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METHODOLOGICAL APPROACHES TO DEFINING RAILWAYS INFRASTRUCTURE CHARGES

Introduction: One of the priority directions of development of railway sector is the right choice of pricing policy of the company for the purpose of maximizing profits and the social welfare improving. The improvement of rail pricing is provided be «State program of reforming the railway transport for 2010-2019». **Objective**: Due to the organizational and the structural changes in rail transport it is essential to ensure transparency in pricing, non-discriminatory access to infrastructure, the creation of a level playing field for participants of the operational process. In accordance with the task we need to identify weaknesses in the existing tariff system and suggest ways to correct them. **Results**: There were characterized and analyzed the existing pricing methods, revealed their advantages and disadvantages, offered possible ways of their liquidation. **Conclusions**: The analysis revealed that the current pricing approach does not correspond to the points of the reform program and is subject to further improvement.

Keywords: pricing, infrastructure, costs, natural monopoly, tariff

Since the emergence of exchange relations in the society a great attention has been paid to issues of pricing. Different approaches regarding pricing mechanisms reflect ambiguity of opinions among the scientific community and practitioners. The understanding of importance of prices has changed over time. Today one of the priority areas of strategic policy of the company is the right choice of pricing policies that would contribute to maximize company profits, economic growth, reduction of sensitivity to consumer prices, restrict potential competition, improve the image of the company or product, demand expansion and accelerate its growth, market dominance etc.

Nowadays a great importance is given to studies of traffic pricing features, including rail transport. Since the traffic charges increase the goods final cost, rail pricing plays an important role in the economy as a whole. So, setting too high tariffs may result in a decrease in the volume of rail freight, which in turn will increase the share of fixed costs per unit of traffic and a decline in revenues and profits of the enterprise. Rail pricing is a complex issue setting which several factors must be taken into account several factors:

- legal and regulatory framework of the state;
- ownership of the company;
- market structure and market conditions;
- the level of the fixed and variable costs and their share per unit of production;
- the laws of supply and demand;
- the impact of traffic volume on the costs of the company;
- characteristics and solvency of the goods;
- the equipment level and class of the slots;
- competition models and types;
- traffic directions and correspondences, etc.

Theoretical and methodological problems and practical aspects of pricing in rail transport are reflected in the works of national and foreign scholars as A. P. Abramov, A. A. Bakaev, Y. S. Barash, I. V. Belov, B. V. Burkynskyi, O. O. Wowk, V. A. Galaburda, O. M. Gnennyi, A. Y. Hybshman, V. M. Hurrnak, V. L. Dikan, L. G. Zayonchyk, V. P. Ilchuk, O. M. Kibik, N. M. Kolesnykova, E. V. Kovalev, Y. F. Kulaev, M. V. Makarenko, A. P. Petrov, I. M. Pisarevskii, V. L. Revenko, E. M. Sych, M. F. Tryhunkov, Y. M. Tsvyetov, V. G. Chekalovets,

V. G. Shinkarenko, V. I. Schelkunov, N. M. Chernyi and many other scientists.

The pricing of transport is governed by several laws and regulations, including the Laws of Ukraine «On Prices and Pricing» [1], «On Railway Transport» [2], «On natural monopolies» [3], «State program of reforming the railway transport for 2010-2019» [4]. Among the main stages of the Program objectives there is marked an improvement of tariff policy, providing free pricing in the competitive sectors of the market for transport services. In June 2013 the Ministry of Infrastructure of Ukraine approved Methodology for calculating tariffs for the carriage of goods by rail [5] and Methodology for calculating tariffs for the carriage of passengers by rail [6].

These techniques are based on the cost method of pricing. But this method is contrary to the current demands of the market, because it does not account for external factors such as the nature, size and dynamics of demand, the level of the market solvency, competitors pricing policies. Focusing only on the costs incurred as a result of exploitation of rolling stock and infrastructure reduces the incentives to rationalize the resources usage and incentives to develop new cost-saving technologies.

