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ANALYSIS OF THE INFLUENCE OF ROLLING STOCK ON INFRASTRUCTURE FACILITIES AS A FACTOR OF MANAGEMENT OF THE ECONOMIC EFFICIENCY OF TRANSPORT CONSTRUCTION ENTERPRISES

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АНАЛІЗ ВПЛИВУ РУХОМОГО СКЛАДУ НА ІНФРАСТРУКТУРНІ ОБ'ЄКТИ, ЯК ФАКТОР УПРАВЛІННЯ ЕКОНОМІЧНОЮ ЕФЕКТИВНІСТЮ ДІЯЛЬНОСТІ ПІДПРИЄМСТВ ТРАНСПОРТНОГО БУДІВНИЦТВА

The article examines the impact of various types of rolling stock, both retrospective, current, and prospective, on infrastructure objects of railway transport, the study of influencing factors will allow to estimate the scope of work on the restoration of such objects, and this will be the basis for the formation of economic indicators of the production program of transport enterprises construction In this way, it will be possible to influence the economic efficiency of the activities of such enterprises, rationally using their production capacities, taking into account the specifics of the performance of individual works at infrastructure facilities. The purpose of the article is to study the potential for

increasing the economic efficiency of transport construction enterprises due to the streamlining and rational long-term planning of the production program of their activities, the main elements of which are the elimination of the accumulated wear and tear of infrastructure objects due to the negative impact of rolling stock of various types during operation. Research methodology involves the use of methods: general scientific methods (abstraction and concretization, induction and deduction, analogy), theoretical research (descent from abstract to concrete), empirical research (comparison, observation), synthesis, analysis, etc. The relevance of solving the scientific problem defined in the article is that JSC "Ukrzaliznytsia" strives to improve the operational indicators of its activity due to the development of the rolling stock fleet and its operational indicators, and the restraining factor is the infrastructure facilities, which according to their technical condition, primarily due to wear and tear, do not allow to use the operational potential to the full extent. It is at this stage that JSC "Ukrzaliznytsia" should pay attention to the efficiency of transport construction enterprises, the purpose of which is to bring the condition of infrastructure facilities to the required operational level. This will allow to optimize the maintenance costs of such facilities and increase the economic efficiency of transport construction enterprises. The results of the study are as follows: the results of the study on determining the main factors affecting the volume and structure of works of transport construction enterprises are presented. The originality and practical value of the research lies in the fact that the article systematizes existing areas of negative impact of rolling stock on infrastructure objects, which directly affects the volume and structure of works of transport construction enterprises, which allows rational management of the economic efficiency of their activities. The conclusions of the study are as follows: the results of the study on the analysis of the impact of rolling stock on infrastructure objects proposed in the work will allow to improve, in the end, the management of the economic efficiency of the activities of transport construction enterprises. The results of the conducted research can be useful for the enterprises of JSC "Ukrzaliznytsia", which, due to their functional purpose, have to perform works on the elimination of wear and tear of infrastructure facilities in order to improve the operational activities of railway transport.

У статті досліджено вплив різних типів рухомого складу, як ретроспективного, поточного, так і перспективного на інфраструктурні об'єкти залізничного транспорту, дослідження факторів впливу дозволить оцінити обсяги робіт по відновленню таких об'єктів і це буде основою до формування економічних показників виробничої програми підприємств транспортного будівництва. Таким чином можна буде впливати на економічну ефективність діяльності таких підприємств, раціонально застосовуючи їх виробничі потужності, з врахуванням специфіки виконання окремих робіт на інфраструктурних об'єктах. Метою статті є дослідження потенціалу з підвищення економічної ефективності діяльності підприємств транспортного будівництва за рахунок упорядкування та раціонального перспективного планування виробничої програми їх діяльності, основними елементами якої є ліквідація накопиченого зносу інфраструктурних об'єктів внаслідок негативного впливу рухомого складу різних типів в процесі експлуатації. Методологія дослідження передбачає використання методів: загальнонаукових методів (абстрагування й конкретизація, індукція та дедукція, аналогія), теоретичного дослідження (сходження від абстрактного до конкретного), емпіричного дослідження (порівняння, спостереження), синтез, аналіз та ін. Актуальність вирішення наукової проблеми, що визначена у статті, полягає в тому, що АТ "Укрзалізниця" прагне покращити експлуатаційні показники своєї діяльності за рахунок розвитку парку рухомого складу та його експлуатаційних показників, а стримуючим фактором є інфраструктурні об'єкти, що за своїм технічним станом, в першу чергу — зношеністю — не дозволяють використовувати експлуатаційний потенціал в повній мірі. Саме на даному етапі АТ "Укрзалізниця" має звернути увагу на ефективність діяльності підприємств транспортного будівництва, призначенням яких є доведення стану інфраструктурних об'єктів до потрібного експлуатаційного рівня. Це дозволить оптимізувати витрати на утримання таких об'єктів і підвищити економічну ефективність діяльності підприємств транспортного будівництва. Результати дослідження наступні: представлено результати дослідження по визначенню основних факторів, що впливають на обсяг та структуру робіт підприємств транспортного будівництва. Оригінальність і практична цінність дослідження полягає в тому, що у статті систематизовано наявні напрямки негативного впливу рухомого складу на інфраструктурні об'єкти, що прямо впливає на обсяги та структуру робіт підприємств транспортного будівництва, що дозволяє раціонально управляти економічною ефективністю їх діяльності. Висновки дослід-

