

Regions of the zone of influence of the Great Silk Road and the Tea Road: strategic directions for the development of economic potential

Natalia Lubsanova ¹⁺

¹ Baikal Institute of Nature Management, Siberian branch of the Russian Academy of Sciences

Abstract. *In the current conditions of economic crises, emerging threats, and risks, there is a need to consider the risks of changes in the economic potential of regions when determining priorities for the development of economic potential. The author has developed an algorithm for substantiating the strategic directions of the development of the economic potential of the regions based on dynamic risk assessment and monitoring of the state of the potential. The proposed methodology was tested in 28 regions of Russia, China, Mongolia, and Kazakhstan of the zone of influence of the Great Silk Road and the Tea Road. The developed methodological approaches to determining the priorities for the development of the economic potential of the regions allow us to justify the strategic directions of growth, considering the risks.*

Keywords: economic potential, regions, the Great Silk Road, the Tea Road, strategic directions

JEL Codes: O18, O53, C13, R11

1. Introduction

The current geopolitical and economic situation dramatically changes the entire system of traditional relations in the Europe – USA – East triangle. In the context of globalization, all states that seek to become world leaders actively use the benefits of their geographical location, create new economic and political blocs. As the world experience shows, economic corridors are important for the successful development of the regional economy and increasing competitiveness (Gálves-Nogales, 2014; Dzumbira, 2017). The creation of corridors does not so much create economic strength but rather directs, focuses, and strengthens the potential for economic growth (Srivastava, 2011).

Globalization processes entail the effect of unpredictability in changing the economic potential of regions due to the increasing influence of economic crises, sudden threats, and risks (Bryan, 2015). In these conditions, there is a need to consider the definition of strategic directions for the development of the economic potential of the regions based on dynamic risk assessment and monitoring of the state of the potential (Zio, 2018).

The concept of regional potential was first formulated by J. Stewart in 1947 by analogy with the physical concept of electric potential as applied to population distribution (Stewart, 1947). Subsequently, it was used in the analysis of the industrial market by K. Harris in 1954 (Harris, 1954), K. Clark in 1966 (Clark, 1966), and D. Rich in 1980 (Rich, 1980). Later, this concept was applied to assessing the attractiveness of European regions for manufacturers and the likely impact of the expansion of the Customs Union on it by C. Clark, F. Wilson, J. Bradley in 1969 (Clark, 1969).

In Soviet economical science, the category "potential" was defined as "the maximum possibility of the economic system, which predetermines the maximum possible volume of production of material goods and

¹⁺ Corresponding author. Tel.: + 7 902 161 98 00; address: 670047, Russia, Buryatia, Ulan-Ude, Sakhyanovoy str., 6, E-mail address: nlub@binm.ru

services that can be achieved under ideal production conditions and optimal use of resources" (Bolshaya sovetskaya enciklopediya, p. 13).

Currently, in the scientific literature, two main approaches to the definition of this concept can be distinguished:

1. as a set of available capabilities, in particular, means of production, stocks, productive forces, etc., which can be used to solve a problem, achieve a certain goal (Pechatkin, 2013; Rastvortseva, 2008);
2. as a measure of the use of resources (labor, natural, industrial, financial, etc.) based on determining the prospective and achieved potential (Belomestnov, 2005; Klotsvog, 1998).

In our opinion, the most accurately reflecting the essence of the concept of "potential" is the first approach, according to which, by potential, we mean the aggregate ability to carry out production and economic activities, to meet the needs of the population.

It should be noted that the variety of approaches to defining the category of "potential" determines the presence of many methodological approaches to its assessment. The most universal and recognized approach is based on the construction of an integral indicator, which includes estimates for several basic estimated indicators. On this basis, many techniques have been developed and applied, both in domestic and foreign practice. These include the methodology developed by the World Bank Group, which was used to study regional development in India and the countries of the European Union based on the index of economic potential; the methodology of the Analytical Center under the Government of the Russian Federation with the addition of productivity indicators, the sectoral composition of the economy and the influence of central planning; the methodology of the Ministry of Economic Development for a comprehensive assessment of the level of economic development of regions (New geography of regional development: assessment of the economic potential of Russian regions and the possibilities of its effective use, 2018; Roberts, 2017).

2. Research Elaboration

To substantiate the strategic directions for the development of the economic potential of the regions of the zone of influence of the Great Silk and Tea Routes, an algorithm was developed that includes three stages: an assessment of the level of economic potential, an assessment of the risks of development of economic potential, and determination of strategic directions for the development of the economic potential of the regions (Figure 1).

