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Ensuring Development of the Production Potential in Terms of Implementation of Strategic Initiatives of the Railway Transport

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Abstract

The article determines importance of forming production strategy for railway transport that takes place under the influence of internal and external factors. It has been established that the most significant influence is caused by internal factors, which are caused, first of all, by the specific features of the main activity of the railway transport, transformational conditions of operation, in particular processes of reforming in the railway industry, and existing state of the production potential. It has been determined that formation of the production strategy of the railway transport is to ensure effective use and development of its own production potential.

Based on the use of a combined approach that stipulates combination of resource, process and reserve components of the production potential, and states the goals and results of operation, the authors provide their understanding of the essence of the production potential of railway transport as ability and capabilities of the available resources and business processes to ensure the main business activities of the railway transport companies to achieve their planned results and established goals in terms of operation of the railway industry.

Keywords: *Production potential; production strategy; railway transport; strategy of development of the production potential of railway transport; sustainable production.*

1. Introduction

The Ukrainian railway transport operates in conditions of strong competition and unstable external financial and economic environment, which requires constant making critical decisions and taking reasonable actions of management of railway companies aimed to increase efficiency of the railway transport and ensure its competitiveness in the global transport and logistics service market. In the context of the above, it is worth noting that achievement of a certain goal depends on the quality and efficiency of strategic management of the railway transport to a large extent, which creates opportunities for establishment of competitive advantages and ensuring a leading position in the transport and logistics market.

In current conditions, a well-developed production strategy, which is based, first of all, on efficient formation, use and development of the production potential of the railway industry, is crucial for development of domestic railway transport. However, at the moment "Ukrainian Railways" PJSC does not fully use the possibilities for development of its own production potential to improve efficiency of the railway transport and ensure its sustainable economic growth. Therefore, current state of the production potential of the railway industry needs to be studied to identify the main issues and form perspective directions to ensure its development.

2. Analysis of Scientific Studies and Publications on Development of the Production Potential

The process of formation of the production potential as a whole, as well as its components, is quite individual in nature, what is related to its specific features with regard to area of operation of the company. Therefore, in order to perform a full-scope analysis of the production potential of the railway transport, first of all, we have to consider the essence of the economic category "production potential", and identify the main components that will become the basis to form directions for its effective use.

Scientific literature is characterized by various approaches to determination of the essence of the term of production potential, and lack of general view to its interpretation, accordingly.

Thus, O. I. Anchishkin defines the production potential as a set of resources, which acquire forms of production factors in the course of production [1].

T.B. Berdnikova [2] considers this term as a category that combines various production opportunities of a company for manufacture and sale of various types of products, and rendering of services [2].

D.V. Galushko [3] discloses the essence of the production potential as a combination of production (material and labour) resources of the company that may be used to realize the targets of production entrepreneurship.

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I.Z. Dolzhanskiy [4] defines the essence of this concept as the scope of work in given units of measurement of labour costs (working hours) that may be performed for a certain period of time by the main production workers on the basis of existing production assets in two and three shifts and optimal organization of labour and production.

O.K. Dobykina [5] reveals the production potential as the ability of the production system to make material values, using production resources.

S.O. Ishchuk [6] provides a reasonable definition of the category of the production potential as a complex, organized and dynamic system, comprising multiple elements that are interconnected and interacting and perform various functions in the process of manufacture of products of the required quantity and quality in terms defined by the market.

M.K. Starovoytov and P.A. Fomin [7] determine the production potential in terms of the effectiveness of its use as a system of economic relations that arise between economic entities at the macro and micro levels to achieve the maximum possible production result, which may be obtained at the most effective use of the production resources, provided required levels of machinery and technology, advanced forms of production organization are available.

L.V. Zapashchuk [8] suggests to consider the production potential as marginal production capacity for the release of a certain scope of the products (rendering of services) of proper quality and range, taking into account the requirements of ensuring strategic flexibility of the production-technological basis of the company. The production potential of a company in this approach acts as a generalization characteristic, reflecting capacity of the existing staff and means of production to ensure conscious and purposeful transformation of the resources (materials and supplies).

T.M. Shatalova and A.G. Yenikeyeva [9] give quite an ambiguous definition of the production potential of the company as relations arising at the micro level between the employees of the company to obtain the maximum possible production result that might be obtained at the most effective use of production resources, with the existing level of machinery and technology, advanced forms of organization of production and regardless of the state of the environment. Meanwhile, the contradictory nature of such relations is determined by the internal environment of the company, and the production potential of the company refers to searching and implementing internal sources of self-development.

