

## Evaluation Method Development for Regional Economies Competitiveness

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### Abstract

*In the present article an evaluation method for regional economies competitiveness has been developed on the basis of World Economic Forum methodology for national competitiveness level evaluation. As a result of three-dimensional modeling, authors created economy competitiveness maps for Volga Federal District in industrial and innovative formats. Economy competitiveness maps that itemize the factors, providing their sustainable development, enable evidence for initiatives that increase competitiveness and investment prospects of regional economies key sectors. Obtained heteromorphic ratings of competitiveness identify competitive advantages and development barriers of regional economies.*

**Keywords:** *Global Competitiveness Index, sustainable development, competitiveness of the regional economy, competitiveness factors, innovation.*

### 1. Introduction

A significant part of modern studies of regional economies global competitiveness and its determinants is based on the theory of competitive advantages by M. Porter [1-7]. Thereafter his theory has been developed in other multiple works where national economies competitiveness is being considered taking into account human capital assets level, institution development, macroeconomic stability, efficient management, market efficiency [8, 9, 10, 13]. New consideration of this issue has been reflected in the World Economic Forum methodology (hereafter – methods) of global competitiveness rating formation [14]. Methods are based on generalized evaluation of Global Competitiveness Index (GCI) that integrates institutional, microeconomic and macroeconomic aspects of economic growth sustainability in midterm [15].

### 2. Method

According to Methods, aggregative factors are divided into three groups.

The first group. Basic requirements: quality of institutions, infrastructure, macroeconomic sustainability, health and primary education.

The second group. Efficiency multipliers: higher education and vocational training, goods and services market efficiency, labour market efficiency, financial market development, technological development level, internal market size.

The third group. Factors of innovations and business competitiveness: competitive capacity of enterprises, innovative capacity.

Value of competitiveness factor special weights during the *GCI* evaluation with three groups of factors defines the state economy development stage. Basic requirements are significantly important for less developed (factor) economies. For efficient economies that transfer from a traditional factor growth model to an innovative model, efficiency multipliers factors are mostly important. Innovation capacity and enterprise competitiveness are important for innovation economies. That is why during the *GCI* evaluation, factor groups specific weights may vary depending on national economy development stage that is defined with a weighted mean arithmetic formula. GDP per capita value is used to divide economies according to development stages.

We presuppose that Methods versatility stipulates its high implementation performance not only on a national economy level but also on a distinct region level. To prove that we will analyze the results of implementation of its derivative version that was used to create a competitiveness map of Volga Federal District (hereafter- VFD) that is currently on the second stage of development.

Due to a lack of correspondence between statistical data panels provided in Russian statistical books and ones

used by World Economic Forum for GCI evaluation according to basic requirements, there are *specific parameters* of basic factors in our computations:

- for "infrastructure" we used the density index of general-purpose hard-surfaced highways;
- for "health and primary education" – expected lifetime at birth;
- for "macroeconomic sustainability" - an index that is opposite to a consumer price index.

Indices used for the first three basic factors almost completely correlate with the Methods parameters. The most complicated choice was made to find an applicable parameter for an "institution" factor. Chosen indices for an "institution" basic factor were brought together in a general institutional index that is calculated with a weighted mean arithmetic formula. Then we performed an actual values natural norming for each factor with a method used for Human Development Index estimation that is based on a usage of line scales of factor actual values transformation in multiple true values of given data with a creation of subscript for each factor:

$$\text{Factor subscript} = (X - X_{\min}) / (X_{\max} - X_{\min}), (1),$$

where  $X$  is a factor actual value;  $X_{\min}$  and  $X_{\max}$  are minimal and maximum values of that factor according to concerned data sample, respectively.

Integral indices for groups of factor given values were estimated additively. The evaluation of efficiency multipliers was performed according to four factors.

The first one. Higher education and vocational training were calculated according to the proportion of students, who study in educational establishments of higher vocational education, in the population structure.

The second one. The labour market efficiency was calculated according to a proportion of people involved in economy from the total number of gainfully occupied population.

The third one. The technological development level was calculated according to a number of personal computers with an Internet connection per 100 employees (pieces).

The fourth one. The size of internal market is defined according to actual ultimate household consumption on a territory of Russian Federation constituent entities.