женння наступні: запропоновані у роботі результати дослідження з аналізу впливу рухомого складу на інфраструктурні об'єкти, дозволять покращити, в підсумку управління економічною ефективністю діяльності підприємств транспортного будівництва. Результати проведеного дослідження можуть бути корисними для підприємств АТ "Укрзалізниця", які через своє функціональне призначення мають виконувати роботи з ліквідації зносу інфраструктурних об'єктів задля покращення експлуатаційної діяльності залізничного транспорту.

Key words: competitiveness, railway transport, transport infrastructure, transport construction enterprise, development, cost price, organizational and economic mechanism, economic efficiency.

Ключові слова: конкурентоспроможність, залізничний транспорт, транспортна інфраструктура, підприємство транспортного будівництва, розвиток, собівартість, організаційно-економічний механізм, економічна ефективність.

STATEMENT OF THE PROBLEM IN A GENERAL FORM AND ITS CONNECTION WITH IMPORTANT SCIENTIFIC OR PRACTICAL TASKS

Forecasting the operating conditions of infrastructural facilities presupposes the determination for the forecasted period of such traffic flow parameters that have the maximum (negative) influence on the technical and operational level of infrastructural facilities, the condition of which depends on the projected amount of work on their restoration, and therefore, the production program activities of transport construction enterprises.

ANALYSIS OF RESEARCH AND PUBLICATIONS OF RECENT YEARS

Significant scientific developments regarding the determination of the impact of rolling stock on infrastructure objects, in order to determine the amount of funds for the restoration of objects, budgeting of transport enterprises have outstanding domestic scientists: A.O. Bezugliy [1], Yu.M. Bibik [2], V.V. Bobyl [3], A. V. Kuzmenko [4], O. V. Savchenko [9]. Thanks to the works of I.B. Matviev [7], A.V. Mysnik [9], which provide an opportunity to determine the level of harmonization of the European railway legislation with the domestic one, we are able to determine the target economic priorities in the activities of transport construction enterprises taking into account modern European legislation. Scientists I.O. Lutyi [5], L.V. Martsenyuk [6] consider the theoretical and practical possibilities of creating a financial microclimate for attracting investments in various areas of operational activity of transport systems. In the current, turbulent economic conditions, special attention must be paid to the management of the economic security of transport enterprises, including enterprises of transport production. Such questions are considered in the work of M.I. Mishchenko [8]. The issue of the mechanism of forming priority directions for increasing the financial stability of transport enterprises in order to ensure effective, uninterrupted work of transport construction enterprises is presented in the work of scientists: I. O. Khomenko, V. M. Gurnak, L. M. Volynets [11].

HIGHLIGHTING PREVIOUSLY UNRESOLVED PARTS OF THE OVERALL PROBLEM

The increase in axial and running loads of rolling stock in the future, the issue of identifying the laws and rates of their growth are constantly the object of constant close attention of scientists.

The method of extrapolation forecasting was used almost everywhere when developing a forecast of the noted rolling stock parameters.

Therefore, the forecast of the noted parameters of the rolling stock was traditionally carried out on the basis of the dynamics of their development for a certain previous period with subsequent extrapolation to the future.