According to this method, tariffs are calculated respectively to the planned passenger traffic volume for the year (based on actual data). It should be noted that insufficient attention is given to the issues of the improvement of financial planning and forecasting methods in rail transport. The current system of railway transport planning in Ukrainian enterprises provides for the application of the trend planning method. It involves the use of indices that characterize the attitude indicators of the reporting year to the base indicators. This method of planning is incomplete and unacceptable, as derived targets obviously contain negative trends and ineffective performance of prior periods. The deviation of actual companies' performance indices from planned indicates the application of inefficient planning methodology for railway transport enterprises. In rail transport, the deviation percentage of the actual figure from the planned ones is very substantial and ranges from 1% to 30%. It is sometimes 2-3 times as many as the actual data [7]. Therefore, the use of such targets does not comply with the above-mentioned reform program, in particular the improvement of railways financial - economic activity and ensuring of its transparency.

So, we can conclude that the existing pricing process is not perfect and requires some adjustments. It is not flexible, since it ignores the influence of the market, in particular the influence of the dynamics of supply and demand for rail charges. It is based on the network average cost of traffic by kinds of cargo [5]. The application of average network costs as the tariff base almost always leads to lower profits of rail transport:

on the directions below average cost - due to artificial restraint traffic volumes and loss of income and profits;

on the directions where the cost exceeds the average level - as a result of artificial attracting additional low efficient traffic and, as a result, cost overruns.

Therefore, to achieve efficiency of rail transport and the formation of the competitive potential of the external market of transport services the cost of transportation in specific areas and correspondences should be used as the basis for cost-based tariffs.

Another significant drawback of this method is that the freight tariff is set at the level of income that would cover both fixed and variable costs, attributed per unit of production, and also would cover the calculated profit [5,6]. At the same time, it happened historically, that the bulk of fixed costs distributed between the different types of cargo transportation in proportion to the set meters of rolling stock. At the same time, historically, the bulk of fixed costs is shared between different types of cargo traffic in proportion to the set gauges rolling stock operation. This leads to a sharp decline in bulk relatively cheap but freight traffic as not each operator is able to cover full costs attributed per unit. In this case optimization of freight tariff classification is extremely important.

According to concept of calculation structure of economically justified tariffs for rail freight traffic and methodology of their calculation, adopted by The Ministry of Infrastructure of Ukraine, transparency of tariffs for transportation must be provided by allocation infrastructure, locomotive and railcar components and income including investment component. It should be taken into account that the infrastructure component belongs to the natural monopoly sector and locomotive and wagon components – to a potentially competitive one. Proposed by scientists previously presented alloca-

tion of total costs on such components is scientifically sound as it is based on the attributing of certain items of «nomenclature cost» to separate components [8].

Some scientists believe that it would be expedient to allocate one more component of the tariff - the stations component. This mainly concerns the tariffs for the passenger traffics, because the allocation of station costs will help to develop their activities in the right direction.

The study of infrastructure pricing features is extremely important. The level of such charges should match the level of costs incurred in the exploitation of infrastructure by trains. Expenses of infrastructure component, according to [8] include the costs of such sectors as transport sector, track, civil engineering, electrical, signaling and path material economy - logistics, management of rail transportation, Railroad Administration, part of the costs of passenger services.

Implementation of the above mentioned allocation components prevents the lack of scientifically based method of apportionment of the costs for the maintenance of infrastructure between passenger and freight traffic.

According to the calculations of Ukrainian Railways on the passenger traffic cost originally referred 6.7 % of infrastructure costs, for freight traffic - 93.3 % respectively. The use of such proportions was nothing more than a measure of reducing loss of passenger traffic. However, inflated cost of freight traffic leads to a drastic reduction in the number of users of these services. Funds for the implementation of subsidizing losses from passenger traffic are sorely not sufficient. At present, this proportion has changed: for passenger traffic – 20 %, for freight – 80 %.