V.V. Dikan and P.Yu. Kas [10] provided the definition of the concept of the production potential of machine building companies that comes down to a combination of resources and reserves of machine building companies, as well as capabilities of the environment, optimal use thereof will ensure obtaining the maximum production result and achieving strategic goals of development of the machine building complex, creating conditions for implementation of an intensive way of development of machine building companies.

I.V. Solomnikov [11] defines the production potential of railway companies as a maximum opportunity to satisfy the population in transportation, with optimal use of the available resources and achievement of the scientific and technological progress. Moreover, the author notes that for industrial companies of the railway transport that are aimed to ensure efficient operation of the infrastructure and railway transport in general, the production potential shall be treated as the scope of products that they are able to make at the optimal use of resources and scientific and technological achievements.

It is worth emphasizing that most researchers, revealing the essence of the production potential, follow the resource approach, but their opinions differ in terms of elements comprising its structure. Some scientists have suggested that only basic production funds shall be considered in the production potential, while others include the main production assets and labour resources, or main production assets, labour and natural resources. In turn, O. Mikhailenko and N. Skopenko [12] somewhat extend the standard understanding of the structure of the production potential, and treat this concept as an integrated, multilevel component comprising resource potential and scientific and technical potential. At the same time, the resource potential includes fund, labor, energy and information potentials. O.S. Khryniuk and T.I. Grymashevich [13] suggest evaluate the production potential of the company by the following elements: the potential of non-current resources and working capital; labor; land; information; investment and innovation potential. Scientists have identified the material and technical potential and potential of production staff as elements of the production potential of the railway companies. In its turn, material and technical potential includes the potential of fixed production assets, current assets, intangible assets and characterizes the level of development of the technical and technological base of the company [11].

The analysis of available scientific approaches to the determination of the essence of the concept of the "production potential" enabled identifying the unity of ideas in relation to its three-element structure: fixed assets, current assets and labor resources. Today, scientists assessing the production potential of company rely mainly on determining the state of these components. However, this approach is justified in a stable, formalized and predictable environment. In this case, the scope of the components of the production potential enables determining the effective allocation and use of resources [14].

Taking into account the above scientific approaches to understanding the essence of the production potential of the company, it is appropriate to distinguish a combined approach combining the resource, process and reserve components of production potential, and indicates the goals and results of the activity. Taking into account the above, the production potential of the railway transport shall be understood as capabilities and possibilities of the available resources and business processes to ensure the main activities of the railway transport companies to achieve planned results and established goals of the railway industry. Accordingly, the structure of the production potential, taking into account the specific features of the main activities, affects efficiency of the operation of the railway transport and formation of a strategy for its development.

3. Study of the Issues and Perspectives of Development of the Production Potential of the Railway Transport

Today, unfortunately, the national economy remains far behind the trends of development of the world economic space, playing the role of a raw material supplement and acting as a market for the import of products, what resulted from a conscious refusal from the previously conquered position of the industrial leader. After all, the industrial policy of Ukraine, which emerged during the era of industrialization, when technical and technological means were considered as the main tool for solving the most important social and political tasks, has proved to be not effective today. The refusal to support strong production potential has led to the fact that most Ukrainian companies are not able to compete with strong transnational capital and they are technologically not ready to respond adequately to the challenges of the information and innovation society. All this requires searching for effective forms, mechanisms and means to revive the production potential of Ukrainian companies that would contribute to creation of the new models of high-tech products, growth of the intellectual capital, updating of the technical and technological base of domestic productions and optimization of the use of the production capacities [15].

The gradual loss of industrial potential and deterioration of the economic situation of the country also had a negative impact on the railway companies that are now in a very difficult situation. There is a steady reduction in the volumes of transportation by rail, caused by the influence of the external factors mentioned above, as well as internal deformations - the critical level of wear and tear of the rolling stock and railway infrastructure, deterioration of

financial and economic indicators of activity, lowered level of investment attractiveness of the railway industry, loss of competitive positions in the domestic transport and logistics space. At the same time as the volume of transportation is decreasing, costs are rising due to the constant rise in prices for energy and other material resources of the railways and high material and energy intensity of the railway transport. As a result, activity of the railway transport companies is making loss and their debt borrowing is growing.

