GLOBALIZATION AND LABOUR PRODUCTIVITY IN THE TRANSPORT SECTOR

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ABSTRACT

While considering globalization of the economy, especially its influence on domestic socio-economic policy, as well as the role of the transport complex in implementation of interstate economic relations, problems of assessing and comparing labour productivity are highlighted.

Comparative analysis of international experience (EU, US and Russia) in the field of labour productivity evaluation for railways is conducted. The influence of modern trends associated with restructuring of railway industry, introduction of new equipment and technology, their impact on the changes in the structure of the company's staff, is analyzed, particularly at the example of Russian Railways.

It is concluded that the growth rates of labour productivity on the railways of Russia generally outpace the rates of its growth in other sectors of the economy. However, the need persists to continue the search for additional resources able to increase productivity and consistent with the impact of globalization on the economy, labour market and labour motivation.

Keywords: labour productivity, transport sector, globalization of the economy, structural changes, labour market, world railways, international experience.

Background. *Labour productivity characterizes the productivity of labour costs, the level of development of the productive forces and remains one of the key indicators of the economic system efficiency. But this indicator is relative, since it is rather difficult to measure performance due to the presence of a variety of measurement methods and parameters that give different results. This issue is constantly being discussed by researchers in Russia [1, p. 34] and in most countries [2, p. 57].*

The increase in labour productivity is manifested in the fact that the share of human labour in manufactured products decreases, while the share of past labour increases, and the absolute cost of human and materialized labour per unit of production decreases. In planning the increase in labour productivity, absolute indicators are used to characterize the level of productivity, and relative ones are used to show the dynamics of its growth.

It remains important to compare the level of labour productivity in the international market as a basic method of economic analysis. Such comparisons make it possible to assess the current state of the object under study, and an analysis of the dynamics of the indicators makes it possible to draw conclusions about the pace of industrial development of a particular country. Eventually, a base appears for building possible hypotheses about the future, and models of economic growth are specified.

The state of the world economic system, instability of market conditions in the coming years will remain a source of uncertainty and risk for enterprises and organizations of the transport infrastructure in Russia. This is due to unresolved fundamental problems of structural imbalances of consumption and accumulation, uneven development of economies of different regions, imperfect mechanisms for regulating financial markets and capital flows, as well as peculiarities of the current technological structure of the global economy, accompanied by changes in the sectoral structure, increasing importance of human capital for economic growth.

The presence of such serious factors makes the problems of productivity growth in the transport sector of economy topical, since the efficiency of the transport infrastructure is one of the defining conditions for intensifying the country's economic development. While recognizing the importance of infrastructure issues, governments of many countries in most cases consider that participation in the market process of the private sector in itself guarantees high productivity without improving the economic management mechanism.

The backbone component of the domestic transport complex in Russia is the holding company Russian Railways, which has diversified spectrum of activities and is one of the world's top three railway companies. The holding company carries out large-scale infrastructure projects aimed at ensuring the strategic development of key industries and accelerating economic growth in the country. Nevertheless, not all goals and objectives are fully compatible either are embodied in practice. Exhaustion of reserves of extensive productivity growth makes scientists, engineers, economists, managers explore the factors of intensive and innovative development, look for resources to improve competitiveness in the global market [3, p. 115].

Creating a favorable investment climate, introducing modern technologies, modernizing the infrastructure, updating the rolling stock, and rationally using all types of resources, all those conditions taken and satisfied together could facilitate the growth of transport labour productivity.

Objective. *The objective of the authors is to consider system of issues allowing to compare railway labour productivity measurement methods at international level, to analyze them in Russia, and to assess the impact of technological factors.*

Methods. *The authors use general scientific methods, economic, comparative, statistical analysis, specific labour productivity assessment tools, mathematical methods.*

System experience is coordinated

The United States, Western European countries and Japan have the most valuable experience in management of labour productivity in theoretical and practical aspects. The US systemic experience in productivity is deemed to have a certain influence on management of this area in Japan and Europe (particularly Germany) in the second half of 20th century. However, if in the USA low production costs and