SETTING OBJECTIVES

The purpose of the article is to study the potential for increasing the economic efficiency of the activities of transport construction enterprises due to the streamlining and rational long-term planning of the production program of their activities, the main elements of which are the elimination of the accumulated wear and tear of infrastructure objects due to the negative impact of rolling stock of various types during operation.

PRESENTATION OF THE MAIN RESEARCH MATERIAL

For modern business conditions characterized by a turbulent economy, such an approach to determining the prospective parameters of rolling stock is not entirely justified.

This is primarily due to the fact that nowadays there is a significant reduction in production volumes in almost all branches of the national economy of Ukraine. As a result, there was a significant reduction in the volume of rail transport. During the economic crisis, the volume of freight railway transportation decreased several times, and on some railways the decrease in transportation was even more significant, for example, on the Southern Railway — by 6.0 times, on the South-Western and Odesa Railways — by 5.3 times, on the Lviv Railway — by 5,1.

On the other hand, the negative impact of such a factor as the decline in production in the cargo-generating

industries on the quantitative and qualitative indicators of freight transportation is temporary and recently more and more severe.

Therefore, in modern economic conditions, the forecast of axial and running loads of rolling stock for the period up to 2030 (according to the National Transport Strategy of Ukraine for the period up to 2030 (order of the Cabinet of Ministers of Ukraine dated 30.05.2018 No. 430-p)) is carried out using extrapolation method of forecasting according to the standard method of selection of a linear trend, construction of confidence intervals and standard error of the forecast, based on the following prerequisites. First, recently there has been some stabilization of economic indicators of activity in cargo-generating industries. Secondly, as noted in the National Transport Strategy of Ukraine for the period until 2030, already by 2030 Ukraine will reach the values of indicators of economic activity equal to those that were noted in the pre-crisis period. Thirdly, the application of the extrapolation method of forecasting is appropriate for the reason that in our case the depth of the analyzed time period is much greater than the depth of the forecast and contains all the main stages of the development of railway rolling stock.

Taking into account all of the above, we note that the forecast was carried out in Microsoft Excel for Windows on the basis of initial data characterizing the change in the values of axial and linear loads as a function of time and compiled according to the growth diagrams of these loads.

One of the most necessary elements of forecasting by the method of extrapolations is the function for analytical alignment of time series obtained on the basis of a qualitative analysis of the dynamics of the development of axial and running loads of railway rolling stock.

The analysis carried out over a period of more than an age allows us to highlight the following feature — a steady trend of increasing values of axial and running loads of all types of rolling stock.

Carrying out the forecast of the development of axial and linear loads of railway rolling stock, which definitely increase the load, both dynamic and static, on infrastructure objects, one cannot fail to note that the change (increasing direction) of such indicators is a consequence of positive changes in railway transport as in now and in the near future.

In particular, the following can be noted.

The share of rolling stock in the cost of fixed assets of railway transport is more than 60%. However, its technical condition has significantly deteriorated in recent years, the average wear rate is more than 60%. If radical measures are not taken to renew the rail rolling stock in the next 4-5 years, its mass failure may occur.

In order to provide railways with the strategic tasks of the country's vital activities and support its export potential, rail rolling stock needs perspective development.

The situation with the fleet of passenger rolling stock is characterized by its extremely unsatisfactory condition. Locomotives, locomotive-hauled passenger cars, diesel and electric trains are inferior to foreign counterparts in important parameters and require significant costs for operation, maintenance and repair. Low consumer quality of wagons, poor sanitary and technical conditions of passage became one of the factors of decreasing demand for passenger transportation, increasing their unprofitability.

According to the calculations of Ukrzaliznytsia, in order to fully meet the demand of the population in passenger transportation, the fleet of locomotive-hauled wagons should number about 10,000 units. Currently, the inventory fleet consists of 8,400 passenger cars, of which almost 1,200 have an exhausted resource (the service life exceeds 28 years). In fact, the working fleet of passenger cars is 7,254 units, or 72% of the need.

In addition to the decrease in the total number of passenger cars, it is also necessary to note their moral and physical aging. The average age of the wagons in use is about 18 years. Without proper replenishment and renewal of the fleet, the shortage of passenger cars will grow so that in the coming years, the actual availability of cars is expected to be half of what is needed.

An analysis of the state of the passenger locomotive fleet shows that 72% of the existing main line electric locomotives have reached the end of their standard service life (30 years). To ensure local and suburban transportation, sections of electric trains and diesel trains are used, the degree of wear and tear of which is: for electric trains — 76%; for diesel trains — 84%; 27% of the electric train fleet and 45% of the diesel train fleet are operated beyond the standard service life.