In these conditions, formation of an effective production strategy, based on the use of a strategic approach to management of the production potential, becomes very important. Formation of the industrial strategy of the railway transport of Ukraine is under the influence of internal and external factors. Among the internal factors, the most significant influence is caused by the specifics of the main activity of the railway transport, transformational conditions of operation, i.e. processes of reforming in the railway industry, and existing state of the production potential. Let's consider each of them in detail.

First, it is the specifics of the main activity. The operational features of the railway transport are as follows: operation is ensured jointly by various production units (stations, car and locomotive depots, signalling and communication distances, etc.) and companies-carriers, operators, forwarding and logistics companies, etc.; the production cycle begins on some railways, and continues and ends with other railway companies. Unlike the industry, the objects of labour (goods), as well as means of labour (cars) pass from one company to the other on the railways. Locomotives, assigned to certain depots, where, they normally return to. The scope of locomotives' operation often do not coincide with boundaries of the railways, thus creating certain problems with estimation of the costs associated with operation of locomotives and compensation of these and other costs. The cars rotate across the network of railways. This justifies a specific area of activity in operation of the railways - regulation of rolling stocks. All this indicates the need for formation of a production strategy to take into account the availability of its own production potential and scope of the resources involved.

Second, it is an intra-transformational conditions of operation of the railway transport. At the current stage, the process of reforming the railway industry is continued through construction of a vertically integrated structure. The business model of "Ukrainian Railways" PJSC will be based on five business verticals: freight transport and logistics, passenger transportation, infrastructure, traction services, production and service. This year and some next years all companies will be created in the market segments. In addition, individual companies providing terminal services, logistics, intermodal transportation will be created in the cargo sector, in addition to traditional transportation. As for the traction rolling stock, a separate company – a traction operator – will be created. As for the passenger sector, in 2018, six regional suburban companies and a railway company will be established.

Third, it is current state of the production potential of the railway transport. Today, the technical resource of the railways is almost exhausted. There is a threat of lack of the railway transport in the future needs of the Ukrainian economy in transportation. Due to catastrophic depreciation of the rolling stock, discrepancy between acquisition and amortization of freight cars and locomotives there is a threat of failure to satisfy the needs of industrial sectors of the economy in transportation of goods with the corresponding costs for the state budget, lowering indicators of economic development of the country. Transportation capacity reserves are almost exhausted due to marginal wear and low performance of passenger rolling stock. Failure to take effective measures to upgrade the passenger rolling stock will result in failure to ensure passenger transportation in full volume and, as a consequence, reduced mobility of people.

4. Specific Features of Development and Implementation of Development Strategy of the Production Potential of the Railway Transport

Based on the study performed, one may conclude that the state of the production potential of the railway transport is worsening, what makes it necessary to develop management actions to increase efficiency of its use. The process of forming a production strategy for the railway transport, based on strategic management of the production potential, shall include the following stages (Figure 1): establishing goals of development of the production potential with regard to business directions; analysis of the factors of the external and internal environment of operation of the railway transport companies and their impact on the level of the production potential; formation of strategic options and choosing a strategic direction for development of the production potential of the railway transport; establishing reserves for increasing efficiency of its use on account of implementation of the concept of economical production; strategy implementation; control and adjustment of the chosen strategy of development of the production potential at the stages of implementation.