Table 1

Quantitative rail labour productivity indicators in Europe

Indicator	Formula	Unit of measurement
Labour productivity (high speed – conventional rail)*	$P_L = \frac{Pl_{net}}{N}$	net tonne-km/employee
	$P_L = \frac{Al}{N}$	passenger-km/employee
	$P_L = \frac{N}{L_{oper}}$ ***	employees/km of network in use
Labour productivity of freight railway transport*	$П_l^{cargo} = \frac{Pl_{gross}}{N^{cargo}}$	gross tonne-km/employee
	$П_l^{cargo} = \frac{Pl_{net}}{N^{cargo}}$	net tonne-km/employee (labour productivity of traffic)
Labour productivity of passenger railway transport (high-speed – conventional rail)*	$P_l^{pass} = \frac{Al}{N^{pass}}$	passenger-km/employee
Labour productivity of infrastructure operation**	$P_l^{inf} = \frac{NS}{N^{inf}}$	train-km/1 employee

** Based on the report of the Economic Commission for Europe. Inland Transport Committee. Railway Transport Working Group. Sixty-sixth session. Geneva, 8–9 November 2012. Item 10. Productivity in Rail Transport [7, p. 2].*
*** This indicator is or was used by a number of companies, for example, by DB Group.*
**** In Russian practice this indicator is interpreted as labour intensity.*

high purchasing power prevailed in the mass consumer market, then in Japan and Germany attention was paid to the social aspect of labour productivity. The Japanese model implied job security, social partnership, a fair distribution of the results of productivity increase, and the experience of European countries showed that the convergence of financial and industrial activity contributes to productivity growth.

In European countries, work on improving productivity is coordinated by the European Association of National Productivity Centers (EANPC, http://www.eanpc.org). The coordinating function of EANPC consists in collecting and summarizing the results of the study of factors affecting labour productivity, but also in stimulating the transfer of innovations from researchers to practitioners, as well as in promoting partnership with various national bodies and organizations, especially ministries, trade union institutions and employers of small and medium enterprises. A similar approach is being implemented by the International Labour Organization (ILO), which sets as its task the efficient use of labour itself and such resources as capital, land, materials, energy, information and time.

In general, it should be noted that in international practices, when developing measures to increase productivity, the relationship between directly production factors and their social (for example, employment) and environmental consequences (for example, environmental impact) are simultaneously taken into account [4, p. 165].

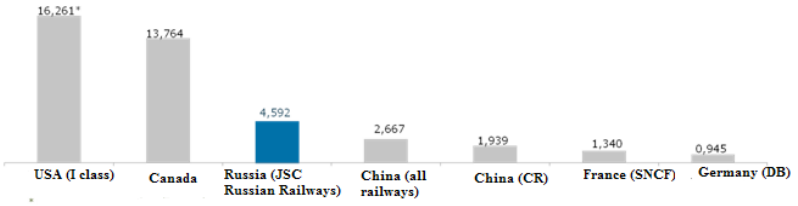
For international comparisons, indicators such as gross domestic product (GDP) per capita, GDP per employee or per work hour are used most often. At the same time, GDP per capita characterizes to a greater extent the standard of living, and not labour productivity. The second indicator is more correct in assessing indirectly expressed labour productivity.

Taking into account the differences and features of the methodology for assessing labour productivity in different countries, we have to admit that the level of this indicator in Russia is not high enough. So, in comparison with the EU countries, labour productivity in the Russian Federation is less than twice, and the necessary rates of its growth have not been achieved in recent years. As a result, the gap with the EU has increased. While the gap with EU of some catching-up countries has reduced – for example, China reduced it to three times, and in 1991 it was more than 10 times [5, p. 9]. According to Russian federal statistical service (Rosstat), in 2016 labour productivity in the country increased on average by only 0,1 %. In order to improve the competitiveness of the domestic economy, in order to reduce the gap in labour productivity between developed countries and the Russian Federation, it is necessary to ensure its annual growth rate of 5–6 %.

Indicators, Levels, Comparison

In Russia, the following among the main factors that influence the level and dynamics of labour productivity [6, p. 20], are taken into account:

- *general state of the economy and potential for its dynamic growth;*
- *product competitiveness and the country's GDP structure;*
- *degree and speed of introduction of new technologies;*
- *conformity of the implemented technologies to the current or previous technological mode;*



Pic. 1. Labour productivity of workers of the railways of the world and JSC Russian Railways engaged in transportation activities in 2014, million red. t-km/employee [8, p. 10].

• social policy of the state, supporting the level of employment, providing the population with jobs, especially in subsidized regions.

In the Russian statistical accounting system, companies record the indicator «labour productivity» in value terms. In general terms, using this approach, labour productivity is determined by the ratio in a comparable form of revenue to the number of employees. Rosstat calculates performance dynamics in comparable prices at the country level, by region, as well as by 15 integrated activities. This calculation is carried out with a delay of nine months for data for Russia as a whole and by type of activity, for a year and three months for data for territorial entities of the Russian Federation.