For proper distribution of these costs to certain types of trains a number of scientific research must be carried out. Such studies were designed by Barash Y. S., Korzhenevich I. P. [9]. They established the dependence of infrastructure spending from the operation of rolling stock on the specific sites with the characteristic parameters of the railway track and catenary structures. Nowadays, the impact of trains on infrastructure is defined through goods turnover, but it can't be a sufficient factor. Important factors of influence on these expenses are the traffic on specific sections, parameters of railway track, construction of overhead catenary, kind of traction, weight of freight and passenger trains, the type of rolling stock, speed, state of the railway track, etc..

The scientific and transparent separation of the infrastructure component of the tariff is a necessary and sufficient condition to ensure non-discriminatory access to infrastructure in the formation of a new tariff system.

Therefore, it is important to choose the best pricing method and tailor it to the specific economic and geographical conditions. Among the existing methods it is possible to select the following:

Short Run Marginal Cost Pricing.

Ramsey-Pricing.

Non-linear Tariffs.

Fully-Distributed Cost Pricing.

Short Run Marginal Cost Pricing. Marginal costs are the costs which are incurred by an additional train run. Applying this pricing principle, prices are set at marginal cost and if demand in this case is equal to the volume of services provided, this method can be considered as optimal. However, if the product or service is produced under the condition of economies of scale, the level of marginal cost is below average cost, and the company will incur losses. In rail transport, covering such losses requires a subsidy from the state, or cross-subsidies from profitable activities that, in turn, contradicts the basic requirements of industry reform. In some cases, losses are compensated by the state from tax revenues. This creates a contradiction, since taxpayers do not always benefit from the direction of «their money» for the maintenance of rail. Another significant disadvantage of this method is that the marginal cost in the short term does not cover the cost of modernization and investment in infrastructure, hinders the development of the industry as a whole. Moreover, the authorities are not interested in infrastructure investment and finding ways to optimize costs, as this will result in new spending and, as a consequence of losses [10]. Due to the fact that variable costs are fixed in the short term, the important characteristics of the rolling stock are not counted in determining the fees, although they significantly affect the deterioration of infrastructure. The level and dynamic of demand are not taken into account, so in periods of demand rising and its high level enterprise loses its opportunity to earn extra income, but in periods of decline - costs increase.

Ramsey-Pricing. Application of this rule allows you to set the price level that would exceed the marginal costs and provide breakeven natural mo-

nopoly, which is the infrastructure in most countries. It should be borne in mind that the infrastructure provides several types of services, the payment of which can be differentiated depending on the region, time, and consumers. According to the above rule, prices rise in inverse proportion to the elasticity of demand that can be represented mathematically as follows:

$$\frac{(P_i - MC_i)}{P_i} = \frac{K}{e_i}, \qquad (1)$$

P_i – price of the service provided;

MC_i – marginal cost of services provided;

K – constant (chosen so as to fulfill the breakeven condition);

e_i – elasticity of demand for service *i* at a fixed price.

In accordance with this, we can conclude that the operating companies with a low elasticity of demand pay high markups on marginal costs, while companies - operators with a high elasticity of demand can only cover the marginal cost of zero margins.

The application of this method in practice is complicated by the fact that infrastructure management does not always have the ability to accurately identify and assess the magnitude and dynamics of demand for different market segments [10].

The purpose of this method is to maximize net social benefits, but for the rail transport, this method requires further adjustment, as the base model does not account for the impact of competition from other modes of transport.

Nonlinear tariffs. Prices set by the rule of Ramsey, are linear. They maximize the social welfare function subject to the breakeven natural monopoly. Unlike linear tariffs, the total cost of the consumer when setting many-part tariffs is disproportionate to the amount of services provided, therefore they are called nonlinear [11]. Today there are a large number of non-linear tariffs. One of the simplest forms is a two-part tariff, which consists of the fixed (the same for all consumers) and the variable part. The main disadvantage of this method is the difficulty of establishing a fixed component at a level that would not affect the demand for transport companies. So, when setting ultrahigh charge there arises a price barrier for consumers to enter the market which is price discrimination under the law of the most states.

Attractiveness of nonlinear tariffs is that they can achieve greater value of social welfare function than linear tariffs: the more bets the charge includes, the higher value of the function can be achieved.