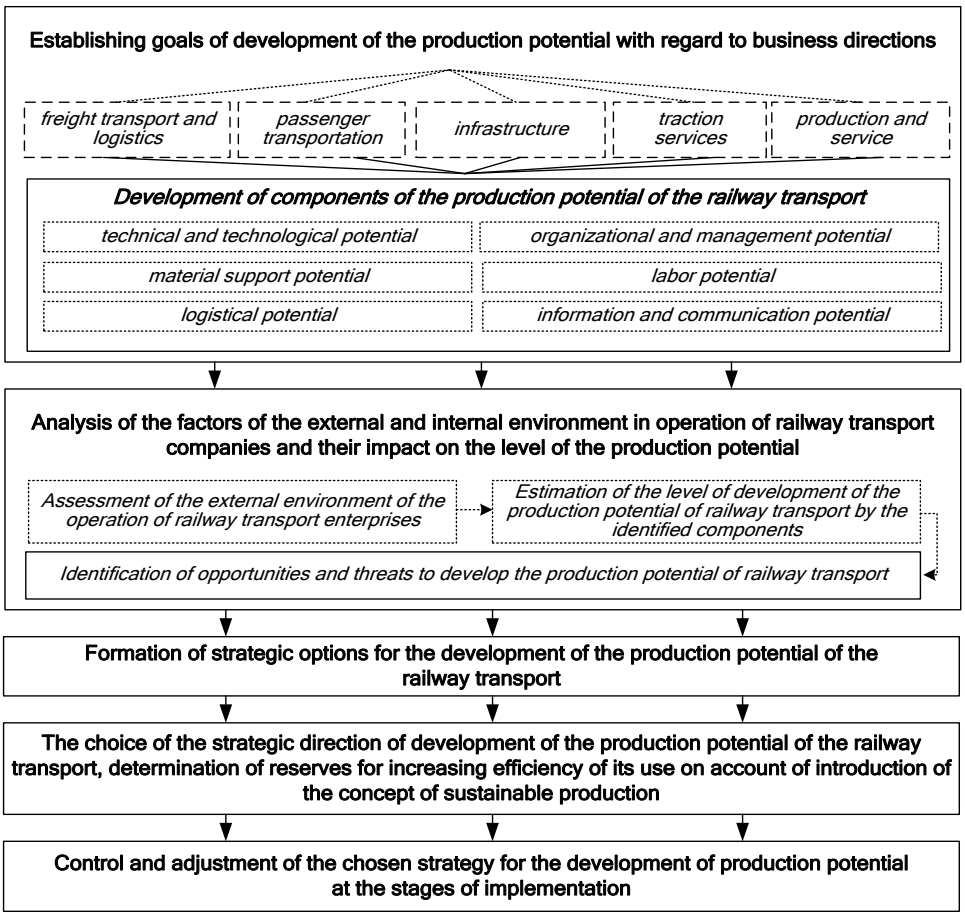


Fig. 1: Sequence of development and implementation of the strategy for development of the production potential of the railway transport.

The first stage includes establishment of the goals for development of the production potential with regard to business areas: freight transport and logistics, passenger transportation, infrastructure, traction services, production and service. Introduction of promising types of activities; ensuring development of the rolling stock and railway infrastructure; implementing innovative transformations in the field of material and technical support; implementing intellectual and innovative technologies; use of effective marketing and pricing tools; ensuring improvement of competences of the staff; implementing resource-saving technologies; using the concept of adaptive company management; and introduction of modern logistics technologies should be highlighted among the main strategic goals for development of the production potential. According to the defined business directions and defined strategic goals, development of such components of the production potential of the railway transport as technical, technological, organizational and management, labor, logistical, information and communication potential and material support potential becomes of great importance.

The second stage takes into account analysis of the factors of the external and internal environment in operation of railway transport companies and their impact on the level of the production potential. This stage is implemented in two directions: assessment and forecasting of changes in environmental factors, in particular global, national and inter-sectoral levels are performed; assessment of the state of the existing production potential, in particular, effectiveness of its use, is performed. The process of assessing the production potential is quite time and painstaking, and requires use of an individual approach for every company. In addition, implementation of such an assessment involves development of a system of indicators that could be both qualitative and quantitative.

The study of the spectrum of methodological approaches to assessment of the production potential of companies has made it possible to distinguish the main ones, i.e.: resource, effective and expert approaches. The resource approach involves calculating the total value of the set of resource components of the production potential. An effective approach is based on the assessment of perspective economic results, in particular, dynamics of volume of output, profit, etc. In its turn, the expert method is based on the use of expert assessment methods, in particular questionnaires.

However, each of these assessment methods has its drawbacks. The resource approach mainly reflects the impact of internal business processes of a company and does not take into account the effect of the environmental factors of operation of any entity. An effective approach takes into account only quantitative changes in the indicators of the production potential assessment, and does not take into account the qualitative growth of its components. One should note the possibility of getting a complete quantitative assessment of the scope of the potential and determining the proportion of every of its elements are among benefits of the resource and effective approaches. The expert approach is characterized by a significant individuality of the assessment and dependence on the level of competence of the experts. However, it allows taking into account the qualitative dynamics of components of the production potential of the company. In the context of the above, it should be emphasized that the use of expert methods has become the most widespread, which involves the following stages: formation of a system of partial indicators for assessment of the production potential components (technical and technological, organizational and management, labour, logistics, information and communication potentials and procurement potential) and their calculation for a certain period; determination of the specific weight of every component within framework of formation of the production potential; determining the specific weight of indicators for every component based on the questionnaire and applying the ranking method; standardization of indicators; calculation of the integral or complex indicator of the level of use of the production potential of the railway companies.

