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Evaluating the efficiency of technical equipmentin transport holding company units

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Abstract

The study aims to investigate the efficiency of technical equipment in transport holding company units. The proposed methodological approach to evaluating the efficiency of technical equipment in the transport holding company helps detect provisions for improving the efficiency of the holding company's productive capacity rather than that of its business units. As a result, the proposed methodology for determining capital productivity fosters the development of a coherent policy. In conclusion, it is necessary to devise an appropriate system for reporting the performance indicators of business units located in the proximity of railways.

Keywords: Economic Efficiency, Holding, Company, Capital.

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Evaluación de la eficiencia de equipos técnicos en unidades de compañías holding de transporte

Resumen

El objetivo del estudio es investigar la eficiencia de los equipos técnicos en las unidades de la empresa holding de transporte. El enfoque metodológico propuesto para evaluar la eficiencia del equipo técnico en la compañía holding de transporte ayuda a detectar provisiones para mejorar la eficiencia de la capacidad productiva del holding en lugar de la de sus unidades de negocios. Como resultado, la metodología propuesta para determinar la productividad del capital fomenta el desarrollo de una política coherente. En conclusión, es necesario diseñar un sistema apropiado para informar los indicadores de desempeño de las unidades de negocios ubicadas en la proximidad de los ferrocarriles.

Palabras clave: Eficiencia Económica, Holding, Empresa, Capital.

1. INTRODUCTION

The significance of the research lies in the need to ensure the sustainable operation and development of the transport sector despite market fluctuations in crisis and post-crisis situations. At the same time, the need to improve the system for economically evaluating the efficiency of technical equipment in transport holding company unit's results from the fact that the current evaluation system was designed for centralized management systems. The latter is based on the territorial and sectoral approach and ignores both the specifics of market relations in terms of

railway transport and its innovation development targets. The detailed elaboration of the system for evaluating the efficiency of technical equipment in the transport holding company and the evaluation of its contribution to overall results facilitate the implementation of an objective and substantiated investment and innovation program of transport holding companies and, consequently, to speed up and enhance its productive efficiency (Stefan et al., 2017).

Many research studies show that poorly efficient technical equipment increases the resource intensity of the transport sector, worsens the company's performance indicators and reduces their upgrade level, which discourages owners, intra-industry participants and external investors from investing into the transport company's assets. The importance of evaluating the efficiency of technical equipment in railway vehicles, which meet the demands of modern economy, stems from the need to ensure a high level of performance in transport companies taking into consideration an increasingly competitive transport market, Russia's unstable economic situation as well as increasing traffic volumes and improving quality of transport services. In the continuously evolving business railway environment, methods of evaluating the efficiency of technical equipment need to be developed, improved and specified.Capital productivity is one of the major performance indicators of any institutional framework. The restructuring of

therailway's industry and the emergence of new vertically integrated structures in transport holding companies highlights the need to devise an indicator that would objectively reflect the level of capacity utilization, particularly in terms of technical equipment (Tereshina, 1994).

2. MATERIALS AND METHODS

In present-day Russia and the post-Soviet area, holding companies lack business experience, because these economic entities began to appear as late as the 1990s. As argued in, however, holding concepts were familiar to legal science back in imperial Russia and some of its features characterized Soviet managerial economics.In international (above all, European and American) economics, holding companies are among the oldest institutional and managerial structures. According to researchers working on the history of the forms of economic organization, such structures date back to 1820. The establishment of holding companies in different countries isdescribed in(Shitkina, 2008).

Holding companies began to appear in the Russian Federation after the adoption of the RF Act No. 1531-1 of 3 July 1991 on the Privatization of State and Municipal Enterprises. In

the period of economic transition, holding entities focused on the privatization of major enterprises, consortiums, groups and associations while maintaining technological, organizational and other relations between member entities.In analyzing the emergence of holding companies in the Russian Federation, Shitkina observes that the first holding company,Avtoselkhozmashkholding (ASM Holding), was established in October 1991 on the basis of the former Ministry of Agricultural and Tractor Machine Building of the USSR. With the advent of major economic reforms, this holding company turned out to be virtually unmanageable due to its gigantic size, territorial extent and the number of its member entities (Shitkina, 2006; Tereshina, 2012).

Holding companies, such as Langepas-Uray-Kogalymneft (LUKOIL), YUKOS, Surgutneftegaz, Transneft and Transnefteprodukt, proved to be more viable in the fuel and energy sector. A similar principle applied to establish other holding companies, including Gazprom, Norilsk Nikel, RAO Unified Energy System of Russia, Svyazinvest, Roslesprom and Russian Metallurgy. Importantly, partially State-owned holding companies were established in those sectors that were natural monopolies or were of major strategic importance, in which the loss of state control would be undesirable. In 2003, the Ministry of Transportation of the Russian Federation transferred assets

worth of over 1.5 trillion rubles to the authorized capital of the affiliated JSC Russian Railways. Most of these assets included railway equipment, rolling stock and other facilities of special significance to transportation (Podsorin, 2018).