The freight locomotives and wagons at the disposal of JSC "Ukrzaliznytsia" are also outdated both physically and morally. With low technical and economic parameters and low operational reliability, they constantly require increased maintenance and repair costs. The condition of many types of freight rolling stock approaches a critical level and cannot satisfy consumer demand.

The distribution of the fleet of freight electric locomotives according to service life shows that by 2030, the service life of 83% of electric locomotives will be exhausted, of which 77% are direct current electric locomotives, 89% are alternating current electric locomotives. Thus, the railways of JSC "Ukrzaliznytsia" face an urgent need to update the fleet of electric locomotives.

Today, 23% of diesel locomotives, including 28% of shunting locomotives, have exhausted their resource and are subject to exclusion from the inventory or extension of their service life.

By 2030, 93% of mainline and 73% of shunting diesel locomotives will reach the end of their service life. When diesel locomotives are operated beyond their service life, indicators of economic efficiency significantly deteriorate, the specific consumption of diesel fuel increases, and traffic safety deteriorates.

Most of the freight and shunting locomotives operating on the railways of Ukraine were designed and produced in the 60—70s, and in terms of quality, they are significantly worse than modern foreign ones, and in comparison with them, they have higher maintenance costs. In addition, the lack of modern microprocessor control and diagnostic systems, asynchronous traction drive, modern cooling

system of traction electric machines reduces their efficiency by 15—20% compared to foreign models, and the use of outdated designs leads to a decrease in their reliability.

The fleet of freight cars as a whole has the following structure:

Semi-trailer trucks — 46.3%;
Tank — 10%;
covered wagons — 11.5%;
universal platforms — 8.4%;
special wagons — 23.8%.

In addition, there are 6,850 refrigerated wagons (including 1,330 autonomous ones) in the wagon fleet, the operation and maintenance of which is provided by the "Refrigerated Wagon Company" branch of JSC "Ukrzaliznytsia".

In recent years, railways have experienced a shortage of loading resources, first of all universal semi-wagons and tanks, as well as special wagons such as rolling stock.

The basic technical solutions of the wagons of the operating fleet were developed in the 1930s and 1960s and remained without significant changes, except for the axle unit, which was transferred from sliding bearings to roller bearings in the 1970s and 1980s. In this regard, the freight wagon fleet is physically and morally outdated, often causes accidents on the railways and does not meet modern reliability requirements. The most significant disadvantages are the 18—100 model trolleys, which do not provide the design speed of the wagons, cause intensive wear and tear of wheel pairs and rail tracks, etc. Absorbers have insufficient energy capacity, which leads to frequent damage to wagons and cargo during shunting operations. Low reliability is characterized by the axle unit and wagon bodies.

All this leads to a high frequency of uncoupling of wagons for unplanned, so-called current repairs with significant costs. For example, semi-cars and tank cars, in addition to annual planned depot repairs, are submitted for current repairs about ten times a year.

The distribution of the fleet of freight cars by service life shows that by 2030, the service life of 35% of their total number will be exhausted, including half-cars — 71%; tank cars — 53%; covered wagons — 41%; platforms — 33%; 37% of special wagons, of which 85% were rolling stock.

The dynamics of demand for transportation in the perspective of 2030 will be influenced by various factors, which will lead to the following consequences.

The structure of demand for transportation in different types of connections over different distances will change.

In particular, the demand for transportation in wagons with a higher level of comfort and the demand for long-distance transportation for the purpose of business, tourism, and recreation will increase. Business and tourist trips (which will be carried out mainly by young passengers) are such a specific segment of the market, where there will probably be a demand for transportation in trains of a new type for Ukraine — day express trains.

The development of resorts will lead to a certain increase in international traffic between Ukraine and its northeastern neighbors and, although to a lesser extent, with its western neighbors.

In suburban traffic around big cities, the competition will become even more tangible from the route taxis, which will take over a part of the passenger traffic of the first suburban zones, that is, commuter trains will be dominated by passengers who travel longer distances.

It can be noted in terms of wagon management that the wagons of the new generation should be suitable for operation both in traditional trains together with old-type wagons, and in high-speed trains that run on load-intensive routes and serve international transport corridors.

