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 the transport sector of economy topical, since the problems of productivity growth in the transport infrastructure is one of the fundamental problems of structural imbalances of the current technological structure of the national economy, accompanied by changes in the world market, world railways, international experience.

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 

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 the economy 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 backbone component of the domestic transport complex in Russia is the holding company Russian Railways, which has diversified its economic, comparative, statistical methods, economic, comparative, statistical analysis, specific labour productivity assessment tools, mathematical methods.

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
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%.

### Table 1

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Formula</th>
<th>Unit of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour productivity (high speed – conventional rail)*</td>
<td>$P_l = \frac{P_l^{net}}{N}$</td>
<td>net tonne-km/employee</td>
</tr>
<tr>
<td></td>
<td>$P_l = \frac{Al}{N}$</td>
<td>passenger-km/employee</td>
</tr>
<tr>
<td></td>
<td>$P_l = \frac{N}{L_{oper}}$</td>
<td>employees/km of network in use</td>
</tr>
<tr>
<td>Labour productivity of freight railway transport*</td>
<td>$P_l^{freight} = \frac{Pl_{freight}}{N_{freight}}$</td>
<td>gross tonne-km/employee</td>
</tr>
<tr>
<td></td>
<td>$P_l^{freight} = \frac{Pl_{freight}}{N_{freight}}$</td>
<td>net tonne-km/employee (labour productivity of traffic)</td>
</tr>
<tr>
<td>Labour productivity of passenger railway transport (high-speed – conventional rail)*</td>
<td>$P_l^{pass} = \frac{Al_l}{N_{pass}}$</td>
<td>passenger-km/employee</td>
</tr>
<tr>
<td>Labour productivity of infrastructure operation**</td>
<td>$P_l^{inf} = \frac{N_S}{N^{inf}}$</td>
<td>train-km/1 employee</td>
</tr>
</tbody>
</table>

** 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.
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].

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:

$$L_P = \frac{\sum \sum P_{i}N_{j}}{\sum \sum N_{j}},$$

where $P_{i}$ – 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 methods to assess the impact of structural changes in the transport complex of the Russian Federation on labour productivity.
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 high-skilled and high-paid 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 would 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 assign the multifactor productivity in 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, the necessity to correctly interpret the influence of the number of employees in the 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 this, the necessity 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: there is 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

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. 202].

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. As noted by researchers [12, p. 10] 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 would be expected soon.

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.

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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 imports 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.

REFERENCES


