



17th Global Conference on Sustainable Manufacturing

Territorial Differentiation as the Factor of Sustainable Economic Development

Vladimir V. Glinskiy^{a*}, Lyudmila K. Serga^a, Mikhail A. Alekseev^a

^a*Novosibirsk State University of Economics and Management, Kamenskaya st., Novosibirsk, 630099, Russian Federation*

Abstract

The article deals with the issues of assessing the impact of territorial development differentiation on the sustainable growth of the country's economy. The ambiguous effect of this factor is proved in paper. The formation of the state territorial development policy depends on the direction of the influence of the differentiation factor (negative or, on the contrary, stimulating). The authors estimated the dependence of the growth of the country's economy on the territorial differentiation by calculating the integral indicator of the differentiation of the socio-economic development of municipalities by constituent entities of the Russian Federation and assessing the concentration of GRP throughout the country. The typology of the regions of the Russian Federation by the level of differentiation of the regional socio-economic development allowed to determine its threshold, after which differentiation stimulating influence arises.

© 2020 The Authors. Published by Elsevier B.V.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Peer review under the responsibility of the scientific committee of the Global Conference on Sustainable Manufacturing.

Keywords: economic growth, territorial differentiation, regions social and economic development, typology.

1. Introduction

The territory of Russia is so vast that regions of the country really differ in environmental, geographical and resource conditions, which in turn influence their peculiarities and differences in social and economic development. Such variation in the development of economy of the territories of the country is known as differentiation.

The problems of differentiation of social and economic systems, its certain components and aspects, as well as its destimulative influence on economic development were studied by S.V. Baranov, K.P. Glushchenko, Yu.S. Zaitseva, E.N. Kataev, E.A. Kolomak, E.A. Konopatskaya, B.L. Lavrovsky, M.V. Moroshkina, E.A. Pogodina, T.P. Skufyina and others. [1, 2, 3, 4, 5, 6, 7, 8]

* Corresponding author. Tel.: +7-913-396-7617; fax: +7-383-243-9494.

E-mail address: s444@ngs.ru

Development of any system is possible only if there are differences in the development of its components. [9, 10, 11, 12, 13] Thus, a certain level of differentiation of social and economic system¹ is useful since it facilitates general development by creating some spatial competitiveness or tension. However, the strengthening of regional differentiation creates problems for carrying out effective state policy relating to the leveling of social and economic development of the regions of the country and approximation of their characteristics to the levels of more developed territories. As a result of the flow of capital and working population from poor regions to rich ones there is a higher risk of regional crises and interregional conflicts, so differentiation in this case destimulates the development and it has to be lowered.

So, there is a dilemma: is differentiation an impetus or deterrent of economic growth, and, accordingly, should it be lowered or raised? In order to solve the dilemma we consider it necessary to study the relationship between the level of territorial differentiation of economy and per capita of the Gross Regional Product (GRP) accession rate², which can serve as a characteristic of economic growth. Proofless statements of some authors about “excessive” differentiation of social and economic development of the regions of the Russian Federation actualize the issue of marking out such regions where differentiation is some deterrent of its economic growth.

2. Research methodology

The following procedure is offered to solve the problem: the level of differentiation of social and economic development of the territories of the Russian Federation for series of years is estimated using the Gini coefficient, calculated on the basis of comparison of GRP distribution and population size by constituent entities. In this case the Gini coefficient shows the degree of deviation of actual distribution of the produced GRP from absolutely even distribution of its production between the regions of the country. From 2010 to 2016, the differentiation has not changed (Fig. 1).

The Lorenz curve regarding the volume of produced GRP by the constituent entities of the Russian Federation in 2010 and 2016 was plotted to characterize the degree of differentiation of economic development of the constituent entities of the Russian Federation.

