



Role of the road sector in the development of the regional economy

Papel del sector vial en el desarrollo de la economía regional

SIDORENKO, Mikhail M. 1

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[Bibliographic references](#)**ABSTRACT:**

This study examines the role and importance of the road sector in ensuring the competitiveness of regions on the basis of the relationship between the technical parameters of the development of the regional road network and the level of socio-economic development of the territory revealed by correlation analysis. The results of this research can contribute to proposals for improving the regional economic policy in the management of the road sector.

Keywords: competitiveness of regions, regional economic policy, road sector

RESUMEN:

El sector vial desempeña un papel importante para garantizar la competitividad de las regiones. En este trabajo de investigación, se realiza un análisis de correlación de los parámetros técnicos del desarrollo de una red regional de carreteras y el nivel de desarrollo socioeconómico del territorio. Los resultados de esta investigación pueden hacer propuestas para mejorar la política económica regional en la gestión del sector vial.

Palabras clave: competitividad de las regiones, política económica regional, sector vial

1. Introduction

The current development stage of regions in the socio-economic space of the country is characterised by the need to form and permanently develop the competitive advantages and competitive potential of a territory with limited resources. In this regard, the abilities of the subjects "to serially and systematically available opportunities (resources, competences, innovative solutions) productively use and receive additional income (rent) from their use come to the fore" [Tatarkin, 2013].

The competitive advantages of the region form the basis of competitiveness and is essentially determined by the development level of the regional socio-economic system. At the same time, 'the competitiveness of the territory is defined not only by the presence of competitive advantages, but also the level of their use' [Saveliev, 2010]. To ensure a highly competitive potential of the region from the influence of several factors, the identification and analysis of such factors will identify further strategic possibilities for promoting the competitive advantages of the region. Such factors include the level of investment and innovative activity, the availability of raw materials in the region, human resources, elements of infrastructure, favourable business climate and investment attractiveness.

Infrastructure is a key determinant in the system of regional competitiveness. The economic nature of infrastructure as an economic system is characterised by a wide variety of industries, including the road sector and highways, thereby providing conditions for expanded reproduction. The effects of increasing the road network on the development and competitiveness of a territory are usefully explored in the works of modern economists.

The competitiveness of individual enterprises in the road sector and the road industry as a whole are presented in Poleshchuk (2005), Medres (2007) and Sidorenko (2009a).

The instruments for assessing competition in the road construction segment with changing market conditions and institutional conditions are described in Vinogradova (2013), Kapustina and Sidorenko (2010) and Melnikova and Kashevskaya (2008).

The spatial organisation of the road construction market and the justification of road construction as a significant factor in the growth of the regional economy are explored by scientists, including Belykh (2012), Ereemeeva (2014) and Manakova (2012).

However, the analysis of publications on the topic of our study indicates that the following areas require further attention: the study of the correlation of road network density and the level of socio-economic development of a territory, the use of the road network and the human capital index in the territory and the length of the road network and the competitiveness of the regions.

The statistical data and the results of the rating research made it possible to substantiate the influence of the development level of the road sector in the region and its place in national competitiveness ratings.

2. Methodology

This study examined the indicators of the density of the network of highways, cargo and passenger transportation; the level of motorisation of the population and the length of the network of roads in the regions of the Urals Federal District. We identified the main trends and grouped the regions according to the level of transport development.

A comparative analysis of the socio-economic indicators of the regions was conducted. Consequently, we confirmed an interconnection between the level of road infrastructure and the position of the region in national ratings.

Data from the Federal State Statistics Service and reports of the Russian rating agencies were the main information sources for this work.

3. Results

The road sector can be considered as the 'most important economic infrastructure element and as an independent subsystem of the economy, creating a complex of specific economic benefits, which determines its sectoral differences' [Sidorenko, 2011].

The logical-structural analysis of the existing approaches in the definition of the 'road sector' in the domestic scientific literature and regulatory acts (see Table 1) shows that the basic element incorporated in all definitions is the highway network. A well-developed highway network contributes to national and regional economies and has become an important factor in creating a competitive advantage.

