UDK 338.47:656.2:332.122

N.S. Chernova, D.S. Surmilo

ANALYSIS OF RAILWAY COMPETETIVE FACTORS

Abstract.*The railway transport performance indices, which are guiding in determining the level of efficiency and competitiveness at the transport market of Ukraine, were singled out and investigated.*

Keywords: *railway transport, efficiency, competitiveness, wagon turnover, train mass, speed.*

Statement of problem in general and its connection with the important scientific and practical tasks

The government program concerning the Ukrainian railway transport reform continues [1]. Transport legislation and traffic management system are being improved. The sharp decline in passenger and cargo traffic volumeresulted in spare reserves of the railway freight capacity. However, this did not solve completely the problem of disparity between traffic flow and transport capacity that causes a number of limitations in meeting the demand for transportation. One of the main drawbacks of transport is low technical level and poor state of its production base. The decline in infrastructure facility reproduction, rolling stock update rates led to a significant deterioration of its technical condition, reliability and durability.

Analysis of recent research and publications, whichstate the initial solution of this problem and are guiding for the author

Most of the technical facilities are operated over regulatory lifetime or close to it [2]. It results inthe significant deterioration of security, railway transport economic efficiency, the increase intraffic resource-intensity and transportation expenses of the national economy of Ukraine [4]. The increase in the transportation cost arouses the transport tariff raising, which greatly reduces the competitiveness of railway transport at the transport market [5].

Picking out the unsolved aspects of the problem which this article is devoted to

Thetariffraisingresultsinsomelimitationsoftransportandeconomiclinksofthenationaleconomyofukraine.Transportation of many products over long distances became unprofitable, the competitiveness of industrial products of the transport friendly enterprisesdecreased not only at the international but also at the domestic market of Ukraine. At the same time, the tariff raisingfor the carriage of passengers and goods have not resulted in the normalization of the financial condition of railway undertakings. The domestic passenger transportation isunprofitable and efficiency of transportation of certain goods is minimal or non-profitable.

Statement of goals of the article (problem statement)

The purpose of this paper is to find railway transport operational factors that affect the most the level of income and the competitiveness of railway transport.

Statementofbasicresearchmaterialwithjustificationofscientificresults

There are several reasons of transport low profitability and losses. The main one is the reduction of traffic volumes while maintaining all the elements of the infrastructure sector. As well as a slight decrease in the number of personnel. Lagging ofgrowth of the profit rates behind the rising prices for fuel, energy, materials, vehicles and equipment consumed by railway.

The main feature is that these reasons exert influence regardless of the form of transport enterprise property.

The current investment crisis, the poor financial condition do not allow to direct the own funds and bank loans for rolling stock and infrastructure renewal, which in turn leads to further deterioration of the financial situation and the loss of competitiveness. Using the railway transport performance statistical data and the factor analysis it is possible to establish the factors that have the greatest impact on revenues, expenses and profits of structural units of railway transport of Ukraine. As a result, we can identify the guiding factors affecting the value of the resulting economic indices of transport performance and its competitiveness.

The wagon turnover formula is officially recommended and most commonly used in the practice of planning and analysis by the railways of Ukraine. Using the formula of disjointed wagon turnover, we can determine the impact of certain indices on the total value of wagon turnover (1):

$$V_{w.t.} = \frac{1}{24} * \left(\frac{l}{V_{srv.}} + \frac{l}{L_{av.d.}} * t_{av.w.} + \frac{l}{L_{av.}^{op.}} * t_{av.}^{op.} + k_{loc} * t_{cargo} \right) \quad (1)$$

l –fullrun of a wagon, km;

$V_{srv.}$ *–service speed, km/h;*

$L_{av.d.}$ *- average distance between technical stations withoutwagon yard operation;*

$t_{av.w.}$ *- average idle time of a transit wagon without yard operation;*

$L_{av.}^{op.}$ *-average distance between technical stations with wagon yard operation;*

$t_{av.}^{op.}$ *- average idle time of a transit wagon with yard operation;*

k_{loc} *- local work coefficient;*

t_{cargo} *- average idle time of a wagon at one station with cargo operations, hours.*

The formula allows toobtain accurate results subject to careful definition of each component that is part of the formula, bothby determination of actual turnover and prospective wagon turnover index.