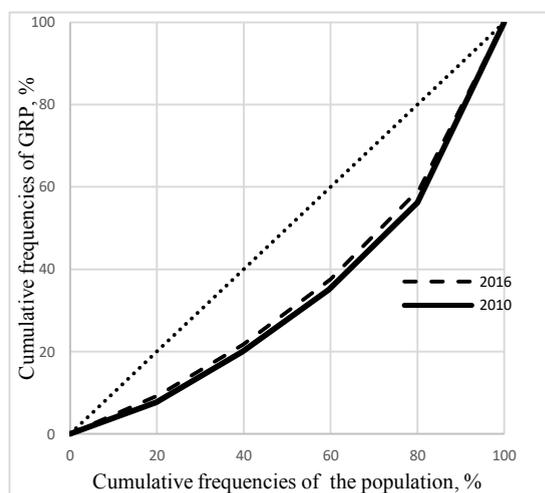


Fig. 1. The Lorenz curve regarding the inequality of production of GRP by the constituent entities of the Russian Federation in 2010 and 2016 (based on [14]).

¹ The calculation of the level of differentiation of the social and economic system is described in detail in (V.V. Glinskiy, L.K. Serga, A.M. Bulkina, 2016).

² Gross Regional Product is an indicator-analogue of Gross Domestic Product, which is calculated by the constituent entities of the Russian Federation.

For this purpose all constituent entities of the Russian Federation were preliminarily ranged by the level of per capita GRP and cumulative frequencies of the population and GRP by the constituent entities of the Russian Federation were defined.

The deviation of the curve from even distribution in 2016 is slightly less than in 2010, so the degree of differentiation of the regions is being lowered faintly. The Gini coefficients for 2010-2016 were calculated to observe the degree of inequality over time (Table 1).

Thus, it may be concluded that differentiation of the regions for the period under review was lowered by 4.3%, it was slightly increased only in 2016, getting back to the level of 2013. However, in general these fluctuations can be considered non-significant since variation of the Gini coefficient from year to year is within σ .

One can also see direct close relationship between the Gini coefficient and the growth rate of per capita GRP (Table 1), since the correlation coefficient between them is 0.847.

Thus, it is fair to say that inequality of the social and economic development of the regions countrywide is a motivating factor of economic growth. However, it is necessary to define whether any level of differentiation is a motivating factor.

The main methodologies of the study of differentiation include: methods of typology, dispersion and correlation and regression analysis [15, 16, 17, 18, 19, 20].

Table 1. Gini coefficient and growth rate average per capita GRP in the Russian Federation in 2010-2016 (based on [14])

Year	Gini coefficient	Growth rate of per capita GRP, as % of the previous year
2010	0,3133	-
2011	0,3123	20,4
2012	0,3004	10,0
2013	0,2998	8,4
2014	0,2993	9,4
2015	0,2963	11,1
2016	0,2997	5,3

[Note: done by the authors].

Since differentiation is stratification of the observation units by level of the factor under study, typologization makes it possible to mark out their certain groups and dispersion analysis reveals the significant difference between them.

3. Regional typology according to the level of intraterritorial differentiation

The authors estimated the level of intraterritorial differentiation of municipal districts of 76 out of 82 constituent entities of the Russian Federation on the basis of the decile coefficient of differentiation according to the methodology presented in [16, 21] for 2013-2015, upon which the distribution of the constituent entities of the Russian Federation was obtained and their typologization was made.

Figure 2 demonstrates the matrix of portfolio analysis of constituent entities of the Russian Federation, made in coordinates of the level of intraterritorial differentiation of social and economic development and per capita GRP accession rate [17].

The critical points of formation of the types of the constituent entities of the Russian Federation in the matrix are: along the OX axis – 1.0 (if the correlation of the level of intraterritorial differentiation of the constituent entity in 2015 is equal to the level of differentiation in general across the Russian Federation); along the OY axis – 11.1% (per capita GRP accession rate in general across the Russian Federation in 2015 against 2014).

The analysis of the matrix indicates aggregation of the constituent entities in the group with low level of differentiation and high GRP accession rate.