The third stage involves formation of strategic options for the development of the production potential of the railway transport, and the following areas play an important role: innovation and technological modernization, reorientation of activities or reduction of elements of the production potential, which act as a barrier to improving the efficiency of the railway transport companies. At the moment, railway companies are taking steps to ensure innovative and technological modernization of the railway transport, in particular, upgrading and modernizing the rolling stock and railway infrastructure.

The fourth stage is based on the choice of the strategic direction of development of the production potential of the railway companies, determination of reserves for increasing efficiency of its use on account of introduction of the concept of sustainable production. In the context of the above, it is worth emphasizing that it is proposed to choose the strategic option on the basis of the criteria of conformity, efficiency and specialization of the parameters of the production potential. Reserves for increasing efficiency of the use of the production potential should refer to more effective use of subjects of labor, means of labor and labor itself. It is proposed to ensure the search and introduction of reserves for increasing the level of the use of the production potential of the railway transport on account of the use of tools for sustainable production.

The final stage of the process of formation of the strategy for managing the production potential is the stage of control and adjustment. Assessment of the efficiency of the use of resources and implementation of organizational and management, technical and technological, labour, logistic and information and communication processes to ensure realization of the production potential is an important step of control. Of course, if required, corrective actions are taken to improve the developed strategy for development of the production potential of the railway transport.

As mentioned above, sustainable production is considered to be an effective tool for searching and implementing reserves aimed to improve performance. The development of the concept of sustainable production is based on Toyota Production System, founded by Tayiti Ono. This production system is aimed to exclude various losses and based on two principles: "just-in-time" and autonomation, in other words, intelligence-based automation. The following items have been distinguished among main production losses: defects, stocks, movement of people, movement of material resources, waiting time, excessive processing and overproduction. The author has repeatedly emphasized that the company should focus on reducing costs, improving performance and product quality [16].

Implementation of the concept of sustainable production will allow achieving significant improvements in the activities of the railway transport companies on account of management of supply of materials, spare parts, units and assemblies; risk management and preventing errors; management of the labor potential in order to minimize various defects, failures, time losses; management of business processes from the moment of receipt of an order for transportation to delivery of the goods to the consumer; use of sustainable production mechanisms to identify and eliminate losses caused by: waiting time; unnecessary transportation; excessive processing stages and extra documentation flow; extra stock; extra movement and shifting; overproduction; and low-quality work.

At the moment, the following main tools are used to implement the concept of sustainable production [17]: analysis of the symptoms of any available losses (3MU); problem solving technology (5W-2N); a method that allows establishing causal relationships in the form of 4M diagram (material, equipment, operator and method); a method of structured practical problem solving (PPS); value stream mapping (VSM); system of "sorting" (5S); system of total preventive maintenance (TPM); system of single-minute exchange of dies (SMED); "just-in-time" system; process of preparation (3P); system for proposing improvements (Kaizen); strategic goal deployment method (Hoshin Kanri); standardized operation; total quality management (TQM); and visualization.

Support of own manufacturer, loading of technical and technological capacities, organization of new workplaces, industrial cooperation of companies, economic feasibility - the best example of confirmation and unconditional proof of improvement of the flow of inevitable process of carefulness in the field of the railway transport. For example, the main strategic direction of the organization of work on the restoration of parts, manufacture of own products for the traction rolling stock, other product range, in particular providing service, corresponds to the following areas of implementation of conceptual measures of carefulness: ensuring timely and qualitative repair (scheduled, unscheduled), maintenance of the traction rolling stock in conditions of locomotive depot in violation of terms (rhythms) of supply (purchase) of components, spare parts; reduction of losses in the transportation process by keeping the traction rolling stock in a technically good condition, ensuring reliability of its operation in the inter-repair period; traffic safety; realization of creative and technical potential in production; introduction of innovative large-scale and local technological solutions related to internal production, loading of production capacities; saving on production and economic needs; possibility to sell products, providing services to non-transport companies and population; improving principles, methods and tools of sustainable production [18].