In the first case, the conditions of operation of the rolling stock are determined by the presence of an already existing fleet of wagons, which dictate well-established, currently well-known requirements for wagons. So, for example, the speed of trains up to 90 km/h is determined by the technical capabilities of the mod trolley. 18-100. Therefore, it is necessary to carry out an in-depth modernization of the mod cart. 18-100, as well as create a new generation cart.

In the second case, both on domestic lines and in international transport corridors, the actual speed can reach 120 km/h, which corresponds to the "SS" traffic mode on the railways of Western Europe. For high-speed freight cars, a design speed of more than 140 km/h is allowed.

When developing wagons of a new technical level and the possibility of their use in traditional trains (the first case), the main requirement is the technical compatibility of the wagons of the new generation with the already existing fleet of wagons. At the same time, the possibility of development of transportation as part of high-speed, international and heavy-duty trains is envisaged. An important requirement is also the maximum possible mutual unification of their nodes and details.

The creation of wagons of a new technical level (the second case) must fully meet the reliability requirements. In addition, the specific cost of production should be reduced by at least 10%, traffic safety should be increased (the probability of accidents is reduced from 3*10-6 to 1*10-6, i.e. three times), the level of mechanization of labor on loading— unloading works (from 45% to 70%). At the same time, all new wagons running on the railways of Ukraine must meet the requirements of the 1-T dimension and be suitable for movement at a speed of 120 km/h. For heavy-duty wagons, the design speed should be 100 km/h, which multiplies the load on the functioning of transport construction enterprises, which must ensure the appropriate technical and technological condition of infrastructure facilities. To ensure the economic expediency of carrying out restoration works and bringing infrastructural facilities and their condition to the requirements of the rolling stock.

Structurally, the wagons of the new generation are assembled from unified blocks, normalized and standardized nodes and modules, which makes it possible to manufacture multi-purpose wagons based on one basic design, and also makes it possible to increase the level of specialization and cooperation in production not only within the scope of wagon building, but also at wagon repair enterprises. to more effectively use the work of researchers, designers and technologists in the direction of shortening the "research-production" cycle.

Cars of high-speed trains of international transport corridors must meet the dimensions requirements of the Ministry of Transport, as well as all the requirements for cars of the "East-West" type and ensure the "SS" traffic mode.

Universal wagons.

Semi-wagons The basic should be a four-axle semi-wagon with a short body frame, which has increased strength and corrosion resistance of rolled sheet metal and profiles due to the use of improved grades of steel and economic rolled steel for machine building. When developing the design of the body of a semi-wagon with hatches, ensure the speed and convenience of unloading operations; the strength of the body must be sufficient to ensure the load from the wheel pair on the rails of 245 kN. The difference of the new generation wagons is a reinforced body structure, which will reduce operating costs due to the reduction of their receipts for current repairs. When developing the type of semi-cars, work is carried out to optimize the volume and shape of the body for maximum compliance with the properties and structure of the cargo to be transported. In particular, the body should not have corrugations and protruding elements that prevent unloading, especially in winter.

Covered wagons. The main direction in the development of covered wagons is to meet the requirements of shippers in terms of providing more convenient conditions for loading and unloading, securing and storing cargo. The design of the covered wagon of the new generation involves an increase in the volume of the body; a floor with typed metal sections with a special coating; the presence, if necessary, of separate partitions that can be moved. When designing the structure of the door, the development of devices that prevent the accumulation of loads on the door is assumed. Improved thermal insulation of the body, as well as ensuring the location of improved equipment for transporting people.

Platforms. The main direction of improvement of the platforms will be the coordination of their dimensions and technical characteristics with the requirements for transportation of mainly artificial cargoes. The design of the platform will allow for modular assembly, which consists in the possibility of equipping it with special equipment, which will provide it with new additional capabilities. The following platform configuration modules are offered:

— side, end sides, folding risers similar to those used on Western European platforms;

— timber risers of the VO-118 type in combination with supports for heavy-duty containers ISO 1 40 +1 20 , 2 30 , 3 20 ;

— end sides and supports for heavy-duty containers ISO 1 40 +1 20 , 2 30 , 3 20 ;

— risers and end walls for lumber in packages, as well as pipes of large diameter.