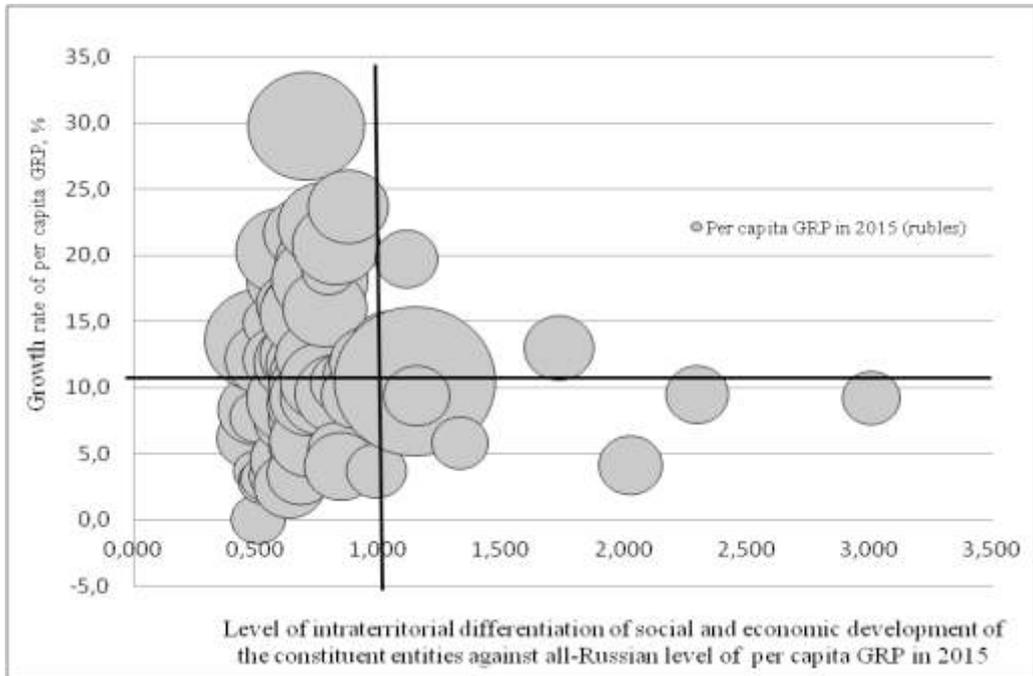


Fig.2. Matrix of the constituent entities of the Russian Federation in coordinates against the level of intraterritorial differentiation and economic growth rate in 2015 [Note: done by the authors].

Joint use of the methods of typology and correlation and regression analysis makes it possible to solve the issue of estimation of the level of destimulative differentiation of the social and economic development (Fig. 3).