5. Conclusion

Today, ensuring efficient operation and competitiveness of the railway transport depends, mainly, on formation of prerequisites for development of the production potential. In this relation, an analysis of the range of scientific approaches to determination of the essence of the economic category of "production potential" has been made that has allowed us proposing the use of a combined approach to understanding the production potential of the railway transport as capability and ability of available resources and business processes to ensure the main activities of the railway transport companies to achieve the planned results and established goals of the railway industry. Taking into account deterioration of the state of the production potential of the railway transport, it has been established that certain management actions need to be developed to increase the efficiency of its use. In the context of the above, a sequence of development and implementation of the strategy for development of the production potential of the railway companies has been formed. It involves setting goals for development of the production potential in the business areas; analysis of factors of the external and internal environment in operation of the railway transport companies and their impact on the level of the production potential; formation of strategic options and choosing a strategic direction for development of the production potential of the railway companies, determination of reserves for increasing the efficiency of its use through introduction of the concept of sustainable production; implementation of the strategy; control and adjustment of the chosen strategy of development of the production potential at the stages of its implementation. The essence of the concept of sustainable production and tools of its introduction at the company as a direction of efficient use of the production potential of the railway transport have been considered.

References

[1] Anchishkin A.I. (1983), Tasks of national economy planning. *Collection of articles of Moscow State University*, p. 72.

[2] Berdnikova T.B., Analysis and diagnostics of the financial and economic activity of the company. Moscow: Infra-M, (2010), 224 p.

[3] Galushko D.V. Management of the competitive potential of a railway machine building company on the basis of implementation of the principles of offensive strategy: Ph.D. thesis in Economics; Specialty: 08.00.05/ Bryansk, (2007), 142 p.

[4] Dolzhanskiy I.Z. The management of the company's potential: tutorial. Center for Teaching Literature, (2006), p. 362.

[5] Dobykina O.K. Potential of the company: establishing and assessing: tutorial. Kyiv: Center for Teaching Literature, (2007), p. 202.
[6] Ishchuk I. (2005), Conceptual fundamentals of the formation and development of the production potential of industrial entities. *Regional Economics* No. 3, 48-56.
[7] Starovoytov M.K. & Fomin P.A. Practical tools for organizing management of an industrial entity. Moscow: Higher School, (2002), 294 p.
[8] Zapashchuk L.V. (2010), Methodical approaches to assessment of the production potential of an industrial entity. *Bulletin of Zhytomyr State Power Engineering University. Series "Economical Sciences"* No.3 (53), Part 3, 60-63.
[9] Shatalova T.N. & Enikeeva A.G. (2007), The economic essence of the production potential, *Bulletin of the Orenburg State University*, 85-91.
[10] Dikan V.V. & Kas P.Yu. (2015), Theoretical fundamentals of development of the production potential of domestic machine building companies. *Development of methods of management and control in transport* 2, 72-85.
[11] Solomnikov I.V. (2016), Technical and technological development of the railway companies in terms of modern economics. *Prichornomski economic studios* 11, 172-176.
[12] Mikhaylenko O. & Skopenko N. (2011), Theoretical aspects of formation of the production potential of agricultural complex, *Relevant problems of economics* 3 (117), 74-79.
[13] Khrynyuk OS & Grimashevich TI, Theoretical and methodical aspects of assessment of the production potential of the company, *Economy and society*. (2017), 13, available online: http://www.economyandsociety.in.ua/journal/13_ukr/132.pdf
[14] Shramenko O.V. & Yakovleva K.Yu. (2014), Information on the core of the production potential of the railway transport, *Bulletin of economy of transport and industry* 46, 196-199.
[15] Dikan V.L. (2014), Development of the production potential of Ukrainian companies, *Bulletin of economy of transport and industry* 46, 136-142.
[16] Ono T., Toyota production system. Leaving mass production / Translated from English/3rd ed., amended version. Moscow: Institute for Complex Strategic Studies, (2008), pp. 208.
[17] Zubenko V.O. & Chesnokov S.M. (2016) Key aspects of the concept of "sustainable production" for the railway transport companies// *Science bulleting of the Uzhgorod National University* 9, 77 - 80.
[18] Meleshko M. (2014) Realization of the production potential – symptom of sustainable production, *Ukrainian Railways* 8 (14), 44-45.