A significant disadvantage of this method is the complexity of determining the demand for services provided by the infrastructure. When applying nonlinear tariff it is necessary to consider that the efficiency will increase as the elasticity of demand reduces. With elastic demand it is expedient to reduce charges in order to maintain market consumers.

Fully-Distributed Cost Pricing. It is based on short-run marginal costs. Infrastructure charge is determined by the distribution of costs between operators based on selected criteria, such as miles of distance traveled, income or short-term marginal costs. While selecting such parameters typically variable costs are not accounted for, accordingly, this choice is purely arbitrary. This feature makes the use of the method quite easy to implement and attractive to decision-makers. However, this method does not account for the pricing elasticity of demand (if the elasticity of demand is known). In this approach, the demand is usually not differentiated according to indicators such as time of day, region, type of cargo, etc. If the gross expenses of the railway infrastructure are allocated depending on the short-term marginal costs or kilometers traveled, charges for feeder line or secondary road network will be very expensive. Thus, this method leads to negative chain reaction and the efficiency of resource allocation is not achieved.

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МЕТОДИЧНІ ПІДХОДИ ЩОДО ВИЗНАЧЕННЯ ПЛАТИ ЗА КОРИСТУВАННЯ ІНФРАСТРУКТУРОЮ ЗАЛІЗНИЦЬ

Вступ. Одним з пріоритетних напрямків розвитку галузі залізничного транспорту є правильний вибір цінової політики підприємства, яка сприятиме максимізації прибутку та поліпшенню соціального добробуту. Удосконалення ціноутворення на залізничному транспорті передбачено Державною цільовою програмою реформування залізничного транспорту на 2010-2019 роки. **Мета роботи.** У зв'язку з організаційно-структурними змінами на залізничному транспорті важливим є забезпечення прозорості процесу ціноутворення, недискримінаційного доступу до об'єктів інфраструктури, створення рівних умов діяльності для учасників перевізного процесу. Відповідно до поставленого завдання необхідно виявити недоліки існуючої тарифної системи та запропонувати шляхи їх подальшого усунення. **Результати.** Охарактеризовано та проаналізовано існуючі методи ціноутворення, виявлено їх недоліки та переваги, запропоновано варіанти ліквідації недоліків**. Висновки.** У результаті виконаного аналізу виявлено, що існуючий підхід до ціноутворення не відповідає пунктам програми реформування й підлягає подальшому удосконаленню.

Ключові слова: ціноутворення, інфраструктура, витрати, природна монополія, тариф

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АНАЛИЗ МЕТОДОВ ОПРЕДЕЛЕНИЯ ПЛАТЫ ЗА ПОЛЬЗОВАНИЕ ОБЪЕКТАМИ ИНФРАСТРУКТУРЫ ЖЕЛЕЗНОДОРОЖНОГО ТРАНСПОРТА

Введение. Одним из приоритетных направлений развития отрасли железнодорожного транспорта является правильный выбор ценовой политики предприятия, которая будет способствовать максимизации прибыли и улучшению социального благосостояния. Усовершенствование ценообразования на железнодорожном транспорте предусмотрено «Государственной целевой программой реформирования железнодорожного транспорта на 2010-2019 годы». **Цель работы.** В связи с организационно-структурными изменениями на железнодорожном транспорте важным является обеспечение прозрачности процесса ценообразования, недискриминационного доступа к объектам инфраструктуры, создание равных условий деятельности для участников перевозочного процесса. В соответствии с поставленной задачей необходимо выявить недостатки существующей тарифной системы и предложить пути их дальнейшего устранения. **Результаты.** Были охарактеризованы и проанализированы существующие методы ценообразования, выявлены их недостатки и преимущества, предложены варианты ликвидации недостатков. **Выводы.** В результате проведенного анализа было выявлено, что существующий подход к ценообразованию не соответствует пунктам программы реформирования и подлежит дальнейшему усовершенствованию.

Ключевые слова: ценообразование, инфраструктура, расходы, естественная монополия, тариф

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