A new method of calculating labour productivity is being developed. For an enterprise, it will be considered as value added divided by labour costs. At the same time, the added value is the sum of gross profit and wages, taking into account taxes and insurance premiums, and, in order to reduce the risks of misstatement of reports, profit indicators before tax are taken into account. Relying on the data controlled by the Federal Tax Service will allow for more reliable estimates of performance, since tax reporting is more accurate than standard statistical forms. The new methodical approach gives the possibility of a «through account»: from the level of an individual enterprise to the level of the country as a whole. In practice, companies monitor the level of labour productivity in physical terms, through the ratio of the volume of output to the number of employees, thus excluding the influence of price conditions.

In the transport sector of the economy, comprising railways, the «reduced ton-kilometers» index is used as a natural indicator. Labour productivity of workers in general terms is determined by the formula:

$$LP_{ij} = \frac{\sum_{i=1}^{n}\sum_{j=1}^{m} Pl_{red\,ij}}{\sum_{i=1}^{n}\sum_{j=1}^{m} N_{ij}},$$

where PL_{red} –volume of work reduced;

N – number of staff;

i – mode of transport;

n – number of modes of transport;

j – companies in the i-th mode of transport;

m – number of companies.

A similar methodical approach in assessing labour productivity is used in Europe [7, p. 2] (table 1).

If we evaluate the data available in open sources (reports of companies, associations, UIC, public organizations) and determine labour productivity using a semi-natural indicator (reduced tonne-kilometers), then JSC Russian Railways ranks third in terms of labour productivity after the railway companies of the 1st class of the USA and Canada, ahead of the countries of Europe, China, Japan, etc. (Pic. 1).

It should be noted that for most railway companies, the main indicator of work is reduced t-km. However, in different companies there are own methods of calculation, which does not always allow a direct comparison. Researchers use various

Table 2

Assessment of impact of structural changes in the transport complex of the Russian Federation on labour productivity

	Structure of employment, %		Change in employ-ment, %	PL, bln t-km		Labour productivity, thous. t-km/employee		Change in labour productivity of the transport sector, thous. t-km/employee		
	2014	2015		2014	2015	2014	2015	total	caused by productivity	caused by structure
Transport – total	100,00	100,00		5080,00	5093,00	1813,44	1843,15	29,71	29,71	–
railway	25,73	23,72	-2,01	2301,00	2306,00	3192,73	3519,00	13,14	83,94	-70,81
other land rtransport	35,87	36,02	0,15	246,80	231,60	245,62	232,72	-4,29	-4,63	0,34
pipeline	7,29	7,22	-0,06	2423,00	2444,00	11871,63	12244,49	19,53	27,17	-7,64
water	2,15	2,13	-0,02	104,00	106,00	1730,45	1802,72	1,24	1,55	-0,31
air	3,23	3,05	-0,18	5,20	5,40	57,40	63,98	0,10	0,21	-0,12

methods to correctly compare labour productivity at JSC Russian Railways [9] and leading international railway companies. So, in [10, p. 3] it is proposed to use the coefficients of adjustment of the calculated values, and in the monograph [2, p. 70] – adjustment coefficients of the volume indicators of JSC Russian Railways for determination of reduced production, obtained on the basis of economic and statistical modeling.

Based on the obtained results, it can be concluded that the level of labour productivity on the railways of North America is higher than on the Russian railways, even when reduced to comparable accounting conditions, by more than 6 times. If, however, we take into account the objective differences in terms of working conditions (the so-called framework conditions: the level of technical equipment, depreciation of fixed assets, etc.), then this gap will be substantially reduced, but it will remain very high – about 3,5 times.

Factors of progress and deceleration

The work of American railways in conditions of deregulation and competition stimulated both technical and technological, as well as organizational and marketing innovations. This made it possible to ensure a dynamic growth in freight turnover with a significant (especially in the first ten years after deregulation) reduction of the number of employees [11, p. 203].

About 40 % of the operational costs of railway transport are directly related to staff as a labour factor. And taking into account the cost of servicing jobs, clothing, labour protection, etc. this proportion is close to 45 %. No other production resource of the industry is characterized by such high resource intensity.

Analysis of international experience in assessing labour productivity in railway transport has shown that in world and domestic economic practices, labour productivity is the most important comprehensive indicator of effectiveness of a company. The basis of calculation there-of is the volume of services rendered in physical or monetary terms, produced by one employee per unit of time. With different units of measurement and factors taken into account when evaluating labour productivity, the methodology for evaluating efficiency of using labour resources is based on the ratio of the results obtained and the costs that determined them.