Table 1
Definitions of 'Road Sector'

Definition	Source
'Road sector - part of the branches of material production, designed in conjunction with the cars more fully meet the needs of the national economy and the population in road transport. Includes a network of public roads with all facilities necessary for its normal operation, as well as companies and organizations for the repair and maintenance of these highways'	[Ushakov, 2005]
'Road sector - an important element of the transport infrastructure, which is a cross-industry system, transforming society living conditions in general, and individual enterprises'	[Litvintsev, 2006]

'Road sector - a complex that includes public roads of the Russian Federation, as well as organisations who carry out surveys, design, construction, reconstruction, repair and maintenance of public roads, conducting research, training, manufacturing and repair of road machinery, mining and processing of materials and other activities related to the design, construction, reconstruction, repair highways'	[Federal Road Agency, 2010]
'Road sector - property complex, including highways, transport infrastructure, as well as organizations that provide normative state and development of the road transport system, state and municipal government agencies that regulate road activity'	[Uporov, 2017]

Note. Compiled by the author

This work also considers the impact of the road network on the parameters of regional competitiveness. 'Insufficient density of roads in Russia hinders the convergence of levels of socio-economic development of regions. Underdeveloped regional and municipal highways exacerbates the problems in the social sphere because of delayed medical care, low transport accessibility of educational institutions and leisure facilities' [Scherbanin, 2011].

The parameter density of paved roads in the regions of the Urals Federal District (UFD) for 2008–2017 are shown in Table 2.

Table 2
Density of paved roads
(km of roads per 1000 km² of territory)

Region	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Russian Federation	37	38	39	43	54	58	60	61	62	62
Urals Federal District	22	23	23	24	32	38	39	39	40	41
Kurgan region	96	110	110	109	127	129	130	132	132	133
Sverdlovsk region	61	61	62	66	93	117	121	123	124	125
Tyumen region	8.5	8.7	8.8	8.7	14	14	14	15	15	15
including										
Khanty-Mansi Autonomous Area	5.8	6.1	6.2	6.0	10.1	10.1	10.3	10.6	10.8	11.0
Yamalo-Nenets Autonomous District	1.6	1.7	1.8	1.8	2.4	2.8	2.8	2.9	3.0	3.0
Tyumen region	50	51	52	51	82	82	83	84	86	87
Chelyabinsk region	103	108	109	111	111	187	190	195	201	204

Note. Compiled by the author from Federal State Statistics Service data

Analysis of the indicators of the length of paved roads in the regions of the Ural Federal District shows that the existing road infrastructure does not provide economic links for territories in some regions of the federation. The recommended index values of 200–300 km per 1000 km² was reached only in the Chelyabinsk Region.

In conjunction with the density indicator of the highway networks, considering the indicators of the level of socio-economic development of the regions of the Ural Federal District seems appropriate. To assess the socio-economic situation of the regions using index indicators, the rating of the socio-economic status of the regions of the Russian Federation and the calculated rating agency 'RIA Reyting' were employed. Rated values help assess and track the direction of

the trend changes, not only within the region but also in relation to other subjects of the Russian Federation. The index values are presented in Table 3.

Table 3
Socio-economic Ratings of the
Ural Federal District Regions

Region	2013		2014		2015		2016		2017	
	Index	Place in ranking	Index	Place in ranking	Index	Place in ranking	Index	Place in ranking	Index	Place in ranking
Kurgan region	30.189	68	27.613	70	28.021	71	26.608	73	26.368	74
Sverdlovsk region	60.257	8	59.106	11	59.486	9	58.484	11	58.911	8
Tyumen region	58.927	9	63.628	7	61.367	8	60.082	10	59.678	7
Khanty-Mansi Autonomous Area	70.383	3	73.927	3	72.871	3	69.933	3	67.676	3
Yamalo-Nenets Autonomous District	61.904	7	64.434	6	64.581	6	66.805	6	66.620	5
Chelyabinsk region	53.61	18	54.691	17	54.436	17	52.233	20	51.459	22

Note. Compiled by the author from the rating of the socio-economic status of the subjects of the Russian Federation. Results of 2013 (2014, 2015, 2016 and 2017)

The rated values of the socio-economic status of the Urals Federal District regions in the dynamics of years remained high for most of the subjects. Thus, the leader among Russian regions is the Khanty-Mansiysk Autonomous Area, which occupied the third position in the analysed period. The top 10 areas include the Sverdlovsk and Tyumen Regions and the Yamalo-Nenets Autonomous District. The Chelyabinsk Region occupied low positions by demonstrating negative dynamics and moved from 18th place in 2013 to 22nd place in 2017. A similar situation was observed in the Kurgan region. In five years, the region received low rankings and shifted from 68 seats in 2013 to 74 in 2017.

Given that part of this study aims to establish a significant relationship between the characteristics of the road network and regional indicators of socio-economic development, a comparison of the obtained results has allowed us to draw the following conclusions:

- *Traditional industrial regions* (Sverdlovsk and Chelyabinsk Regions) exhibit a direct correlation between road network density and the parameters of the socio-economic situation. Increasing the density of roads in the territory entails strengthening the position of the region in the national ranking of the socio-economic situation.