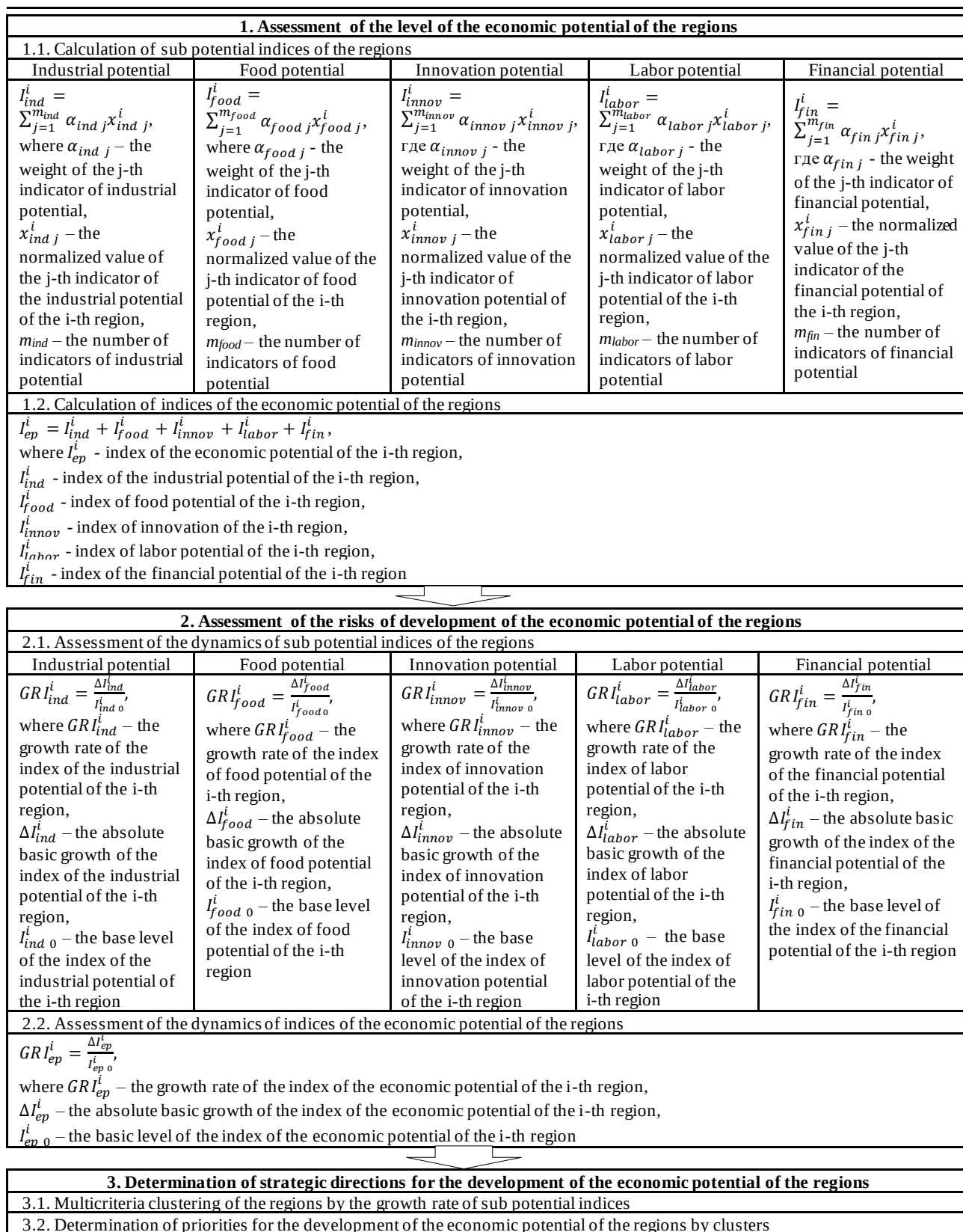


Fig 1. Algorithm for substantiating the strategic directions of development of the economic potential of the regions

The assessment of the economic potential of the regions is carried out based on an integral indicator, which includes five indices of sub potential: industrial, labor, food, innovation, and financial. The indicators are normalized according to the magnitude of the discrepancy between the best and worst values. Determination of the weights of particular indicators in formulas 1-5 is performed on the basis of a probabilistic approach and a matrix of pairwise preferences (Gupta, 1987). To assess the risks of development of the economic potential of regions, it is carried out based on an analysis of changes in the components of the index of economic potential. The rates of growth of indices of economic potential and its sub potential are determined. The negative values obtained as a result of calculations indicate the presence of negative trends and the need to concentrate government support measures in this area.