Norming of the factor values in the third group was performed with the following indices: the number of researchers per capita, expenses associated with the research, the number of created high production technologies.

On the basis of the received group integral indices, consolidated index of economies competitiveness was defined for VFD regions and a three dimensional competitiveness map of VFD was created according to the following quality formats:

- industrial economy competitiveness format;
- innovative economy competitiveness format.

Economy competitiveness evaluation of a constituent entity of Russian Federation is presented the following way  $R = (X, Y, Z)$ ,  $R \in P^3$  on a three dimensional competitiveness map  $P^3$ .

Positioning data of economy competitiveness image on the map may be interpreted as components of multidimensional term of regional competitiveness, attitude position of that image is defined with integral indices values:

- in industrial format: efficiency multipliers and basic factors, image shape size - the summary index of competitiveness value, that are significant for economies that are on the second stage of development;
- in innovative format: efficiency multipliers and innovative factors, image shape size - consolidated competitiveness index value, that are significant for economies that transfer from the second to the third stage of development (table 1).

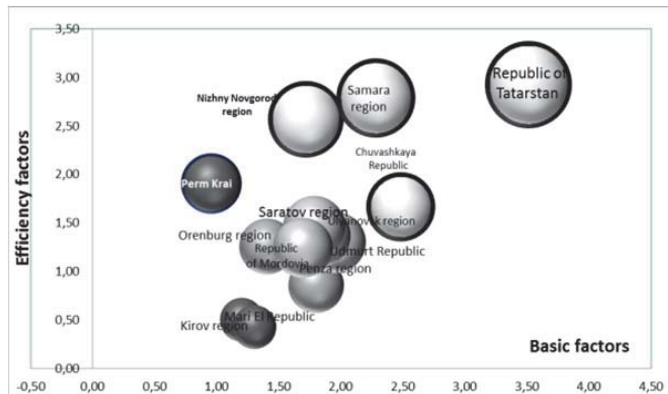
### 3. Results

Three clusters are the result of three dimensional modeling in industrial format of economy of Russian Federation constituent entities forming VFD (Fig. 1). The first cluster is formed with: Republic of Tatarstan, Samara region, Nizhny Novgorod region, Republic of Bashkortostan and Chuvashkaya Republic. These Russian Federation constituent entities are notable for their high values of efficiency multiplier factors. Among the most important competitive advantages of regional economies of that cluster are quality of living and human potential. Strategic policy to increase the quality of living in that constituent entities of Russian Federation is supported with scales of production, the products of which are meant to be consumed by the population.

**Table 1:** Consolidated competitiveness index evaluation of VFD regions in 2012

	Basic factors	Specific weight	Efficiency factors	Specific weight	Factors of innovations	Specific weight	The calculated index of competitive strength
Republic of Bashkortostan	2,01	0,4	1,62	0,5	0,37	0,1	1,65
Mari El Republic	1,20	0,4	0,51	0,5	0,00	0,1	0,73
Republic of Mordovia	1,80	0,4	0,86	0,5	0,30	0,1	1,18
Republic of Tatarstan	3,51	0,4	2,93	0,5	0,93	0,1	2,96
Udmurt Republic	1,95	0,4	1,30	0,5	0,15	0,1	1,45
Chuvashkaya Republic	2,48	0,4	1,67	0,5	0,28	0,1	1,85
Perm Krai	0,96	0,4	1,91	0,5	0,93	0,1	1,43
Kirov region	1,30	0,4	0,43	0,5	0,10	0,1	0,75
Nizhny Novgorod region	1,72	0,4	2,57	0,5	3,00	0,1	2,27
Orenburg region	1,40	0,4	1,26	0,5	0,17	0,1	1,21
Penza region	1,83	0,4	1,37	0,5	0,54	0,1	1,47
Samara region	2,28	0,4	2,79	0,5	1,41	0,1	2,45
Saratov region	1,78	0,4	1,46	0,5	0,68	0,1	1,51
Ulyanovsk region	1,69	0,4	1,25	0,5	0,76	0,1	1,38

The second cluster contains Saratov region, Republic of Mordovia, Penza region, Udmurt Republic, Orenburg region, Ulyanovsk region. Constituent entities of that cluster form an intermediate belt of basic factors and efficiency multipliers factors with not significantly different values.