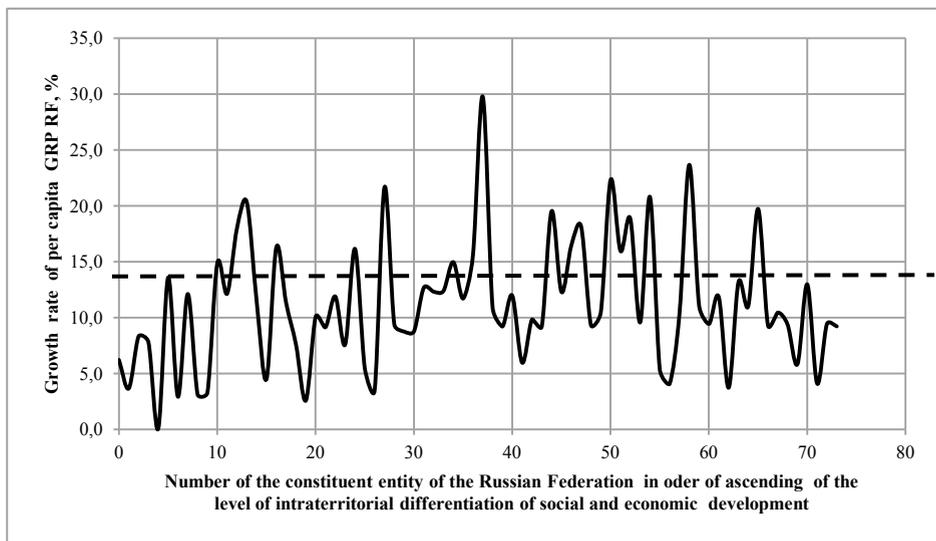


Fig. 3. Growth variability curve by the constituent entities of the Russian Federation in 2015 [Note: GRP accession rate in general across Russia is marked at the level of 11.1%].

The dependence of chain per capita GRP accession rate in comparable prices (of economic growth) on the level of intraterritorial differentiation was estimated using regression analysis (Fig. 4). Selection of the theoretical model of dependence on the basis of maximum determination coefficient made it possible to mark out the optimum model of polynomial of degree five:

$$y = 0,0902x^5 - 2,0375x^4 + 17,4820x^3 - 70,4920x^2 + 130,7600x - 76,6180 \quad (1)$$

$$R^2 = 0,1354$$

where y is per capita GRP accession rate of the constituent entity of the Russian Federation;
 x is the level of intraterritorial differentiation of the social and economic development of the constituent entity of the Russian Federation.

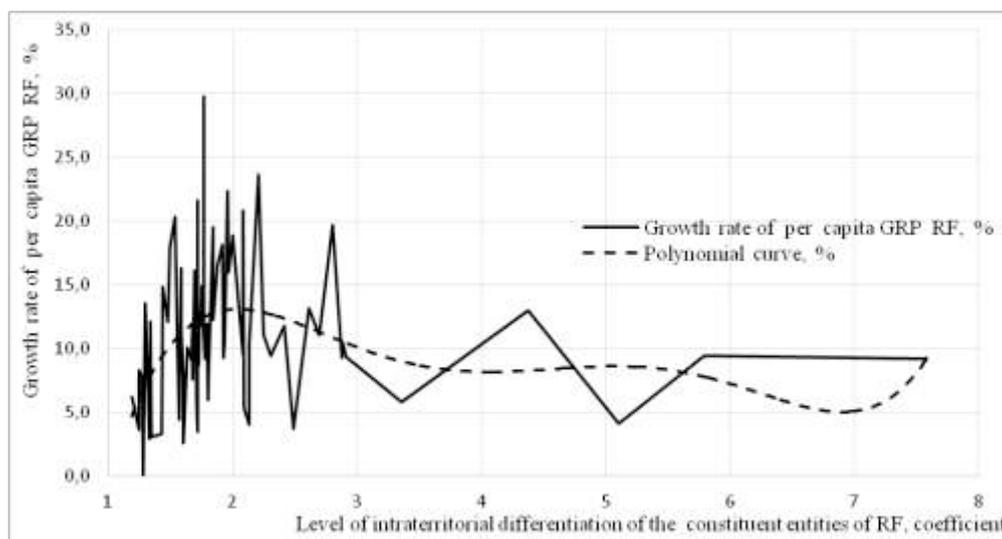


Fig. 4. Correlation between per capita GRP accession rate and level of differentiation in 2015.

In accordance with the model y takes maximum value when $x = 2.001$.

Table 2. Grouping of the constituent entities of the Russian Federation by the level of intraterritorial differentiation of municipal districts in 2015.