Determination of strategic directions for the development of the economic potential of the regions is carried out based on clustering regions according to the values of the growth rates of sub potential indices using the k-means method. In accordance with the characteristics of each of the clusters, the priorities for the development of economic potential are determined.

3. Results and Discussions

As the object of the study, 28 regions of Russia, China, Mongolia, and Kazakhstan were identified as affected by the China-Mongolia-Russia economic corridor, as well as alternative options for transport corridors: the Western Europe - Western China corridor, the Dostyk-Alashankou - Mikhailovka-Uba corridor. The regions were identified and grouped according to the three most frequently identified routes of the China-Mongolia-Russia economic corridor: eastern, central and western, and alternative transport corridors (Soni, 2018; Dorj, 2017; Namzhilova, 2018; Rygzynov, 2018; Tulokhonov, 2018) (Table 1).

Table 1: Grouping of the regions of Russia, China, Mongolia, and Kazakhstan in the zone of influence of the Great Silk and Tea Road

Option	Region
Eastern route of the China-Mongolia-Russia economic corridor	Inner Mongolia
	Heilongjiang
	Dornod
	Sukhbaatar
	Zabaykalsky Krai
Western route of the China-Mongolia-Russia economic corridor	Xinjiang
	Uvs
	Zavkhan
	Govi-Altai
	Republic Tuva
The central route of the China-Mongolia-Russia economic corridor	Inner Mongolia
	Hebei
	Selenge
	Darkhan-Uul
	Ulaanbaatar
	Tuv
	Dundgovi
	Dornogovi

Option	Region
Corridor "Western Europe - Western China"	Govisumber
	Republic Buryatia
	Orenburg Oblast
	Aktobe region
	Kyzylorda Region
	Turkistan Region (formerly South Kazakhstan)
	Jambyl Region
	Almaty Region
	Almaty
	Xinjiang
Corridor "Dostyk-Alashankou - Mikhailovka-Uba"	Altai Krai
	East Kazakhstan region
	Almaty Region
	Xinjiang

Source: Compiled by the author

The choice of particular indicators of sub potential was carried out on the basis of theoretical and practical criteria: the presence of economic feasibility, timeliness, and frequency of publication, availability, stability, comparability, and duration of series. Based on the selection, eight indicators were identified: "The volume of gross regional product per capita, thousand US dollars (PPP)", "The volume of gross value added in the section "Manufacturing industries" per capita, thousand US dollars (PPP)", "Population density, people per 1 km²", "The number of economically active population per 1000 people", "Average monthly wages, US dollars (PPP) per person", "The volume of gross value added in the section "Agriculture" per capita, thousand dollars USA (PPP)", "The number of personnel engaged in research and development per 1000 people", "The volume of gross value added in the section "Financial activity" per capita, thousand US dollars (PPP)". The indicators were normalized according to the magnitude of the discrepancy between the best and worst values. As a result of the analysis of the values of indicators for 2010-2017, the weights of private indicators of economic potential were obtained.

Based on the developed methodology, the indices of the economic potential of the regions of Russia, China, Mongolia, and Kazakhstan in the zone of influence of the Great Silk and Tea Routes were calculated for the period from 2010 to 2017. The data obtained as a result of the calculations indicate a decrease in the index of the economic potential of the regions for all five options in 2017. The most significant drop in the index was observed in the regions included in the zone of influence of the central route of the China-Mongolia-Russia economic corridor (Table 2).

Table 2: Growth rates of the index of the economic potential of the regions of Russia, China, Mongolia, and Kazakhstan in the zone of influence of the Great Silk and Tea Routes, % to the previous year

Option	2011	2012	2013	2014	2015	2016	2017
Eastern route of the China-Mongolia-Russia economic corridor	6.57	1.93	-8.83	9.35	-5.26	7.25	-16.10
Western route of the China-Mongolia-Russia economic corridor	9.72	11.81	-7.24	-2.42	1.10	5.49	-12.86

Option	2011	2012	2013	2014	2015	2016	2017
The central route of the China-Mongolia-Russia economic corridor	2.39	8.07	-5.67	0.31	1.50	6.41	-17.22
Corridor "Western Europe - Western China"	5.11	2.22	-15.69	10.73	3.14	0.59	-3.91
Corridor "Dostyk-Alashankou - Mikhailovka-Uba"	0.92	3.57	-15.57	6.12	-1.30	8.02	-11.95

Source: Calculated by the author

Analysis of changes in the components of the economic potential index for the period 2010-2017. by region is presented in Table 3. Based on the analysis results, the greatest development risks were identified in the formation of food and production potentials: a decrease in indices was observed in 22 and 20 regions out of 28 analyzed.