**Fig. 1.** VFD competitiveness map in a format of industrial quality

The third cluster has been formed with the weakest constituent entities of Russian Federation according to basic factors and efficiency multipliers factors values: Perm Krai, Kirov region and Mari El Republic. With no doubts the economy of Republic of Tatarstan became a leading one on a VFD industrial competitiveness map with its maximum value of composite competitiveness rating.

#### 4. Conclusions

This result is not accidental. Economy growth rate of Tatarstan is larger than an average economy growth rate in Russia. Among the main competitive advantages of Republic of Tatarstan are high industrial capacity, developed fuel-and-power and academic complexes, beneficial geographical position, significant stock of mineral raw resources and recreation resources availability. However, economy of the republic is weaker than some other VFD regions' from the innovative

development point of view what is shown on a competitiveness map that is performed in a "innovative quality" format.

Innovative competitiveness map organization in the suggested Methods is based on a usage of standard measures that provide quantitative evaluation of innovative development and scientific research level in regional economies, specifically the number of researchers per capita, expenses associated with the research, the number of created high production technologies [11, 12].

In general the VFD economy is getting closer to a World Economic Forum quantitative criterion - gross regional product per capita, of standard countries that are on the transfer stage to innovative development stage. However its forming regions show different ability to make this transfer with different present innovative capacity of their economies, dynamics and innovative processes results.

VFD competitiveness map, made in a format of "innovative quality" (Fig. 2), shows that Nizhny Novgorod region takes the first place in the District with a significant breakaway. According to innovative development level this region outstrips other regions of that district. One of the most important competitive advantages of the region is educational and innovation infrastructure (Russian centers of automobile and aircraft construction, shipbuilding instrument making industry, nuclear physics, defense industry).

Consideration of interregional competitiveness effects during the social economic development strategy implementation in Volga Federal District in the period of time till 2020 can result in innovation and productivity growth in each constituent entity of Russian Federation that is a part of VFD. That finally can increase the innovative homogeneity of its territories. National innovation policy implementation allows balancing the present inequalities in innovative development levels and forming of conditions for synergistic effect implementation. Successful experience of Nizhny Novgorod region may be used as efficient model of innovation movement of VFD regions.

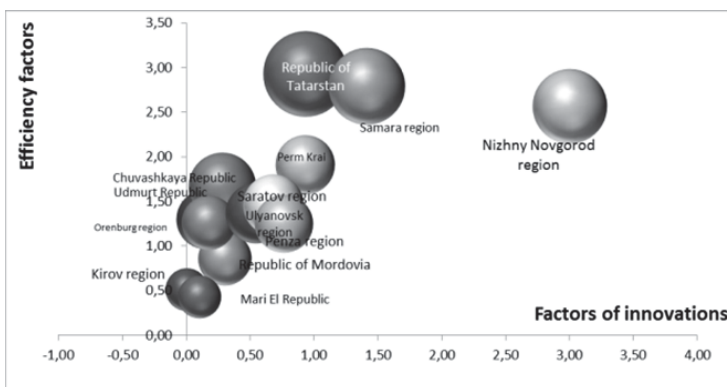


Fig. 2. VFD competitiveness map in a format of innovative quality

To cover this gap in development reaching Nizhny Novgorod region level, other VFD constituent entities of Russian Federation including Republic of Tatarstan need to implement diversification programs that are aimed at dominance of science- technology-consuming production that is based on its technological modernization and also on stimulation of innovative business activity. Lack of innovation capacity that limits the innovative competitiveness level growth of their economies is a threat to modernization development of VFD regions.

Innovation capacity accumulation is always accompanied with investment outlay increase that results in economy growth deceleration and economic efficiency reduction of invest capital. That is the reason why structural and technological reforms of regional economies renewals will be accompanied with economic growth rate decrease at first. That is the price that they have to pay for their ability to adapt to new standards of competitiveness. Region competitiveness maps will help to arrange initiatives to decrease the expenses for that adaptation, to increase the international competitiveness and investment prospects of economy key sectors . These maps allow specification of factors that provide sustainability of distinct regions.

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