- *Raw regions* (Tyumen Region, Khanty-Mansi Autonomous Area and the Yamalo-Nenets Autonomous District) are characterised by a neutral reaction. No direct correlation exists between road network density and the parameters of the socio-economic situation. Raw regions permanently occupy a leading position in the national ranking of the socio-economic situation despite the low road density in the territory. The drivers of growth for these regions include alternative modes of transportation, namely, pipeline and railways.

- *Rural regions* (Kurgan Region) are characterised by a negative correlation of the road network density and the socio-economic situation of the region. Increasing the road density in the territory does not contribute to an upgrade in the socio-economic status of the territory. Increasing the number of paved rural roads must be prioritised.

The next group of indicators characterises the use of the road network and the mobility of the population in the regions of the Urals Federal District (see Table 4).

Table 4
Road use indicators

Region	2012	2013	2014	2015	2016	2017
Passenger turnover of public buses, mln. passenger-km						
Kurgan region	669	656	570	537	506	480
Sverdlovsk region	3177	3302	2955	3048	3044	2903
Tyumen region	4478	3733	3149	3066	3109	3292
including:						
Khanty-Mansi Autonomous Area	2019	1602	1281	1166	1208	1333
Yamalo-Nenets Autonomous District	805	639	365	400	333	251
Chelyabinsk region	2813	2763	2182	3095	2316	1600
The number of own cars per 1000 population, units.						
Kurgan region	265.3	281.6	301.4	308.1	314.3	321.0
Sverdlovsk region	303.8	312.6	319.8	353.7	360.7	370.5
Tyumen region	283.8	294.3	312.2	310.5	316.4	321.8
including:						
Khanty-Mansi Autonomous Area	282.1	302.4	318.1	328.7	327.6	335.4
Yamalo-Nenets Autonomous District	242.9	268.7	290.9	299.4	296.6	294.1
Chelyabinsk region	262.9	309.1	300.3	300.3	302.7	311.3

Note. Compiled by the author from the Federal State Statistics Service data

During the study period, a systemic reduction in passenger traffic occurred in almost all regions of the Urals Federal District. The only exception transpired in the Khanty-Mansiysk Autonomous Area, where the figure increased by 10.3% from 2016–2017.

In general, passenger turnover is unstable. Changing the structure of passenger traffic is associated with a significant increase in the motorisation of the population. This situation is explained by the desire of Russians not only to improve their own quality of life and mobility but also by the growth of their economic activity. Such growth has become one of the dominant factors in Russian life, especially for the younger generation, and is expressed in the readiness of the population to invest their savings in the purchase of cars.

Consequently, we may infer that the parameters of road network usage, as well as the rate of the motorisation of the population, play an important role in the formation of such an important competitive advantage in the region as the level of human development. This circumstance is

justified by the presence of such significant external (extra-transport) effects generated by the road network, such as:

- social and transport justice as a measure of transport accessibility for the population of the region;
- increasing the efficiency and productivity of road users;
- increase in economic activity of the territory' [Sidorenko, 2009b].

Most studies fully estimate the parameters of the region's human development using the Human Development Index (HDI), calculated by the Analytical Centre under the Government of the Russian Federation, which conducts the assessment of the level and quality of life. Calculating the index involves the following indicators: life expectancy, per capita income and education indicators. A summary of HDI regions of the Urals Federal District are presented in Table 5.

Table 5
Human Development Index in the
Regions of the Ural Federal District

Region	2012		2013		2014		2015		2016	
	Index	Place in ranking	Index	Place in ranking	Index	Place in ranking	Index	Place in ranking	Index	Place in ranking
Kurgan region	0.823	62	0.830	63	0.831	66	0.829	72	0.832	72
Sverdlovsk region	0.865	9	0.878	10	0.873	11	0.874	15	0.877	17
Tyumen region	0.897	3	0.901	3	0.903	3	0.906	3	0.908	3
Chelyabinsk region	0.846	31	0.850	33	0.857	29	0.862	27	0.868	28

Note. Compiled by the author using data from the 2018 Human Development Report in the Russian Federation

With the exception of the Kurgan Region, all regions of the Urals Federal District demonstrate high levels of human capital. The contribution of the road network to the growth of the HDI is realised primarily through increasing the mobility of the population and, as a result, increasing the availability of educational and medical services, reducing unproductive travel time, lowering the level of transport discrimination of the population and promoting efficient migration of labour resources within natural biorhythmic standards.

An overview of the Russian regional competitiveness rankings, which includes the scientific, research, consulting, expertise, education and engineering companies and rating agencies, showed that each composite index takes into account the transport characteristics and the extent of communications in the region.

We have assessed the level of correlation between the length of the network of paved roads and the parameters of the competitiveness of the regions of the Ural Federal District. The lengths of paved roads in the regions of the Ural Federal District are presented in Table 6.