Table 3: Change in the index of economic potential and its sub potential for the period 2010-2017 across the regions of Russia, China, Mongolia, and Kazakhstan in the zone of influence of the Great Silk and Tea

Routes

Option	Region	Industrial potential	Food potential	Innovation potential	Labor potential	Financial potential	Economic potential
Eastern route of the China-Mongolia-Russia economic corridor	Inner Mongolia	-0.65	-0.13	0.06	0.31	0.01	-0.40
	Heilongjiang	-0.37	0.08	-0.04	0.20	0.01	-0.12
	Dornod	0.94	-0.07	-0.33	0.16	-0.05	0.66
	Sukhbaatar	-0.01	-0.09	-0.40	-0.16	-0.06	-0.71
	Zabaykalsky Krai	-0.14	-0.11	-0.01	-0.10	-0.02	-0.37
Western route of the China-Mongolia-Russia economic corridor	Xinjiang	-0.10	-0.18	0.04	0.43	-0.03	0.15
	Uvs	0.05	-0.12	0.44	-0.16	-0.03	0.19
	Zavkhan	0.06	0.00	0.43	-0.19	-0.03	0.27
	Govi-Altai	0.19	0.20	-0.02	-0.09	-0.03	0.25
	Republic Tuva	-0.12	-0.08	-0.10	-0.29	-0.01	-0.60
The central route of the China-Mongolia-Russia economic corridor	Inner Mongolia	-0.65	-0.13	0.06	0.31	0.01	-0.40
	Hebei	-0.15	-0.16	0.06	0.24	0.01	0.00
	Selenge	-0.62	-0.44	-0.04	-0.05	-0.07	-1.23
	Darkhan-Uul	-0.03	-0.11	0.22	0.02	-0.07	0.02
	Ulaanbaatar	0.26	-0.01	0.05	0.62	-0.33	0.59
	Tuv	0.19	-0.43	-0.14	0.13	-0.06	-0.32
	Dundgovi	0.08	0.15	0.15	-0.15	-0.05	0.19
	Dornogovi	-0.03	-0.19	-0.08	0.32	-0.05	-0.03

Option	Region	Industrial potential	Food potential	Innovation potential	Labor potential	Financial potential	Economic potential
Corridor "Western Europe - Western China"	Govisumber	-0.21	-0.03	-0.06	-0.10	-0.13	-0.53
	Republic Buryatia	-0.10	-0.18	0.04	0.43	-0.03	0.15
	Orenburg Oblast	-0.16	-0.08	0.00	-0.25	-0.02	-0.50
	Aktobe region	-0.19	-0.14	-0.01	-0.20	0.00	-0.54
	Kyzylorda Region	-0.09	-0.15	-0.01	-0.24	0.07	-0.41
	Turkistan Region (formerly South Kazakhstan)	0.09	0.13	0.05	0.52	0.08	0.87
	Jambyl Region	-0.01	-0.01	-0.03	-0.34	0.06	-0.33
	Almaty Region	-0.02	-0.13	-0.02	-0.10	0.03	-0.23
	Almaty	-0.12	0.00	-0.08	0.02	1.09	0.91
	Xinjiang	-0.10	-0.18	0.04	0.43	-0.03	0.15
Corridor "Dostyk-Alashankou - Mikhailovka-Uba"	Altai Krai	-0.21	-0.34	0.01	-0.32	-0.02	-0.88
	East Kazakhstan region	0.02	-0.03	0.02	-0.10	0.09	0.00
	Almaty Region	-0.02	-0.13	-0.02	-0.10	0.03	-0.23
	Xinjiang	-0.10	-0.18	0.04	0.43	-0.03	0.15

Source: Calculated by the author

To determine the optimal number of clusters, hierarchical clustering was carried out, the results of which made it possible to assume that the regions under consideration can be divided into six clusters. The clustering of regions was carried out using the k-means method. The results of determining the significance of the difference between the obtained clusters using the F-test indicate a significant difference.

Based on the average values for the clusters, the characteristics of the clusters were determined (Table 4). The largest part of the regions (13) was assigned to cluster 6, characterized by medium and high risks of all sub potential. The next largest cluster, cluster 4, includes ten regions with positive innovation and labor potentials dynamics.