In 2015, JSC Russian Railways was the parent company and held shares in 143 subsidiaries and affiliates. The subsidiaries' increasing role in Russian Railways' business activities is complemented by the development of competitive segments in the corporate management system and by improvements in the collaborative economic mechanism the interaction between the holding company and them. The establishment of the holding company enhanced the motivation and coordination between its functional units and, at the same time, concentrated productive and financial resources in one same center. The concentration of resources in the same center requires a mechanism adapted to market conditions in order to control the use of capital and, above all, of capital advanced into fixed assets. Specifically, the deterioration level of the fixed assets of Russian Railways' subsidiaries is constantly increasing (Kharitonova & Podsorin, 2013).

Analysis of fixed assets is made to study, plan and determine trends in using fixed assets, with a special focus on the following: providing the company and its business units with fixed

assets; matching the amount, content and performance standards of fixed assets and, especially, those of its most active portion, i.e. vehicles and transport equipment; determining the degree of fixed assets' utilization and factors influencing it; ensuring full use of fleet vehicles; assessing the use of active fixed assets in terms of time and capacity; identifying the impact of using fixed assets on the output and other indicators of the enterprise's economic performance; and detecting increases in capital productivity, output and profits due to the improved use of fixed assets (Podsorin, 2014).

Many international economic research studies try to respond to these major challenges. International experience in enhancing the use of fixed assets is described in(Cantos & Maudos, 2001). Capital productivityis the indicator used in most guidelines issued by various Russian ministries and departments with a view to assess the Russian companies' use of fixed assets. There are various methods for analyzing capital productivity. Despite its apparent clarity, capital productivity is an issue yet to be addressed (Nurullinaet al, 2018). There still exist different points of view on the objective interpretation of what capital productivity is, how to plan and implement it in practical economic life. In this regard, the following remains subject to debate: method of calculating capital productivity (value or physical); output measurements used in calculations (gross,

commercial, sold or net output); method of evaluating the value of fixed assets (initial, replacement or net value); way of estimating capital productivity (as the ratio of product value or profit margin to the value of fixed assets; and, finally, a prevailing trend for changes in capital productivity in a changing technological environment in terms of production efficiency (Kharitonova, 2016; Tereshina, 2011).

Today, the most widespread measurement method is the cost one. It makes it possible to compare the output and used instruments of labor not only in diverse production facilities and sectors, but also in different ties, i.e. it helps determine the indicator behavior (Zavyalova, 2018). Besides, this method is extremely simple and straightforward. At the same time, it has a number of deficiencies, mainly its impersonality and constant price volatility.This is why, along with the cost method, it would be appropriate to adopt the physical method of measuring capital productivity, which offers excellent opportunities for intertemporal comparisons, i.e. the physical indicator undergoes no changes over time.In general, capital productivity in the railway sector is defined as the ratio between transport production and the average annualinitial/replacement value of fixed assets. The existing approach to determining capital productivity in terms of transportation is as follows:

$$CP_o = \frac{Pl + Al}{FA},$$

Pl = freight, t/km,

Al =passenger traffic, pas/km,

FA=value of fixed assets, in rubles.

In determining the capital productivity of Russia's biggest transport holding company, JSC Russian Railways, the method adopted to evaluate capital productivity takes into consideration the company's output, including freight, passenger traffic and deadheading wagons of other owners (nS_{dead}):

$$CP_o = \frac{Pl + k_{pas} \cdot Al + k_{dead} \cdot nS_{dead}}{FA},$$

The following conversion factor will be used to determine transport performance: k_{pas} =conversion factor, passenger/km to t/km and k_{dead}= conversion factor, deadheading wagons of other owners/km to t/km. Using factors bringing diverse products to a unified kind contributes to the company's objective output and value addition.In this regard, evaluating the efficiency of technical equipment in transport holding company unit'sgains in importance, taking into consideration their contribution to the holding company's overall performance and the value of fixed assets under

their control (Fraszczyk et al., 2016; Urdanoz & Vibes,2013).

3. RESULTS

Currently, capital productivity is one of the key efficiency indicators of JSC Russian Railways' business units. Table 1 shows formulas for determining the capital productivity of Russian Railways' major business units.