Table 6
Lengths of Paved Roads in the Regions
of the Ural Federal District

Region	2012	2013	2014	2015	2016	2017
Kurgan region	9046	9204	9275	9414	9422	9502
Sverdlovsk region	18101	22649	23528	23840	23997	24293

Tyumen region	20402	20666	20966	21322	21870	21918
including:						
Khanty-Mansi Autonomous Area	5422	5395	5520	5671	5780	5739
Yamalo-Nenets Autonomous District	1849	2165	2178	2229	2313	2327
Tyumen region	13131	13106	13268	13421	13776	13852
Chelyabinsk region	9861	16524	16847	17231	17767	18078

Note. Compiled by the author using the Federal State Statistics Service data

The highest values of the net length of paved roads occurred in the Sverdlovsk region at 24293 km by the end of 2017. Conversely, the lowest value of the index was found in the Yamalo-Nenets Autonomous District at 2327 km by the end of 2017. However, this research emphasises relative and not absolute performance. Therefore, the greatest increase in the road network from 2012 to 2017 was observed in the Chelyabinsk Region (+83%), and the outcome was almost doubled. The average growth rates shown were traditionally commodity regions: the Sverdlovsk Region (+34%) and the Yamalo-Nenets Autonomous District (+25.9%). Low levels of road construction dynamics were observed in the Khanty-Mansi Autonomous Area (+5.8%), the Tyumen Region (+5.4%) and the Kurgan Region (+5%) in terms of net growth in the period under review.

The effectiveness of the road network helps reduce transport costs in the final price of goods transported between the periphery and the centre and plays an important role in reducing economic disparities between regions and increasing competitiveness in terms of access to new markets. Developed road networks is a key competitive advantage of the region and largely determines its competitive position. The competitiveness rating of the regions of the Urals Federal District is presented in Table 7.

Table 7
Regional Competitiveness
Index Ural Federal District

Region	2013		2014		2015		2018	
	Index	Place in ranking	Index	Place in ranking	Index	Place in ranking	Index	Place in ranking
Kurgan region	0,51	76	0.470	74	0.43	74	0.66	77
Sverdlovsk region	3.58	5	3.52	5	3.47	6	3.19	6
Tyumen region	3.06	8	2.94	11	2.76	14	2.73	15
Khanty-Mansi Autonomous Area	2.76	12	2.96	10	3.07	8	2.95	8
Yamalo-Nenets Autonomous District	2.14	28	2.3	26	2.22	27	2.53	21
Chelyabinsk region	2.72	14	2.93	12	2.74	15	2.82	11

Note. Compiled by the author from the Regional Competitiveness Index - Growth Poles of Russia (AV RCI)

According to a poll of the growth among the subjects within the top 7 rankings of the Urals Federal District, the most competitive region is the Sverdlovsk Region. According to the 2018 results, the top 20 ranking includes the Khanty-Mansiysk Autonomous Area and the Tyumen and Chelyabinsk Regions. The Yamal-Nenets Autonomous District is represented in the top 40 ratings. The Kurgan Region is an outlier among the regions of the Urals Federal District according to their competitiveness index.

The values of the index of the competitiveness of regions calculated on the basis of their ratings have a direct correlation with the parameters of the length of the road network in the regions. This outcome confirms the importance of the road sector in ensuring the sustainable competitiveness of the regions.

Most competitive regions (e.g. the Sverdlovsk Region) are characterised by extensive networks of highways, unity and relatedness of regional economic space, high mobility of production factors and low transport discrimination populations.

In the regions, the outsiders (Kurgan Region) do not provide the specified level of growth of the road network. The involvement of new economic agents in the economic turnover decreases, and such decrease lowers the investment attractiveness of the region. In addition, reduced population mobility has a negative impact on the level of human capital and promotes the outflow of able-bodied population in other areas.

Significant differences occur in regional competitiveness levels due to numerous factors. At the same time, the analysis undertaken clearly shows the importance of the road sector as a backbone element of the transport infrastructure providing the competitive advantages of the regions.

4. Conclusions

Overall, the findings of the study generate several conclusions.

Firstly, the road sector is an important backbone element of regional infrastructure. The level of development of the road networks affects the competitiveness and investment attractiveness of regions.

Secondly, a correlation is established between road network density in the region and the parameters of socio-economic development. The features of this correlation for various types of regions were determined: traditional industrial regions, raw regions and rural regions.

Thirdly, analysis of the data on the use of the regional road network in combination with the level of automobilisation of the population shows the differentiation of regions in terms of the level of population mobility, transport discrimination and the level of human capital.

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1. Ural State University of Economics, Russia. Senior lecturer, MBA. e-mail: sidmm.84@gmail.com

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