Achieving new functional capabilities of the platform is based on a tried and tested unified frame design. The possibility of combining the proposed modular configuration should minimize the empty mileage of this type of wagons. A unified frame will increase the maintainability of the platform and reduce operating costs. It is proposed to abandon the transportation of bulk cargo on platforms. Modification of the platform for interstate and international transportation is planned.

The basis for developments should be the principle of modular composition with rational unification of nodes and systems, which reduces the cost of new equipment and its development.

The principle of modular arrangement allows:

— to include in the design of electric locomotives the possibility of their further modular modernization as more effective technical solutions are created;

— to ensure in the future the possibility of deploying additional enterprises for the modular assembly of electric locomotives with minimal capital investments;

— to lay down in the projects the maximum adaptability of electric locomotives to the service principles of maintenance and repair using transitional modular sets;

— to rationally invest funds in the development of new units and systems, maximally adapted for use in locomotives of various purposes and rationally deploy their production at specialized enterprises, creating a specific environment.

The development of electric locomotives of the new generation must be carried out on the basis of unified basic projects.

The basis for the formation of a complex of technical solutions for electric locomotives is laid:

— collectorless traction electric drive;

— integrated on-board microprocessor control systems with the main equipment diagnostics subsystem:

— new technologies for manufacturing bodies from modern structural ones

— materials with increased corrosion resistance, weight reduction,

— by increasing the service life;

— new constructions of the crew part, which ensure a tire mileage of 1 million km and maximum speeds of up to 160—250 km/h;

— new designs of traction gears;

— new braking equipment. which ensures maximum compatibility with the microprocessor control system.

The DS-3 experimental cargo-passenger electric locomotive will become the basis for the development of a new generation of electric locomotives. All electric freight locomotives of the new generation will be created on the basis of technical solutions developed on promising passenger cars, and will be unified with them as much as possible.

In order to increase the productivity of the use of locomotives and reduce the number of employees of the locomotive industry, it is necessary to optimize the number of the operating fleet of locomotives in the period from 2023 to 2030, reducing it by 15-20% relative to the volume of ton-kilometer work in 2023.

The main factors of increasing the productivity of locomotives are as follows:

— an increase in locomotive turnover stations by an average of 27%. For electric locomotives up to 1000 km per day, diesel locomotives — up to 500 km;

— 10% increase in locomotive crews turnover stations. Up to 300 km in an electric locomotive, up to 200 km in a diesel locomotive;

— an increase in the regional speed of freight trains by 20% (up to 41 km/h);

— creation of a flexible information and management system in the locomotive industry.

CONCLUSIONS AND PROSPECTS FOR FURTHER DEVELOPMENT

An analysis of the deep economic recessions that have taken place in the world over the past 100 years shows that the rates of growth out of the crisis are higher than the rates of decline in the pre-crisis period. A long-term forecast based on these approaches gives the need for freight transportation until 2030, which is equal to the maximum on the railways of Ukraine in 1988.

The results of the research on the analysis of the influence of rolling stock on infrastructure objects proposed in the work will allow to improve, ultimately, the management of the economic efficiency of the activities of transport construction enterprises.

Література:

1. Безуглий А. О., Бельська О. Л., Бібик Ю. М., Ракович І. В. Нормативне забезпечення запровадження довгострокових контрактів на експлуатаційне утримання автомобільних доріг для забезпечення їх експлуатаційного стану. Дороги і мости. 2020. Вип. 22. С. 8—19.

2. Бибык Ю. Н. Особенности системы ценообразования в дорожном строительстве Украины. Новая экономика. 2019. Спецвипуск № 2. С. 105—107.

3. Бобиль В. В., Дехтяр С. С. Специфіка функціонування підприємств транспорту в умовах фінансової нестабільності. Ефективна економіка. 2022. № 5. — URL: http://www.economy.nayka.com.ua/?op=1&z=10273 (дата звернення: 06.03.2023). DOI: 10.32702/2307-2105-2022.5.4

4. Кузьменко А. В., Харченко В. В. Ціна як економічна категорія: порядок встановлення та методи ціноутворення в умовах сучасної ринкової економіки. Економіка і суспільство. 2017. Вип. 13. С. 547—552.

5. Лютий І. О., Ювженко Н. М. Аналіз системи фінансування дорожньої інфраструктури України. Наукові праці НДФІ. 2019. Вип. 3. С. 66—75.