Table 1. Formulas for determining capital productivity of Russian Railways' major business units

Business Unit	Calculating Capital Productivity
Railway Domain (RD)	$CP_O^{RD} = \frac{\Sigma Pl_{conv}}{FA_{r.d.}}$
Directorate for Rail Traction (RT)	$CP_O^{RT} = \frac{\Sigma Pl_{gr}}{FA_{RT}}$
Transport Service Center(TSC)	$CP_O^{TSC} = \frac{\sum P_{tsc}}{FA_{tsc}}$ Ptsc = rail loadings, in thousands
Central Directorate of Traffic Control(CD)	$CP_O^{CD} = \frac{\sum P_{conv}}{FA_{CD}}$
Directorate of Railway Stations(DRS)	$CP_O^{DRS} = \frac{A}{FA_{DRS}}$
Directorate of High-Speed Communications (DHSC)	$CP_O^{DHSC} = \frac{Al_{conv}}{FA_{DHSC}}$

Business Unit	Calculating Capital Productivity
Rail Transport Operations (CDI RT)	$CP_o^{RT} = \frac{L_n \times (d_d \times I(MN) + d_{in})}{FA_{RT}}$
Electrification and Electrical DistributionUnit of CDI (Transenergo)	$CP_o^{EI} = \frac{L_{mile}^{OS} \times (d_d \times I(PL_{br}^e) + d_{in})}{FA_{EI}}$
Rolling Stock of CDI (CDI WS)	$CP_o^{WS} = \frac{N_w}{FA_{WS}}$
Automation and Remote Control Unit of CDI (CDI ARU)	$CP_o^{ARU} = \frac{N_{ARU}}{FA_{ARU}}$
Central Directorate for Terminal and Warehouse Management (TW)	$CP_O^{TW} = \frac{P}{FA_{TW}}$
Central Directorate for Track Maintenance (CDTM)	$CP_O^{CDTM} = \frac{L}{FA_{CDTM}}$
Directorate for Traction Rolling Stock Maintenance (DTR)	$CP_O^{DTR} = \frac{N_{dtr}}{FA_{DTR}}$
Central Directorate for Heat and Water Supply (CDHW)	$CP_O^{CDHW} = \frac{Q_{conv}}{FA_{CDHW}}$
Main Computer Center (MCC)	$CP_O^{MCC} = \frac{N_{MCC}}{FA_{MCC}}$
Central Communications Unit (CCU)	$CP_O^{CCU} = \frac{N_{CCU}}{FA_{CCU}}$

Pl_{conv} = number of conversed t/km byi-th railway company unit

FA_{RD}= value of fixed assets in the railway domain

Pl_{gr}= gross freight ton-kilometers

P_{TSC} =rail loadings, in thousands

FA_{RT} = value of fixed assets at the Directorate for Rail Traction

FA_{TSC} = value of fixed assets at the Transport Service Center

FA_{CD}= value of fixed assets at the Central Directorate of Traffic Control

FA_{DRS} = value of fixed assets at the Directorate of Railway Stations

FA_{DHSC} = value of fixed assets at the Directorate of High-Speed Communications

FA_{MCC} = value of fixed assets at the Main Computer Center

FA_{CDI} = value of fixed assets at the Centrale Directorate of Infrastructure

A = number of passengers dispatched

Al = passenger traffic in high-speed railway services

N= conversedunits

1155 Ln =track mileage, in km. Tereshina et al.
Opción, Año 34, No. 87 (2018): 1144-1162

I(Mn) = index to changes in operating load indicators

dI, dIN=share of technical equipment dependent and independent of the workload

FART=value of fixed assets related to railway transport operations of CDI

L^{OS}_{mile} = overhead system track mileage, in km.

$I(Pl^{e}_{br})$ =index to changes in operating load indicators

FAEI= value of fixed assets related to electrification and electrical distribution operations of CDI

Nw= equivalent units of the rolling stock of CDI

FAWS = value of fixed assets related to the rolling stock of CDI

NARU= equivalent unitsof the automation and remote control unit of CDI

FAARU =value of fixed assets related to the automation and remote control unit of CDI

To enhance the efficiency of technical equipment,it is necessary to devise an appropriate system for reporting the performance indicators of business units located in the proximity of railways. This will enable a time-efficient and suitable reprocessing policy based on technologies on a par with the world's best counterparts and standards. Table 2 shows the capital productivity values of the territorial branches' main business units as of 2014.