The analysis revealed that currently there is a major change in the structure of railway operational costs due to rising prices for materials, fuel, electricity and rolling stock, as well as due to changes in the order of their registration.

This analysis is important for the study of variable costs, which ultimately will allow to some extent taking into account the impact of the traffic decline on the networkworkload, the need for rolling stock, contingent, as well as expanding the economic analysis of the current costs, determining the ways to decrease the costs and to provide funds for railway transport infrastructure.

Based on the fact that the wagon turnover is thegeneral comprehensive qualitative index of railway transport performance, reflecting the results of the technical, economic and organizational activities of all parts of the railway transport of Ukraine, it was given the focus in the analysis (Fig. 1).

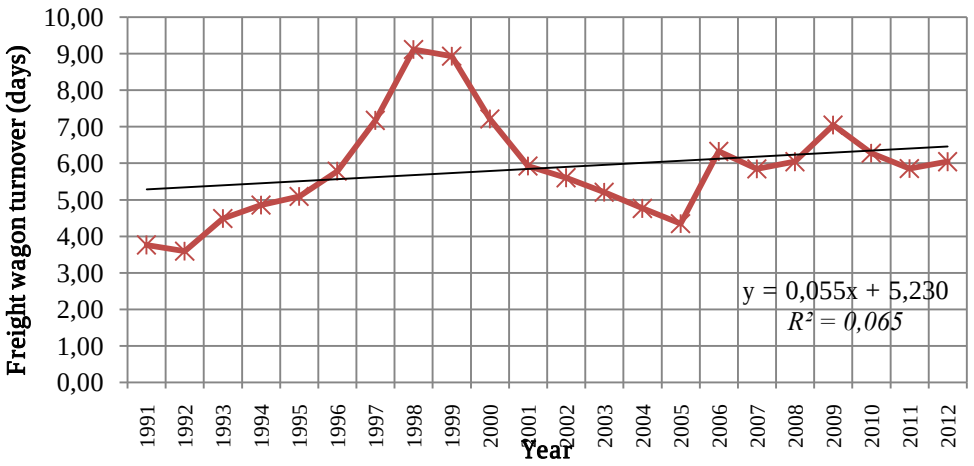

Fig. 1.Dynamics of thefreight wagon turnover index (Source: [3] with follow-up of authors).

Another important component in the structure of the wagon turnover time is the time of wagon movement, depending on the technical and therefore service speed (Fig. 2.).

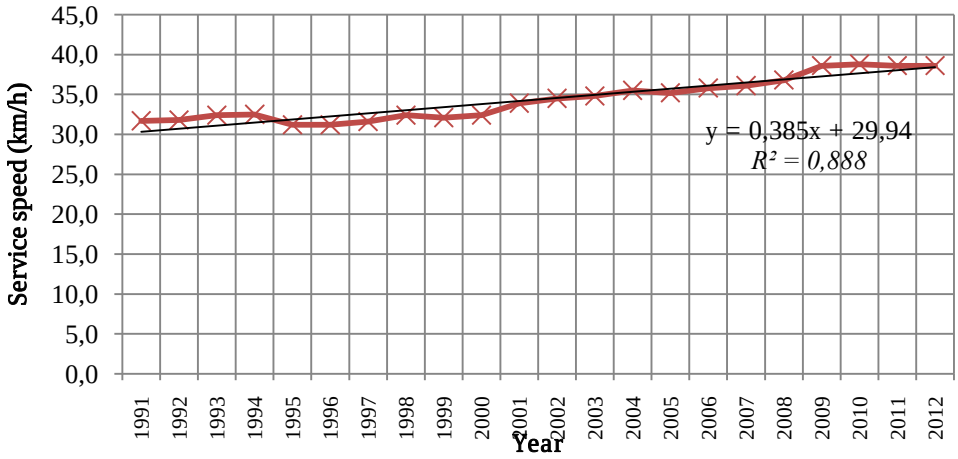

Fig. 2.Dynamics of railway rolling stock service speed (Source: [3] with follow-up of authors).

The most time in the wagon turnover time structure takes idle time at technical stations - 35% and idle time during cargo operations - more than 30% of the total turnover time.