Level of intraterritorial differentiation	Number of units	Constituent entities of the Russian Federation	Correlation coefficient
2.001 and below	53	Jewish Autonomous Okrug, Chechen Rep., Krasnodar kray, Dagestan Rep., North Ossetia – Alania Rep., Sakha (Yakutia) Rep., Tyva Rep., Novosibirsk Region, Kabardino-Balkar Rep., Karachay-Cherkess Rep., Stavropol kray, Kemerovo Region, Rostov Region, Kamchatka Region, Rep. Adygea, Rep. Bashkortostan, Penza region, Rep. Kalmykia, Rep. Khakassia, Omsk Region, Samara Region, Rep. Komi, Belgorod region., Rep. Altai, Tula region, Zabaikalsky kray, Volgograd region, Chelyabinsk region, Altai kray, Rep. Buryatia, Astrakhan region, Lipetsk region, Vladimir region, Rep. Tatarstan, Udmurt Rep., Primorsky kray, Arkhangelsk region., Magadan region, Rep. Karelia, Ulyanovsk Region, Bryansk Region, Orenburg Region, Sverdlovsk Region, Perm kray, Amur Region, Voronezh Region, Orel Region, Krasnoyarsk kray, Irkutsk Region, Khabarovsk kray, Murmansk Region, Moscow Region, Ivanovo Region	0.447
Above 2.001	21	Tomsk Region, Leningrad Region, Kurgan Region, Kaluga Region, Saratov Region, Vologda Region, Kirov Region, Nizhny Novgorod Region, Novgorod Region, Rep. Mordovia, Yaroslavl region, Tambov region, Rep. Mariy El, Ryazan Region, Tyumen Region, Smolensk Region, Chuvash Rep., Kursk Region, Tver Region, Kostroma Region, Pskov Region	-0.192

Thus, the level of differentiation equal to 2.001 is a border (point) of the typology of the constituent entities of the Russian Federation by 2 groups (Table 2):

- constituent entities where economic growth is stimulated by differentiation of the social and economic development (correlation coefficient (r) is equal to 0.447);

- constituent entities where high level of differentiation destimulates economic growth ($r = -0.192$).
It is necessary to form their own strategy of further development for each group of the constituent entities.

Summary

The results of the study prove the hypothesis of influence of territorial differentiation of the social and economic development of the constituent entities of the Russian Federation on per capita GRP accession in the region. At that, differentiation with the level below 2.001 is an impetus, otherwise it is a deterrent of economic growth of Russia.

State and regional executive authorities can use the results of this study when they make management decisions and develop strategies for the socio-economic development of individual regions of the Russian Federation.