Table 4: Assessment of the risks of developing the economic potential of the regions of Russia, China, Mongolia, and Kazakhstan in the zone of influence of the Great Silk and Tea Routes by clusters

Cluster	Number of regions	The average values				
		Industrial potential	Food potential	Innovation potential	Labor potential	Financial potential
1	2	0.175	0.060	0.050	0.570	-0.125
2	5	0.070	0.024	0.244	-0.114	-0.042
3	1	-0.120	0.000	-0.080	0.020	1.090
4	1	0.940	-0.070	-0.330	0.160	-0.050
5	10	-0.287	-0.169	0.018	0.305	-0.020
6	13	-0.075	-0.135	-0.059	-0.167	-0.003

Minimal risk
 Average risk
 High risk

Source: Calculated by the author

Based on the analysis of the distribution of the regions by clusters and options for transport corridors (Table 5), problem areas (cluster 6) were identified within each of the options.

Table 5: Distribution of the regions of Russia, China, Mongolia, and Kazakhstan in the zone of influence of the Great Silk and Tea Routes by clusters and options of transport corridors

Option	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
Eastern route of the China-Mongolia-Russia economic corridor				Dornod	Inner Mongolia, Heilongjiang	Sukhbaatar, Zabaykalsky Krai
Western route of the China-Mongolia-Russia economic corridor		Uvs, Zavkhan, Govi-Altai			Xinjiang	Republic Tuva
Central route of the China-Mongolia-Russia economic corridor	Ulaanbaatar	Darkhan-Uul, Dundgovi			Inner Mongolia, Hebei, Selenge, Dornogovi, Republic Buryatia	Tuv, Govisumber
Corridor "Western"	Turkistan Region		Almaty		Xinjiang	Orenburg Oblast,

Option	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
Europe - Western China"	(formerly South Kazakhstan)					Aktobe region, Kyzylorda Region, Jambyl Region, Almaty Region
Corridor "Dostyk-Alashankou - Mikhailovka-Uba"					Xinjiang	Altai Krai, East Kazakhstan region, Almaty Region

In accordance with the characteristics of the clusters, strategic directions for the development of the economic potential of the regions were determined (Table 6).

Table 6: Strategic directions for the development of the economic potential of the regions of the zone of influence of the Great Silk Road and the Tea Road by clusters

Cluster	Strategic directions for the development of the economic potential of the regions				
	Industrial potential	Food potential	Innovation potential	Labor potential	Financial potential
1					++
2				+	+
3	+		+		
4		+	++		+
5	++	++			+
6	+	++	+	++	+

++ - high priority

+ - medium priority

So, for the regions included in cluster 6, the development of food and labor potentials has a high priority; the middle priority is industrial, innovation, and financial potentials. The development of financial potential is a priority for cluster 1.

4. Conclusions

As a result of the assessment, it can be concluded that the development of the central variant of the spatial orientation of the China-Mongolia-Russia economic corridor has the highest economic potential. For all components of the economic potential, the excess of the indices of this option over the others was determined. It was revealed that the most significant lag in the indices of innovation and financial potentials, which indicates the underdevelopment of the innovation and financial infrastructures in these regions.

The author has developed an algorithm for substantiating the strategic directions of development of the economic potential of regions, which includes three stages: a level assessment based on an integral indicator, assessment of development risks based on a dynamic assessment, and determination of strategic development directions based on cluster analysis using the k-means method. The proposed methodology has been tested in 28 regions of Russia, China, Mongolia, Kazakhstan, which are included in the zone of influence of the Great Silk and Tea Routes. Based on the calculations, 6 regional clusters were identified, strategic directions for the development of economic potential for each cluster were determined in accordance with its characteristics.

The proposed methodology for clustering regions based on changes in the indices of sub potential of economic potential makes it possible to identify problem areas within each of the options and form the directions of growth of economic potential.

The developed methodological approaches to determining the priorities for the development of the economic potential of the regions on the basis of a dynamic risk assessment and monitoring the state of potential make it possible to substantiate the strategic directions of growth, taking into account the risks. The research results can be used by federal and regional authorities in the development of spatial and territorial strategies and programs for economic development.