6. Марценюк Л. В., Міщенко М. І., Чернова Н. С. Визначення доцільності залучення інвестицій на концесійних засадах у залізничний транспорт України. Економіка і держава. 2020. № 9. С. 4—11. DOI: 10.32702/2306-6806.2020.9.4

7. Матвієв І. Б. Європейське залізничне законодавство / І. Б. Матвієв. — Узин: Поліграфсервіс. — Вип. 1. 2006. 296 с.; том. 2. 2007. 312 с.

8. Міщенко М. І., Марценюк Л. В., Чернова Н. С., Гріненко М. О. Теоретичні підходи до управління економічною безпекою транспортних підприємств у сучасних умовах. Економіка і держава. 2020. № 11. С. 35—40. DOI: 10.32702/2306-6806.2020.11.35.

9. Міщенко М. І., Марценюк Л. В., Миснік А. В. Європейський досвід тарифоутворення на вантажні перевезення як інструмент фінансової безпеки залізниць. Ефективна економіка. 2020. № 10. URL: http://www.economy.nayka.com.ua/?op=1&z=8275. DOI: 10.32702/2307-2105-2020.10.7

10. Савченко О. В., Марцінко Д. В. Аналіз методів ціноутворення та перспектив їх застосування. Вісник Хмельницького національного університету. Економічні науки. 2018. № 4. С. 304—308.

11. Хоменко І. О., Гурнак В. М., Волинець Л. М. Пріоритетні напрямки підвищення фінансової стійкості підприємств транспортної інфраструктури України. Фінансові дослідження. 2018. № 1 (4). URL: http://fr.stu.cn.ua/tmppdf/110.pdf

References:

1. Bezugliy, A. O., Belska, O. L., Bibik, Yu. M. and Rakovich, I. B. (2020), "Regulatory security for the provision of long-term contracts for the operation of motor roads for the security of their operational camp", Roads and bridges, Vol. 22, pp. 8—19.

2. Bibyk, Yu. N. (2019), "Features of the pricing system in road construction in Ukraine", New economy. Special edition, Vol. 2, pp. 105—107.

3. Bobil, V. V. and Dekhtyar, S. S. (2022), "The specifics of the functioning of transport enterprises in the minds of financial instability", Efficient economy, Vol. 5, available at: http://www.economy.nayka.com.ua/?op=1&z=10273 (Accessed 06 March 2023). DOI: 10.32702/2307-2105-2022.5.4

4. Kuzmenko, A. V. and Kharchenko, V. V. (2017), "Price as an economic category: the procedure for establishing that method of pricing in the minds of the current market economy", Economics and Suspilstvo, Vol. 13, pp. 547—552.

5. Lyuty, I. O. and Yuvzhenko, N. M. (2019), "Analysis of the financial system of the road infrastructure in Ukraine", Scientific practice NDFI, Vol. 3, pp. 66—75.

6. Martsenyuk, L. V., Mishchenko, M. I. and Chernova, N. S. (2020), "Determination of the dossile value of obtaining investments in concession ambushes for railway transport in Ukraine", Economy and state. Vol. 9, pp. 4—11. DOI: 10.32702/2306-6806.2020.9.4

7. Matviev, I. B. (2006), "European railway legislation", Polygraph service, Vol. 1, no. 2.

8. Mishchenko, M. I., Martsenyuk, L. V., Chernova, N. S. and Grinenko, M. O. (2020), "Theoretical approaches to the management of economic security of transport enterprises in modern minds", Economy and state, Vol. 11, pp. 35—40. DOI: 10.32702/2306-6806.2020.11.35.

9. Mishchenko, M.I., Martsenyuk, L.V. and Misnik, A.V. (2020), "The European experience of tariff formation for freight transportation as a tool for the financial security of railways", Efficient economy, vol. 10, available at: http://www.economy.nayka.com.ua/?op=1&z=8275 (Accessed 06 March 2023). DOI: 10.32702/2307-2105-2020.10.7

10. Savchenko, O. V. and Marcinko, D. V. (2018), "Analysis of pricing methods and prospects for their application. Bulletin of the Khmelnytskyi National University", Economic sciences, Vol. 4, pp. 304—308.

11. Khomenko, I. O., Gurnak, V. M. and Volynets, L. M. (2018), "Priority directions for increasing the financial stability of transport infrastructure enterprises of Ukraine", Financial studies. Vol. 1 (4), available at: http://fr.stu.cn.ua/tmppdf/110.pdf (Accessed 06 March 2023).

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