References

- [1] S.V. Baranov, T. P. Skuf'ina, Comparative dynamics of economic growth and interregional differentiation of the territory of the Russian North [Sravnitel'naja dinamika jekonomicheskogo rosta i mezhregional'naja differenciacii territorii rossijskogo Severa], *Voprosy statistiki*, 11 (2015) 69-77.
- [2] K.P. Glushhenko, On the evaluation of inter-regional inequality [Ob ocenke mezhregional'nogo neravenstva], *Prostranstvennaja jekonomika*, 4 (2015) 39-58.
- [3] Ju.S. Zajceva, Interregional differentiation in the BRIC countries: assessment possibilities [Mezhregional'naja differenciacija v stranah BRIK: vozmozhnosti ocenki], *Mirovaja jekonomika i mezhdunarodnye otnoshenija*, 5 (2010) 44-51.
- [4] E.A. Kolomak, Interregional Inequality in Russia: Economic and Social Aspects [Mezhregional'noe neravenstvo v Rossii: jekonomicheskij i social'nyj aspekty], *Prostranstvennaja jekonomika*, 1 (2010) 26-35.
- [5] E.A. Konopackaja, Differentiation of regions of the Russian Federation by the level of human capital development [Differenciacija regionov Rossijskoj Federacii po urovnju razvitiya chelovecheskogo kapitala], *Jekonomika, statistika i informatika. Vestnik UMO*, 2 (2011) 178-184.
- [6] B.L. Lavrovskij, Territorial differentiation and approaches to its weakening in the Russian Federation [Territorial'naja differenciacija i podhody k ee oslableniju v Rossijskoj Federacii], *Jekonomicheskij zhurnal Vysshej shkoly jekonomiki*, 4, V.7 (2003) 524-537.
- [7] M.V. Moroshkina, Interregional Differentiation of the Subjects of the Russian Federation [Mezhregional'naja differenciacija sub#ektov Rossijskoj Federacii], *Jekonomicheskij analiz: teorija i praktika*, 45 (2014) 20-26.
- [8] E.A. Pogodina, E.N. Kataev, Assessment of the level and depth of differentiation of the economic and social development of the regions of the Volga Federal District [Ocenka urovnja i glubiny differenciacii jekonomicheskogo i social'nogo razvitiya regionov Privolzhskogo federal'nogo okruga], *Nacional'nye interesy: priority i bezopasnost'*, 21 (2014) 30-37.
- [9] Y.F. He, C.P. Chen, R.J. Chou, The Key Factors Influencing Safety Analysis for Traditional Settlement Landscape, *Ustainability*, Vol. 11, Iss. 12 (2019) 3431. DOI: 10.3390/su11123431
- [10] M. Salahuddin, J. Gow, Effects of energy consumption and economic growth on environmental quality: evidence from Qatar, *Environmental Science and Pollution Research*, Vol. 26, Iss. 18 (2019) 18124-18142. DOI: 10.1007/s11356-019-05188-w
- [11] V.N. Borisov, O.V. Pochukaeva, Investment and Innovative Technological Efficiency: Case Study of the Arctic Project, *Studies on Russian Economic Development*, Vol. 28, Iss. 2 (2017) 169-179.
- [12] V.N. Borisov, O.V. Pochukaeva, Relationships Between Development Factors of the Arctic Zone of the Russian Federation, *Studies on Russian Economic Development*, Vol. 27, Iss. 2 (2016) 159-165.
- [13] V.F. Minakov, O.S. Lobanov, T.A. Makarchuk, T.E. Minakova, N.M. Leonova, Dynamic management model of innovations generations, *Proceedings of 2017, 20th IEEE International Conference on Soft Computing and Measurements, SCM (2017)* DOI:10.1109/SCM.2017.7970743
- [14] <http://www.gks.ru>
- [15] V.V. Glinskiy, L.K. Serga, On the issue of the prospects for the development of small business in Russia [K voprosu o perspektivah razvitiya malogo predprinimatel'stva v Rossii], *Sibirskaja finansovaja shkola*, 6(71) (2008) 3-6.
- [16] V.V. Glinskiy, L.K. Serga, A.M. Bulkina, Differenciacija municipal'nyh obrazovanij kak faktor jekonomicheskogo razvitiya territorij [Differenciacija municipal'nyh obrazovanij kak faktor jekonomicheskogo razvitiya territorij], *Voprosy statistiki*, 8 (2016) 46-52.
- [17] L.K. Serga, M.I. Nikiforova, E.S. Rumynskaja, M.S. Hvan, Applied use of portfolio analysis methods [Prikladnoe ispol'zovanie metodov portfel'nogo analiza], *Vestnik NSUEM*, 3 (2012) 146-158.
- [18] V. Glinskiy, L. Serga, M. Khvan, K. Zaykov, A Spatio-Dynamic Modelling of Environmental Safety of the Russian Federation Regions, *Procedia Manufacturing*, 8 (2017) 315–322.
- [19] V. Glinskiy, L. Serga, K. Zaykov, Identification Method of the Russian Federation Arctic Zone Regions Statistical Aggregate as the Object of Strategy Development and a Source of Sustainable Growth, *Procedia Manufacturing*, 8 (2017) 308-314.
- [20] V. Glinskiy, L. Serga, M. Khvan, K. Zaykov, The Assessment Methods of the Level of Countries Environmental Safety, *Procedia Manufacturing*, 21 (2018) 494-501.
- [21] V. Glinskiy, L. Serga, A. Novikov, G. Litvintseva, A. Bulkina, Investigation of Correlation between the Regions Sustainability and Territorial Differentiation, *Procedia Manufacturing*, 8 (2017) 323-329.