Table 2. Capital productivity of the territorial branches' main business units as of 2014, t-km/rub

Branch	РЦКУ (proposed methodology), t-km/rub	РЦКУ (methodology in use), unit of measure/rub.	Branch	CDI (proposed methodology), t-km/rub	CDI (methodology in use), Unit of measure/rub.
Kaliningrad	0.028	0.694	Kaliningrad	0.053	0.176
North Caucasus	0.189	2.955	North Caucasus	0.169	0.459
Southeastern	0,196	3.062	Southeastern	0.172	0.465
Kuybyshevskaya	0.211	3.811	Kuybyshevskaya	0.248	0.601
Trans-Baikal	0.241	4.106	Trans-Baikal	0.284	0.961
Krasnoyarsk	0.257	4.572	South Ural	0.283	0.747
South Ural	0.286	4.875	Krasnoyarsk	0.312	0.747
West Siberian	0.306	5.488	West Siberian	0.323	0.778
Moscow	0.334	4.851	Moscow	0.354	0.890
Northern	0.348	4.831	Northern	0.396	0.955
Volga Region	0.352	5.438	Gorkovskaya	0.495	0.759
Sverdlovskaya	0.400	7.120	Trans-Baikal	0.420	0.961
Far Eastern	0.405	6.007	Oktyabrskaya	0.473	1.175
Oktyabrskaya	0.505	7.249	Sverdlovskaya	0.563	2.694
Gorkovskaya	0.559	7.728	Свердловская	0.594	1.187
East Siberian	0.642	11.406	East Siberian	0.840	2.008
Mean value by branch	0.329	0.329	Mean value by branch	0.374	0.374

Table 2 (cont.). Capital productivity of the territorial branches' main business units as of 2014, t-km/rub

Branch	CD		Branch	RT	
	proposed methodology, t-km/rub	Methodology in use, unit of measure/rub.		proposed methodology, t-km/rub	Methodology in use, unit of measure/rub.
Kaliningrad	0.039	0.395	Kaliningrad	0.076	0.801
Southeastern	0.141	1.148	North Caucasus	0.155	1.280
North Caucasus	0.149	1.213	Southestern	0.199	1.636
Kuybyshevskaya	0.264	1.992	South Ural	0.244	1.798
Volga Region	0.272	2.186	Kuybyshevskaya	0.276	2.158
South Ural	0.302	2.156	Moscow	0.313	2.395
Moscow	0.316	2.384	Volga Region	0.308	2.513
West Siberian	0.338	2.540	Trans-Baikal	0.322	2.373
Northern	0.345	2.496	Northern	0.325	2.387
Krasnoyarsk	0.347	2.792	Krasnoyarsk	0.326	2.520
Oktyabrskaya	0.361	2.694	West Siberian	0.328	2.550
Sverdlovskaya	0.544	4.054	Oktyabrskaya	0.444	3.361
Gorkovskaya	0.548	3.945	Gorkovskaya	0.529	3.858
Far Eastern	0.562	4.333	Sverdlovskaya	0.540	4.163
Trans-Baikal	0.580	4.140	Far Eastern	0.582	4.556
East Siberian	0.486	7.713	East Siberian	0.855	6.816
Mean value by branch	0.384	0.384	Mean value by branch	0.364	0.364

The average value of capital productivity at the Regional Center for Corporate Management is 0.329 t-km/rub, with maximum and minimum capital productivity recorded at the Oktyabrskaya (0.505 t-km/rub) and Kaliningrad (0.028 t-km/rub) Railways respectively. The average value of capital productivity at the Central Directorate of Infrastructure is 0.374 t-km/rub, with maximum and minimum capital productivity recorded at the East Siberian (0.840 t-km/rub) and Kaliningrad (0.053 t-km/rub) Railways respectively. The average value of capital productivity at the Central Directorate of Traffic Control is 0.384 t-km/rub, with maximum and minimum capital productivity recorded at the Trans-Baikal (0.580 t-km/rub) and Kaliningrad (0.039 t-km/rub) Railways respectively. The average value of capital productivity at the Central Directorate of Rail Traction is 0.364 t-km/rub, with maximum and minimum capital productivity recorded at the East Siberian (0.855 t-km/rub) and Kaliningrad (0.076 t-km/rub) Railways respectively. Analysis of Table 2 shows that the methodology in use does not allow comparingthe capital productivity indicators for JSC Russian Railways among themselves and average values by branch. The proposed methodology for determining capital productivity fosters the development of a coherent policy aimed at enhancing the effectiveness of using technical equipment at the Russian Railways Holding Company and at upgrading it in a timely manner.

