

In general, it can be argued that adaptive management is a flexible, innovative enterprise management capable of adapting to the new environment (in a competitive and internal environment with changes in plans and models depending on the situation: during the crisis, or when innovations are introduced, or in the case of organizational changes) with new management tools and techniques.

The mechanism of adaptive management collects and analyzes information on previous management situations, produces new behavior based on past experience. The main guideline is the goals and criteria laid down in the management system, that is, the prognostic values of the parameters that describe the situation are used [5].

Many authors [2, 6, 10] characterize the adaptability and adaptive control of such properties as resilience and flexibility. Resilience is the ability of a system to function effectively in the face of external influences and internal disturbances. Flexibility should be understood as the ability

of the system to move as a result of the effects of external and internal environmental factors from one working state to another with minimal resources and time. Therefore, an adaptive control system is able to provide adaptability of the basic elements of the internal environment by giving them the properties of flexibility [6] and the use of new management tools and methods.

The purpose of adaptive operational management of a railway undertaking is to develop the most effective management decisions aimed at ensuring the harmonious development of an entity in a changing external environment and sharpening competition in the market. The main task of adaptive management is to maintain the internal stability of the enterprise in a constantly changing external environment by realizing the internal economic potential.

Formation and functioning of the railway transport enterprise operational management system in the aspect of adaptive management shall meet the following requirements:

- the correctness of accounting for the complex spatio-temporal cause and effect of the interaction of the elements that make up the internal environment of the enterprise;
- constant monitoring of the adequacy of management decision-making algorithms to the conditions of enterprise functioning;
- prioritizing the flexibility and variability of management decision-making algorithms and implementing management actions for enterprise organizational structure mobility;
- the need to use a special mathematical (including formal-logical) apparatus for solving problems of optimal regulation and forecasting the dynamics of enterprise development [10].

In addition, adaptive management needs to take into account and reconcile individual, national, and regional interests in the dialectical interrelationship based on defining general and partial principles of the industry's operational activities.

To the list of tasks of adaptive management of operational activity of the

railway transport company we suggest to include: optimization of the current management system; monitoring of external and internal environment: systematic analysis of activity, evaluation of competitive advantages, economic potential; creation and use of the system for forecasting changes in the environment; determination of the scheme of strategic partnership, optimal interaction with other market actors; improving the quality of goods and services; increase of efficiency of use of economic potential of the enterprise; increase of adaptability of the enterprise to innovations, development of innovative activity, innovative adaptability; implementation of progressive management tools, including strategic and organizational ones; creating prerequisites for creating an adaptive competitive environment.

The object of adaptive management at the micro and macro levels is the system of operational activity of the railway transport enterprise for a specific time period, the subject is the content of the processes occurring within the enterprise and in its external environment, their influence on the harmonious development.

The goals and objectives of adaptive management can be achieved through effective tools, namely: a forecasting tool that will allow you to quickly evaluate what results the current state of the industry will bring; an instrument for operational adjustment of plans that will allow to adapt and modify development plans, functioning to changes in the environment; an operational management accounting tool that will provide feedback of management decisions with the current results of the enterprise; tools of amo-organization, which will allow to support quickly and independently or improve the level of organization of industrial and economic activity of an industrial enterprise in changing external or internal conditions of functioning; a self-management tool that is based on the ability of the enterprise on its own, without external pressure to adapt to change based on the implementation of its basic functions for self-preservation and self-development; managerial innovation - the

formation of innovative ideas and technologies for their implementation, which should be aimed at reducing the time of decision-making, improving productivity, ensuring the achievement of goals and quality of results of managed processes; motivation. The implementation of the basic principles and provisions of an adaptive approach to the management of the operational activity of the railway undertaking should be carried out through a developed system of models and decision-making methods that have a single information base and linked to each other certain information links.

The structure and composition of the model system must vary depending on the input, so a management information system must be used to make management decisions. The system of methods and models shall include a factor analysis of the results of the operational activity of the railway undertaking; forecasting demand for goods and services provided by the enterprise; formation and optimization of production capacities; reliability assessment; logistical support.

An important aspect of adaptive management is management decision making. The decision-making algorithm should include the following stages: detecting changes, external perturbations; information gathering and change analysis; diagnose possible problems caused by changes in the environment and develop scenarios for their solution; definition of management goals in solving the problem; developing a criterion for evaluating the effectiveness of the solution; generation of a list of possible impacts on the industry's adaptation to environmental change; predicting the effects of these impacts and adapting to emerging situations; verification and evaluation of decision options; making, registration, bringing to executors, execution, control over execution of decisions.

**Conclusions from the study.** In summary, it should be noted that adaptive management functions are directly related to forecasting and planning, work organization, activation and promotion, coordination and

regulation, control, accounting and analysis. The key role in the implementation of adaptive management is the managerial decision. The mechanism of adaptive management of a railway transport enterprise in a competitive environment is a set of principles, tools and technologies for making and executing management decisions. Their adoption is determined by an information system, which is defined as a single set of software, technical and organizational solutions that can accumulate information about the state of affairs of an entity that covers production, technological, financial, logistics, marketing, personnel and other processes, combining all units of the enterprise in a single information space. An adaptive operational management system organizationally consists of two interconnected systems: an adaptive planning system and an adaptive regulation system. Structurally, the two systems are almost identical.

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## ПРОБЛЕМИ ТА ПРІОРИТЕТИ РОЗВИТКУ ЗАЛІЗНИЧНОГО ТРАНСПОРТУ УКРАЇНИ

*Овчиннікова В.О., д.е.н., професор,  
Гонтар Н.О., аспірант,  
Мірошніков П.В., студент (УкрДУЗТ)*

*Встановлено, що вирішальну роль у забезпеченні сталого розвитку національної економіки відіграє залізничний транспорт, який наразі знаходиться на завершальному етапі реформування. Доведено, що сучасний техніко-економічний стан галузі характеризуються наявністю безлічі проблем, що обумовлені гіпердинамікою світової науково-технологічної революції, нестабільністю політичної ситуації в країні та у світі, появою конкуренції в галузі та зростанням її темпів на інвестиційних ринках і ринках транспортно-логістичних послуг, одночасним дефіцитом і збитком інформації через розвиток цифровізації у світі, а також поліваріантністю способів реалізації можливостей управлінських рішень. Визначені пріоритети розвитку залізничного транспорту.*

*Ключові слова: залізничний транспорт, розвиток, ефективність, конкурентоспроможність, проблеми, пріоритети.*