The measurement of labour productivity is determination of the absolute level and of the change of this level for a certain period. As already noted, depending on the choice of a unit of measurement, the volume of production can be expressed in physical, value or labour indicators. Accordingly, there are also methods of measuring labour productivity: natural, semi-natural, cost, labour (by normalized working time) and index (by heterogeneous types of products, works, services).

In order to use data on labour productivity to assess performance of Russian Railways, the calculation of productivity of transportation activities by the conventional-natural method is used as a priority tool. The cost method is used with an expanded product range (services), while the volume of work performed may include marketing, logistics, service components.

The main direction of increasing labour productivity remains reduction in the number of personnel through introduction of innovations [1, p. 31].

Innovation is most conducive to reducing number of employees. So, Carl Benedikt Frey and Michael A. Osborne [12, pp. 37–38] estimated the impact of technological changes on 702 professions (from orthopedists to tour guides, from animal trainers to personal financial advisers and parquet grinders). According to them, about 47 % of the total number of jobs in the United States are under threat. Wages and educational attainment are in inverse relation with the likelihood of computerization. Instead of reducing the demand for middle-income professions, which was the trend of the last decades, their model predicts that in the near future, computerization will mainly lead to the disappearance of low-skilled and low-paid jobs. In contrast, highly skilled and highly paid professions are less susceptible to computer capital. As noted by researchers [13, p. 12] the growth of multifactor productivity is positively associated with highly skilled labour. However, external effects of this kind are mainly limited to industries that intensively hire university graduates. In this connection, it becomes obvious that structural shifts in favor of high-performing industries should be expected soon.

Table 2 shows assessment of the impact of structural changes in the transport sector of the Russian Federation on labour productivity.

As can be seen from table 2, the maximum productivity in the transport complex falls on pipeline transport, with the index of 12224,5 thous. t-km/person. Nevertheless, it is not easy to unequivocally assess the mutual influence of the ongoing sectoral processes. The increase in productivity of the transport thanks to increase in productivity in railway transport was at 83,9 thous. t-km, while at the same time, due to a change in the structure of employees, labour productivity decreased by 70,8 thous. t-km. In this case, it is necessary to correctly interpret the influence of structural changes. On the one hand, reduction in the number of emlpoyees increases labour productivity in one or another mode of transport, and on the other, the same reduction in the number of employees of a mode of transport reduces the share of that transport mode in the total number of transport employees, neutralizing thus both positive or negative impact on performance of the whole transport sector.

In view of that aspect it is necessary to treat structural shifts in number of employees with particular predilection. There is a need for development of high-performance jobs in transport sector (as it happens within highly particular pipeline transport). Nevertheless, the growth of number of high-performance jobs will be hampered by the influence of low-productivity. Hence the need arises to pay attention to the modes of transport, which, while reducing labour productivity, increase the proportion of the number of employees in the total number of employees in the transport complex. As can be seen from table 2, automobile transport has such negative trends: with a decrease in productivity by 12,9 thous. t-km/employee the share of its employees increased by 0,15 %, which led to a negative impact on labour productivity of

workers of the transport sector by 4,29 thous. t-km/employee.

Significant factors that decelerate the growth of labour productivity are:

• high wear of technical equipment, accompanied by low rates of renewal and disposal;

• insufficient investment in renewal of fixed capital, which is a consequence of the overall low level of gross savings in the economy;

• low technological level of production processes;

• lack of motivation for high-quality work activities of employees, which is primarily associated with low discipline and diligence.

Conclusions. *The level of labour productivity achieved in railway transport is the result of implementation of a set of measures to introduce new technical means and advanced technologies, and to create high-performance jobs. At the same time, the optimization of the number of the employees is carried out at the expense of advanced technology and innovative production processes, structural and organizational changes. On the railways, minimally manned and unmanned technologies are being introduced. For example, a complex of automated systems operates at Ust-Luga station, which makes it possible to manage the multi-park system from one dispatch center, and Moscow Central Circle [railway line] is designed and operated on the basis of digital technologies.*

The growth rates of labour productivity in railway transport of Russia are ahead of those in other sectors of the economy. However, maintaining a high level requires constant efforts to find newer tools and resources.

The negative impact of globalization processes on productivity should be noted. The increase in exports of raw materials and, above all, fuel and energy, contributes to the growth of labour productivity in physical terms, while in value terms it decreases.

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