The identified relationship between wagon turnover time and idle time during one freight and technical operations allows to estimate in figures the impact of these factors on the wagon turnover.

Another performance index that has a significant impact on the wagon turnover time, according to the study, isthe train gross weight (Fig. 3.).

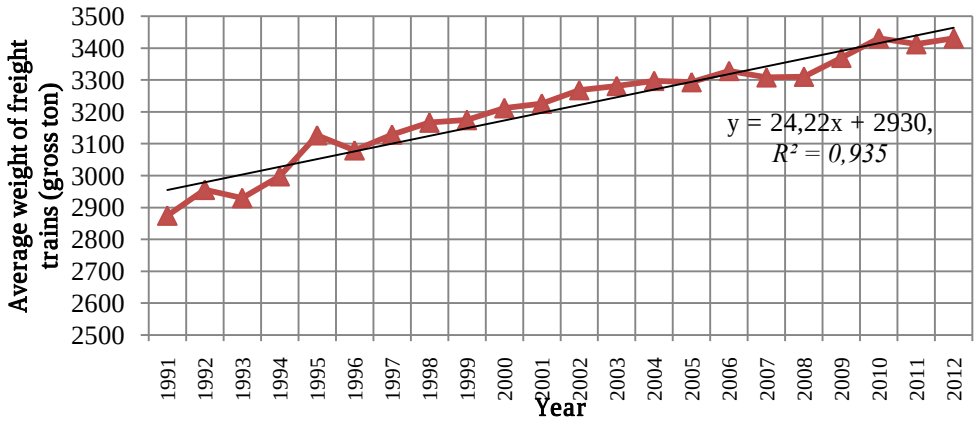

Fig. 3.Dynamics of average gross weight of freight trains (Source: [3] with follow-up of authors).

The value of the correlation coefficient between the wagon turnover time and train gross weight is in the range from 0.87 to 0.94 (depending on the specific operating conditions).

Studyconclusions

There are the results of correlation-regression analysis above. The analysis revealed the extent to which costs are sensitive to changes in traffic and density.

Fluctuations in the value of goods traffic by particular directions, railway, type of cargo, unpredictable nature of its change becomes the normal state of the network in the market economy conditions. This is an essential feature of the state of the "environment", i.e. the demand for rail transportation, which is bound to affect the choice of strategy for performance index operational management. Thus, the wagon turnover acceleration may not be accompanied by savings in rolling stock operating costs (as well asthe fleet reduction). On the contrary, the energy expenditure may increase, and as a result the transportation costs as well. Probabilistic nature of the change of economic performance of railways, low dependent on the achieved level of performance indices, can be considered as the peculiarity of the current state of the industry. This is evident due tothe analysis showing income sensitivity to the changes of such factors as wagon turnover time, train gross weight, rolling stock service speed.

Prospects of further research in this area

All these factors are resultant in determining the level of the industry efficiency and predicting of its competitiveness at the transport market of Ukraine. Therefore, the prospective research trend in this area is the determination of qualitative and quantitative values of the industry profitability and competitiveness dependence on the above stated factors.

References

1. *Державна цільова програма реформування залізничного транспорту на 2010 – 2019 роки [Електронний ресурс] : затв. Постановою Кабінету Міністрів України від 16 груд. 2009 р. № 1390 [в редакції Постанови Кабінету Міністрів України від 26 жовт. 2011 р. № 1106]. – Режим доступу: http://zakon1.rada.gov.ua/.– Назва з екрана.*

2. *Дикань В. Л. Реформирование экономики Украины и конкурентоспособность предприятий : монография / В. Л. Дикань. – Харьков : Основа, 1997. – 345 с.*

3. Довідникосновнихпоказниківроботизалізниць України (2002–2012 роки). – К. :Поліграфсервіс, 2013. – 58 с.

4. Економіка і залізничний транспорт України: моніторинг макроекономічних і галузевих показників (1996–2010 рр.) / [наук. кер. Ю. М. Цветов, М. В. Макаренко]. – К. : КУЕТТ, 2007. – 316 с.

5. Мукмінова Т. А. Економічнаконкуренція на залізничномутранспорті / Т. А. Мукмінова // Залізничний транспорт України. – 2001. – № 4. – С. 48–58.