4. CONCLUSION

The proposed approach to evaluating the efficiency of technical equipment in transport holding company units allows researchers to do the following:

- Consider the influence of the transport holding company's diversification on capital productivity,

- Assess the amount of required capital advanced with a view to purchase essential equipment in terms of the transport holding company's business units and types related mostly to transportation,

- Determine the real growth rate of capital productivity of the transport holding company's business units in order to objectively evaluate the efficiency of operating resources,

- Carry out the ongoing planning and budgeting operations at regional corporate management centers taking into consideration the real growth rate of capital productivity,

- Pursue investment policies at the business units of holding companies corresponding to the expected amount of work and the achieved capital productivity.

A methodology needs to be developed to evaluate the capital productivity of transport holdings' business units, including the rationale behind their performance in terms of volume in order to evaluate capital productivity. The production function's development is proposed as a basis for shaping a system of balanced indicators for the volume of work of the railway's business units. The implementation of a system for evaluating the capital productivity of holding companies' business units in accordance with the objectives and challenges of the corporate development strategy will contribute to a rational redistribution of effects from the realized volume of work between them and their business units.To evaluate the capital productivity of the railway's business units according to a specific business type, only the value of technical equipment used in this business sector should be taken into consideration. The existing approach to evaluating capital productivity considers only the value of technical equipment used in the railway's business units. Their capital productivity, however, is undervalued. Ways to enhance the use of fıxes assets are analyzed in(Christian, 1999). To improve the efficiency of productive resources, it is necessary to devise an appropriate system for reporting the performance indicators of business units located in the proximity of railways. Currently, the indicators under investigation do not correspond to the railway performance's outcome indicator.

REFERENCES

CANTOS, P., & MAUDOS, J. 2001. **Regulation and Efficiency: The Case of European Railways**. Transportation research part a-policy and practice. Vol. 35, N° 5: 459-472. Netherlands.

CHRISTIAN, B. 1999. **Fixed Capital and Internal Rate of Return**. Journal of Mathematical Economics, Vol. 31, N° 4: 523-541.Netherlands.

FRASZCZYK, A., LAMB, T., & MARINOV, M. 2016. **Are Railways Really That Bad? An Evaluation of Rail Systems Performance in Europe with a Focus on Passenger Rail**. Transportation research part a-policy and practice, Vol. 94, pp. 573-591.Netherlands.

KHARITONOVA, A. 2016. **Economic Substantiation of the System for Managing the Fixed Capital of Transport Holding Companies' Affiliates**.URL: http://www.miit.ru/content/.pdf?id_wm=722201. Accessed.Russia.

KHARITONOVA, A., & PODSORIN, V. 2013. **The Economic Mechanism for Fixed Capital Management in Holding Companies**. N° 6. P. l.USA.

PODSORIN, V. 2014. **Economic Development and Labor Efficiency Management in the Railway Sector: A Monograph**. M.: MIIT, p. 129. USA.

PODSORIN, V. 2018. **Economic Methods for Managing the Updating of Transport Companies' Technical Equipment and Systems**. URL: http://miit.ru/content/Диссертация.pdf?id_wm=740534. Accessed.Russia.

SHITKINA, I. 2006. **Holding Companies: Legal Regulation and Corporate Management**. M.: Volters Kluver. P. 648.Netherlands.

SHITKINA, I. 2008. **Holding Companies: Legal Regulation and Corporate Management**. Academic and Practical Edition.

M.: Volters Kluver, p. 648.Netherlands.

STEFAN, S., TIM, S., MARCEL, F., GERHARD, S., & CHRISTIAN, B. 2017. **Fixed Capital Investment Estimation for Modular Production Plants, Chemical Engineering Science**. Vol. 158, pp. 395-410.Netherlands.

TERESHINA, N. 1994. **Economic Regulation and Transportation Competitiveness**. M.: TsNTB MPS RF, P. 131.Netherlands.

TERESHINA, N. 2011. **A Comprehensive Evaluation of the Value of New Technological Systems' Life Cycle Using Reliability Verification Methods**. N° 1. pp. 27-39.Netherlands.

TERESHINA, N. 2012. **Innovation Management in Rail Transport: A University Textbook**. M.: Vega-Info, P. 592. USA.

URDANOZ, M., & VIBES, C. 2013. **Regulation and Cost Efficiency in the European Railways Industry**. Journal of productivity analysis. Vol. 39, N° 3: 217-230. Germany.

ZAVYALOVA, N. 2018. **Economic Assessment of the Efficiency of Technical Equipment of Transport Holding Companies' Business Units**.URL: http://www.miit.ru/content/.pdf?id_wm=774124. Accessed.Germany.

NURULLINA, G. M., RAMAZANOV, R. K., & USMANOVA, L. A. 2018. **Psycholinguistic Aspect of Studying the Text as a Product of Speech Activity.** The Journal of Social Sciences Research, 4, 113-116.Russia.

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