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6. References

- [1] Belomestnov, V. G. (2005) Management of the potential of socio-economic systems of the region. Saint Petersburg: ROST.
- [2] Bolshaya sovetskaya enciklopediya. (1975) / ed. A. M. Prokhorov. T. 20. M.: Sovetskaya enciklopediya.
- [3] Bryan, S. G. & Pruitt, T. K. S. (2015) Systemic risk and the macroeconomy: an empirical evaluation. NBER working paper, 20963. Cambridge: NBER. https://www.nber.org/system/files/working_papers/w20963/w20963.pdf.
- [4] Clark, C. (1966) Industrial location and economic potential. *Lloyds Bank Rev.*, 82 1-17.
- [5] Clark, C., Wilson, F. & Bradley, J. (1969) Industrial location and economic potential in Western Europe. *Regional Studies*, 3 (2), 197-212. <https://doi.org/10.1080/09595236900185201>
- [6] Dorj, T. & Davaasuren A. (2017) The role of the central transport corridor of Mongolia in the development of the economic corridor of the three countries. *Eurasian cooperation: humanitarian aspects*, 1, 42 -51.
- [7] Dzumbira, W., Geyer, H.S. (2017) Measuring the spatial economic impact of the Maputo Development Corridor. *Development Southern Africa*, 34 (5), 635-651. <https://doi.org/10.1080/0376835X.2017.1318699>
- [8] Gálves-Nogales, E. (2014) Making economic corridors work for the agricultural sector. Rome. <http://www.fao.org/3/a-i4204e.pdf>
- [9] Gupta, S. & Wilton, P.C. (1987) Combination of forecasts: an extension. *Management Science*, 33 (3), 356 -372.
- [10] Harris, C. (1954) The market as a factor in the localization of industry in the U.S. *Ann. Ass. Am. Geogr.*, 44, 315-348.
- [11] Klotsvog, F. & Kushnikova, I. (1998) Resource potential of the subjects of the federation and its use. *Economist*, 12,

33-39.

- [12] Namzhilova, V. O. (2018) Economic corridors in the Eurasian space: China's initiatives and world experience. *Russia and the Asia-Pacific Region*, 1 (99), 65-81. <https://doi.org/10.24411/1026-8804-2018-00004>.
- [13] New geography of regional development: assessment of the economic potential of Russian regions and the possibilities of its effective use (2018) Washington – Moscow: International Bank for Reconstruction and Development, World Bank, Analytical Center under the Government of the Russian Federation. <http://documents.vsemimybanc.org/curated/ru/483301521139382232/pdf/124327-REVISED-PUBLIC-Re-mapping-opportunity-Russian.pdf>
- [14] Pechatkin, V. V. (2013) Investment and innovative development of Russian regions: key problems and directions of their solution. *Economic revival of Russia*, 3 75-78.
- [15] Rastvortseva, S. N. (2008) The essence of the socio-economic efficiency of the development of the region. *Regionology*, 4, 130-135.
- [16] Rich, D. (1980) Potential models in Human Geography. Norwich, Norfolk: Geo Abstracts.
- [17] Roberts, M. (2017). Identifying the Economic Potential of Indian Districts. World Bank Policy Paper 7623. <http://documents.worldbank.org/curated/en/862931468185344797/pdf/WPS7623.pdf>
- [18] Rygzynov, T. Sh. (2018) Border infrastructure of Russia, Mongolia, and China along the Silk and Tea Road Route. In Ts. D. Gonchikov (eds.) *Sustainable development in East Asia: current ecological-geographical and socio-economic problems* (pp. 140-144). Ulan-Ude: The Buryat Scientific Center of the Siberian Branch of the Russian Academy of Sciences.
- [19] Soni, S.K. (2018). China–Mongolia–Russia Economic Corridor: Opportunities and Challenges. In B. Deepak (eds) *China's Global Rebalancing and the New Silk Road*. Singapore: Springer. https://link.springer.com/chapter/10.1007/978-981-10-5972-8_9.13.
- [20] Srivastava, P. (2011) Regional corridors development in regional cooperation. ADB Economics Working Paper Series. 258. <https://www.adb.org/sites/default/files/publication/28889/ewp-258.pdf>
- [21] Stewart, J. Q. (1947) Empirical mathematical rules concerning the distribution and equilibrium of population. *Geogr. Rev.*, 37, 461-485.
- [22] Tulokhonov, A. K. et al. (2018) Russian transport megaprojects in new geopolitical situations. *Bulletin of the Buryat Scientific Center of the Siberian Branch of the Russian Academy of Sciences*, 2 (30), 37 -45.
- [23] Zio, E. (2018) The future of risk assessment. *Reliability Engineering and System Safety*, 177, 176-190. <https://doi.org/10.1016/j.ress.2018.04.020>

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